UNIVERSITY OF SOUTHAMPTON

A MAN OR A MOUSE?
Developing Effective Teaching using Technology for Distance Education, An Evaluative Study

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Introduction

Chapter 1

Introduction

This thesis focuses upon the construction, implementation and evaluation of a distance education course. The title of this course was 'Environmental Awareness' and is referred to in this document as the 'EA course'. The overall purpose of this research is to explore some of the issues relating to the use of technology for distance education within a European context. The provision of a distance education course is an ongoing, developmental process. This process involves course construction, followed by its practical implementation and subsequent adaptation. The adaptation of the course is based upon an ongoing evaluation of all aspects of the course development. The diagram below represents this developmental approach:

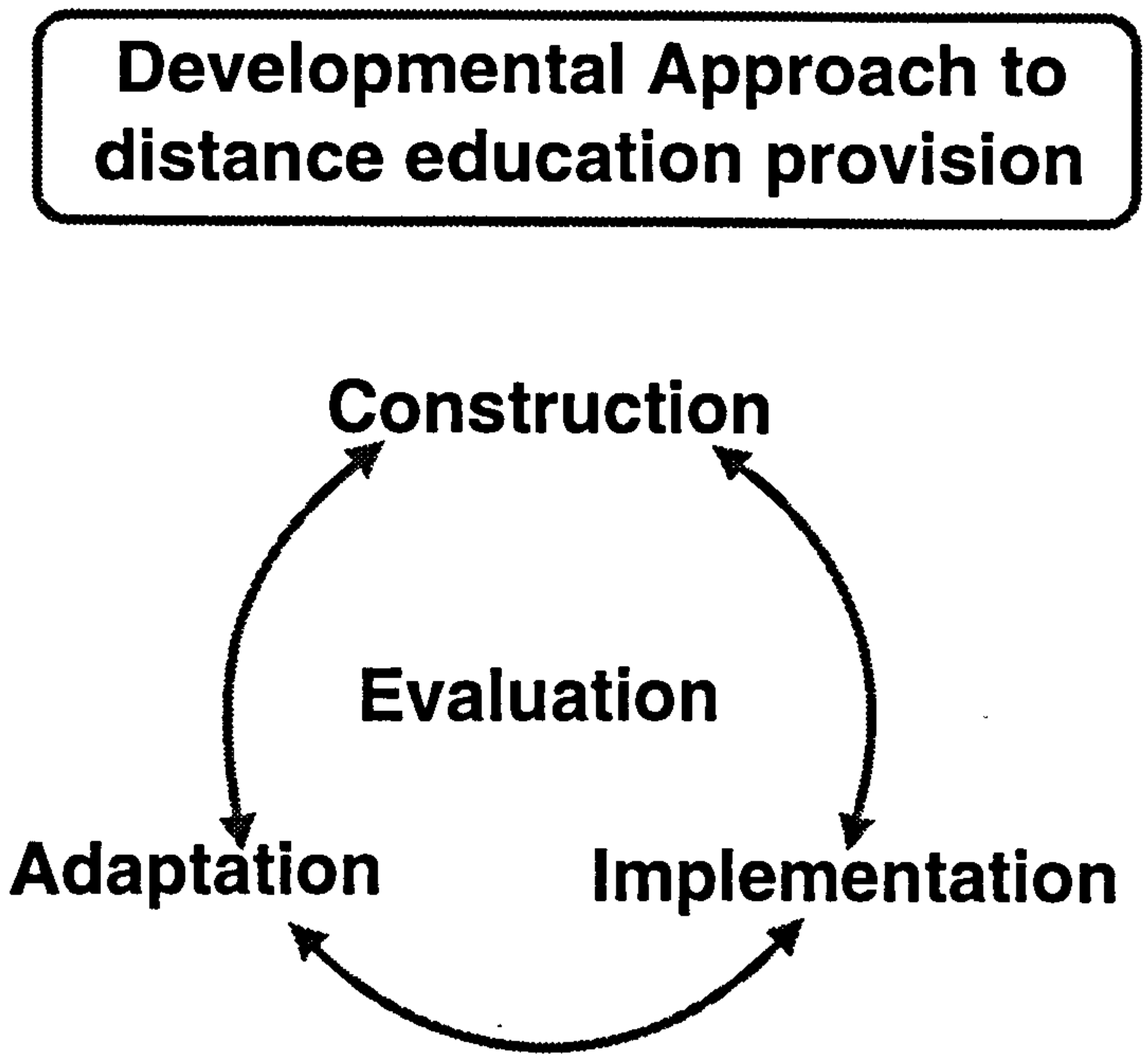


Figure 1: Developmental approach to distance education provision

Aims, objectives and outcomes

This thesis represents a single cycle of the evaluation process. Within this research it is possible to identify specific research aims and, associated with these aims, specific objectives and outcomes.

Aims

- To design and implement an effective distance education course.
- To construct measuring instruments to evaluate successful distance education in the context of the EA course.
- To evaluate the success of the course.

Objectives

- Identify, through case study evaluation of appropriate previous distance training courses and the study of educational principles, issues to be addressed when constructing the EA course.
- Derive, by addressing these issues, teaching strategies for delivering the EA course.
- Construct the EA distance training course to implement these teaching strategies.
- Implement this course in a real life situation using 'multi-media technology'.
- Perform an evaluative study of the EA course.

Outcomes

- A set of principles to form the 'primary knowledge base' for distance education using multimedia technology. These issues will be derived through consideration of past distance education case studies.
- Derive, from an evaluation of the EA course, reasoned recommendations for those interested in either delivering or evaluating a distance education course. These recommendations are named the 'secondary knowledge base' of distance education using multimedia technology.

The research structure

This thesis represents a single cycle within the ongoing process of constructing and adapting distance learning courses. In order to benefit from experience gained in the past, the EA course was constructed by a preliminary examination of past case studies. The diagram below indicates the elements within the construction, implementation and evaluation of the EA course.

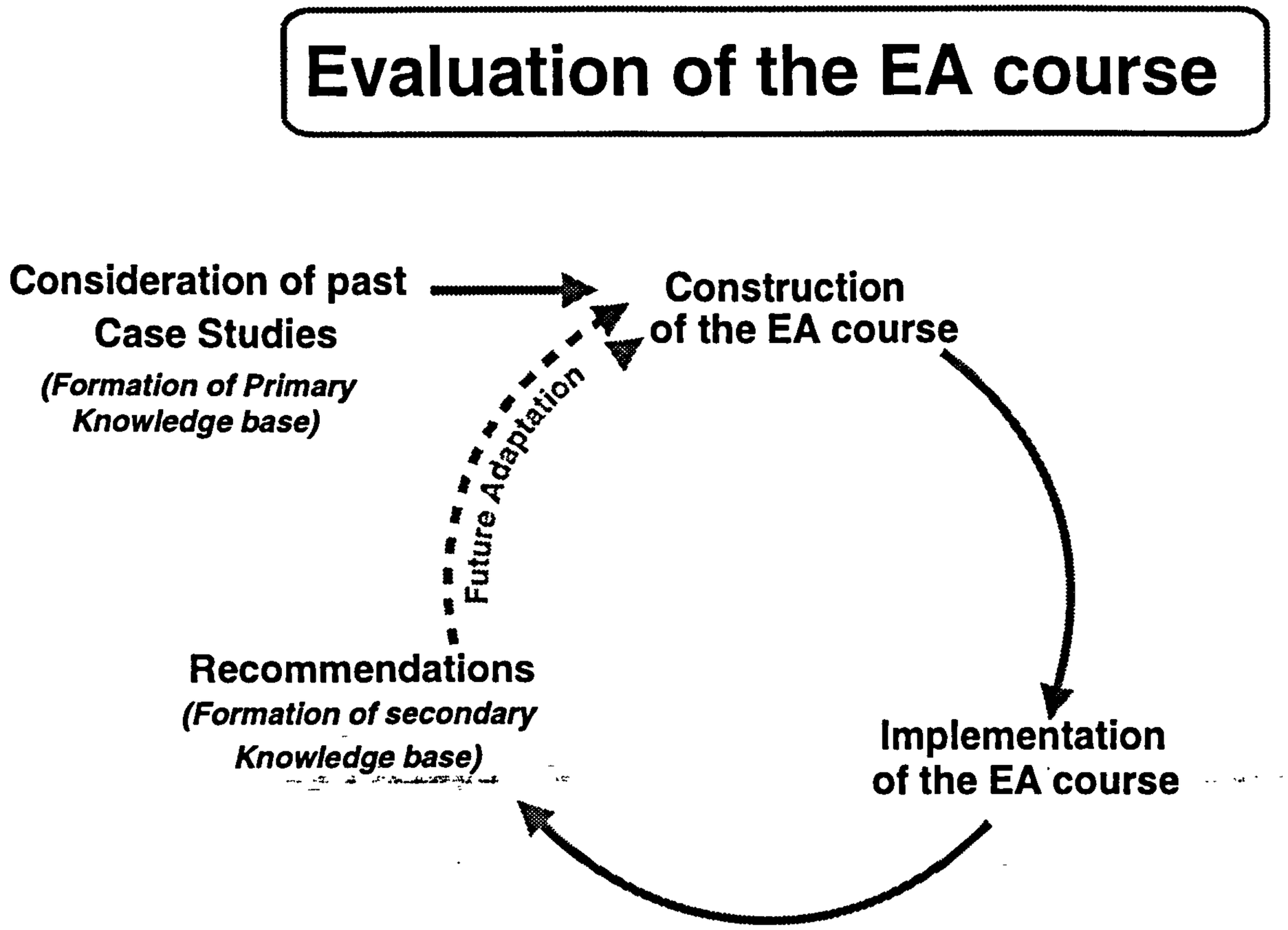


Figure 2: Developmental evaluation of the EA course

The initial phase of constructing the EA course was based upon consideration of issues derived through case study evaluations of past courses (the primary knowledge base). The subsequent implementation and evaluation of the EA course aimed to provide an enhanced framework of issues for future course provision and evaluation (the secondary knowledge base). It is hoped that the secondary knowledge base will thereby take a step forward in the process of adaptation of further distance education courses.

An overview of this thesis

This introduction aims to provide an overview of this thesis, introduce the researcher and establish concepts and terminology used.

The rationale section (Chapter 2) aims to establish why research in this field is necessary. Following this, the general principles of 'effective learning' and 'educational evaluation' are considered in relation to distance education. The next section of this thesis (Chapters 3&4), 'Constructing the course and its evaluation (General principles)', considers these issues, in turn forming the context for the work which follows.

Having established a basic understanding of the concepts of effective learning and educational evaluation, the next section (Chapter 5) 'Learning from the Past', aims to identify the issues considered when constructing the EA course. It begins with a historical overview of distance education. This discusses the approaches taken by organisations in the past and identifies a formal definition for the term distance education. Three past case study evaluations are then discussed, and their findings are related to the situation of the EA course. These are considered in the context of effective learning and educational evaluation, to identify problem areas (Chapter 6). This section ends with a summary set of issues for consideration when constructing and implementing a distance education course of this nature. This set of issues, 'the primary knowledge base', forms the basis of information used to construct the EA course.

Having established the primary knowledge base, the next section of this thesis (Chapter 7) discusses how these issues were addressed in the construction and implementation of the EA course. Following this, the next section of the thesis (Chapters 8 through 14), 'Evaluating the course', is

concerned with the specific details of the evaluation of the EA course. It begins by relating the general principles of effective learning and educational evaluation, discussed earlier in Chapters 3 and 4, to the specific context of the EA course. Through consideration of these issues the evaluation methods used for the EA course are presented (Chapter 8).

The evaluation of the EA course involved adopting a 'multi-method' approach: the evaluation is made up of many inter-related 'mini' evaluations, each considering various aspects of the course, together providing a cross referenced 'picture' of the whole. For each of the 6 mini evaluations a separate chapter (Chapters 9 - 14) explains the practical method used, followed by the findings obtained and a discussion of these findings. A single chapter summarises the findings of all of the mini evaluations (Chapter 15). It is hoped that this will allow useful comparisons to be made between the findings for each of the mini-evaluations.

The final section of this thesis, the discussion, attempts to use the findings of the research to build upon the issues identified within the primary knowledge base, (Chapter 16). The final part of the discussion presents the 'secondary knowledge base for distance education using multimedia technology'.

The project within which this research took place

This study describes an evaluation of a specific distance training course, the EA course. This course was constructed and delivered as part of DELTA's Multimedia Tele-School (MTS) project, which is outlined below.

Beginning in the 1980's, the European Commission began to coordinate a number of projects to be implemented in a European context which would be of benefit to the European Community. These projects took many forms. Some were designed to improve cooperation between the member states, others were designed to promote economic growth or to offer new opportunities for vocational education and training. One of the EC projects designed to explore the possibilities for providing vocational education and training in a European context was the DELTA project. The DELTA (Developing Learning through Technological Advancement) project was an umbrella term used for a consortium of projects designed to stimulate progress and cooperation in learning technology and its application throughout Europe.

One of the projects within DELTA was the Multimedia Tele-School project. This project was originally to run for three years from 1990 to 1993, though at the time of the writing of this thesis an extension to t
his period was being considered by the Commission. The project's brief was to explore the possibilities for providing vocational distance training courses to companies within Europe using multi media technology. This was to be carried out by a consortium of approximately thirty partner organisations.

Working together, they were to construct and deliver distance training courses to members of companies spread throughout Europe. The project partners would take on one of three roles to achieve this. 'Technology provider' partners were to provide the technology to be used by the 'course providers', whose role it was to either construct or adapt training courses and then deliver them using the technology. The third type of project partner were the 'assessors', their role was to carry out evaluative studies on the courses delivered in order to ensure that they were as cost effective and as 'successful' as possible.

The diagram below indicates the researcher's role in relation to the overall project.

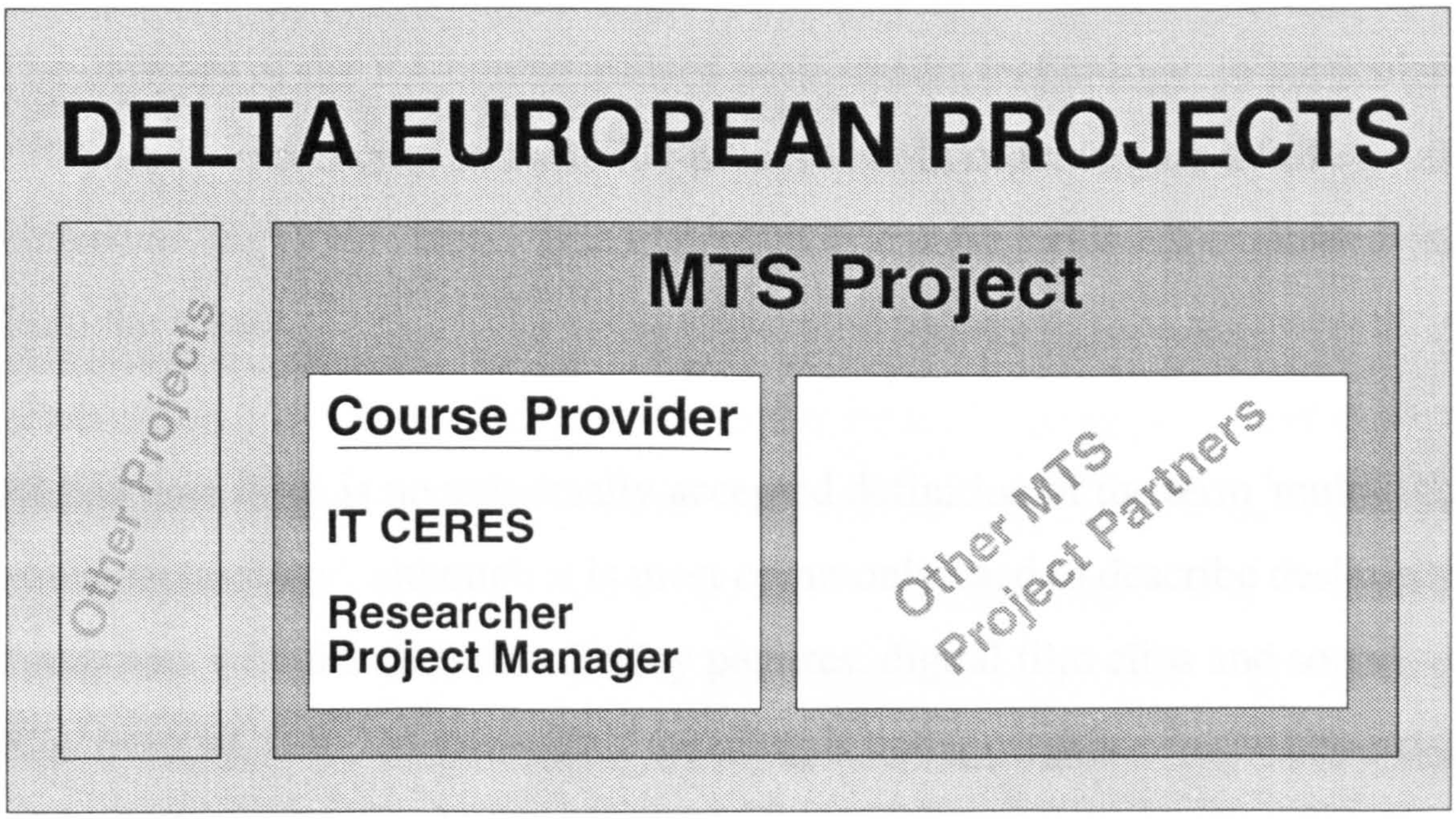


Figure 3: The researcher's role within the context of the evaluation

One of the 'course provider' project partners was based at IT CERES, 'Information Technology Centre for Educational Research in the

Environmental Sciences'. IT CERES is based at the University of Southampton, within the School of Education. The author of this thesis was an employee of the University of Southampton working within IT CERES. His role within IT CERES was that of project manager for the MTS project. As such, he assumed responsibility for constructing and delivering a distance training course on Environmental Awareness using 'multimedia technology', the EA course. The EA course which was evaluated as the main part of this thesis.

Concepts and terminology used within this thesis

The term 'multi-media technology' in this context

The delivery of the EA course utilised multi-media technology, in particular computer conferencing and satellite broadcasts. In order to gain a full understanding of this thesis, it is important that these terms are explained from the outset.

At this time there is no universally accepted definition of the term 'multi-media technology', although it is most commonly used to describe desktop computers with the ability to display pictures, digital film clips and sound files from a CD ROM drive. This meaning is not appropriate in the context of the MTS project or this thesis.

In the context of this thesis, and the MTS project the term 'multimedia technology' is used to describe the technology used to deliver the distance

training courses. This technology is, specifically, computer conferencing and satellite broadcasting.

An overview of computer conferencing

A computer conference system allows people to communicate at a distance by sending and receiving text between a main central computer, or 'host computer', and their personal computer. This is achieved using a modem which converts the computer digital signal to an audio tone, similar to that of a fax machine, which can be sent along a telephone line to the receiving site where it is converted back to a digital signal. Sending text electronically provides the same opportunities as using the postal system, but at the speed of a fax machine.

In addition to simply sending and receiving text, the computer conference allows 'conversations' to take place. The initiator of the 'conversation' sends their text to the host computer; this is stored in the computer's memory bank, and the initial text is referred to as an 'item'. Once an item has been sent to the computer conference, anyone connecting to the system, 'logging on', will be able to read or request the host to send the item to their personal computer, where they can store it to look at later or print it out. Once an item has been examined, it is possible to send a 'response'; this is simply a piece of text which is tagged on to the end of the item along with the respondent's name and the date and time at which it was sent. The next person to log on to the system will see the item and the response, they in turn may add a comment. In this way conversations are possible, with each

comment stored chronologically. A numbering system is used to allow a number of 'conversations' to take place in the same conference, each item is numbered 1,2,3,... while responses to items are numbered with this item number followed by the response number. For example, response 4 to item 2 would be numbered '2.4'; this allows easy reference. A participant may join in the 'conversations' at any time, they simply read what has been said so far and can pick up on points made earlier, add a comment or even start a new conversation. This means that there is no need for a scheduled meeting time for the conversation.

Another important facility provided by the computer conference system is that of setting up the computer conference structure, separate areas of the computer, so that conferences may be set aside for different purposes. This feature was used in the implementation of the EA course, and is discussed later in this thesis (Chapter 7).

Satellite Broadcasts

In simple terms, a satellite broadcast is a television programme which is transmitted via a satellite. The satellite broadcast programmes used for the MTS project were live transmissions incorporating some pre-recorded material. During the programmes the course tutors were in the studio, those involved in the courses, 'the learners,' could then watch the programmes from their remote sites. As the programme proceeded, learners had the opportunity, using the computer conference system, to pose questions to the tutors in the studio. These questions were then answered 'live' during the

programme. In this way the satellite broadcasts were used as pseudo-seminars for the course. Computer conferencing and satellite broadcasting provided the main method of communication between those involved in the EA course.

Having introduced the overall framework for this research, the next section aims to highlight the perceived need for research of this nature.

Rationale

Chapter 2

Why an interest in this area?

This chapter aims to establish a rationale for research into distance education using multimedia technology. Many of the issues raised in the following chapter are areas of concern identified by the European Commission (Fox, 1989). The EC at the present time are supporting a number of projects, such as DELTA, to address these issues.

Why a distance education course?

A rapidly changing world

It is widely understood that Europe is changing in technological, cultural and environmental terms (COMETT Report 388, 1991). As national and political boundaries become weaker and cross-cultural communities larger, many people are finding that they now have to operate in a much wider cultural framework (Potter, 1990). The importance of these issues in relation to education was formally recognised within the Maastricht Treaty on European Union (EC, 1991; articles 126 & 127). These articles of the Treaty indicate that: 'as the European Community continues in its efforts to unify, economically and politically, the different cultures it encompasses, all of its people are having to broaden their horizons in order to fit into the new European framework created' (SATRUNOVA, 1992; p. 7). The following

quotation emphasises the link between this cultural process and education: 'Lifelong learning implies an attitude of mind which recognises that the changing environment we live in requires us to continually update our knowledge and acquire new skills' (De Geest, 1990; p. 4).

> Such changes are not only affecting large organisations such as governments, industries and educational establishments, but also small groups and individuals. As the economic and political barriers continue to be removed, people are feeling the need to adopt a wider perspective to their situation in order to take full advantage of the opportunities that will arise (Potter, 1992). At the present time a number of companies, both large and small, are realising this and trying to prepare for it (Castells, 1993). One important area which transcends these cultural boundaries is that of environmental science. This means that if, for instance, an organisation wishes to promote consideration of environmental issues in their policy formation and working practices, they must, 'do so in a cross-cultural context and involve all those concerned' (Musto, 1989; p. 16).

Technological advancement

It is not only culturally that the world is changing; technology is advancing at an ever increasing rate (Davis, 1992). A preconception often associated with the advancement of technology is that it should take some of the burden from our everyday life (Kay, 1992). This, so far, has not proved to be the case. Technology will often make a process more efficient, so that the people involved are having to work harder than ever before in order to keep

up with it (Leggat, 1993). This contradicts the perception that the introduction of technology into a system will always relieve some of the work load for the individual. Evans (1992) identifies a number of scenarios in which increased demands are made on individuals because of technological advancement. As technology is introduced into a system, the expectation is often that the productivity of that system will be increased. It then follows that, as one organisation adopts the use of technology, the others have to follow suit in order to remain competitive (De Geest, 1990).

Apart from the demands put upon people by the increased efficiency technology brings, there is also the possibility that a process which used to involve a number of people now requires only one. A person who used to work on one part of a production line may now have control of a complete automated process which requires knowledge of all parts (R.L.B., 1992). These factors have a number of implications in terms of the individual's workload and the areas of expertise they require. For instance the machine operator may need to have an understanding of a complete process where before they only needed to know about one aspect of it. They may also need to split their work time between a number of tasks requiring greater time management. To compound these problems, technology itself is an area of rapid change (Stachelsky, 1991).

Any rebellion to the technological advancement means that one gets left behind, branded a stubborn traditionalist who is not 'moving with the times'. Such a situation prompts the remark that, "In an era of advancing technology and changing job requirements, access to vocational education

and training is becoming increasingly important" (Coffey, 1981; p. 15).

Why a course on Environmental Awareness?

Apart from the need for personal development to keep up with technology, there are a number of areas where people's ethics are considered outdated or ill-founded and increasing pressure is being applied for people to change (Neidermeyer & Pariser, 1993). One of the major issues of public concern at the present time is that of the environment (Charter, 1993). Some consider that effective environmental education is vital to ensure the effectiveness of measures taken to address environmental problems (Fox, 1989). Many believe that, in the present climate, pressure is being put on us all to consider the environmental impact of many of the actions we take in our day-to-day lives (Miller, 1991). At the present time, those that are bearing the brunt of this pressure are companies and industries (Oulton & Scott, 1992). It follows that to be effective, industries will need to educate their workers in order to reinforce the changes in environmental policy that they are having to adopt.

The situation outlined is especially relevant to the industrialised countries, particularly those in Western Europe. Continuous personal development after leaving school is probably more important now than ever before (Titmus, 1985). Neil (1981) points out that not only is there a great need for continuing training but less time in which to do it. It is ironic that the situation that puts so many demands on people to train also means that their time is more valuable than ever before, in terms of productivity. Adding to

this the fact that increased competition requires all companies to keep costs down, and one begins to identify the full scale of the problem.

What is needed to satisfy some of today's learning needs?

An optimal solution that provides training in a pan-European context, promoting shared experiences is necessary (De Geest, 1990). It was the intention of the EC that the courses within DELTA's MTS project should aim to highlight the benefits of shared learning across company and country borders. It should also aim to cause a minimal disruption to the learner's day-to-day working schedule. It should keep costs as low as possible. It should be flexible enough to allow for future change. It should be responsive to the learners' needs (DELTA Report, 1992). The EA course represented an attempt to provide such an 'optimal solution'.

Perry, at the Open University's tenth anniversary International conference, was reported to have said during an opening speech,"Almost the only cheap way of doing it (providing effective, vocational learning within a European context) is to use distance learning. It does not require people to go off work and reduce the gross national product; it does not require capital for buildings; it can be done by a very small number of teachers; it is a very attractive way of tackling the problem of continuing education" (Neil, 1981).

The rationale presented above describes a background to why some

perceive a need for distance education using multimedia technology within Europe. If one accepts that there is a need for this form of education, one may also expect that developmental work would be beneficial to further the understanding of such courses. This thesis represents an attempt to explore some of the issues relating to this learning environment.

In order to build upon experiences in the past, consideration of evaluations made on past attempts at distance education courses is necessary. This must be founded on a basic understanding of 'effective education' and 'educational evaluation'. The next section of this thesis considers these two areas, to establish the general principles for the work that follows it.

Constructing the EA course and its evaluation

(General principles)

Chapter 3

Effective Learning in Distance Education

This chapter aims to establish an understanding of the term *effective learning* in the context of distance education. The issues discussed in this chapter are used to provide a basis for discussion of effective learning in relation to distance education courses.

Learning theories relating the use of multimedia communications systems for distance education are less common than those for traditional face-to-face learning, as it is still a relatively new subject (Mason & Kaye, 1990). Initial consideration of the general principles of learning in a wider context is therefore followed by a more focused examination of those related to distance education.

This chapter will begin by consideration of some of the key issues relating to learning. Following this general discussion of learning, a model of the learning event is presented which is then used to discuss the notion of effective learning in general terms. Using this model as a basis, a model for learning using multimedia technology for distance education is constructed, From this latter model the notion of effective learning for distance education is derived, which is intended to provide a framework for the later evaluations of distance education courses.

Identifying a generalised model for learning

Learning may be described as an event or process which is part of development in all living things (Gagne, 1970). There are many influencing factors and possible outcomes to the learning process (Bruner, 1966; Davis, Alexander & Yelon, 1974).

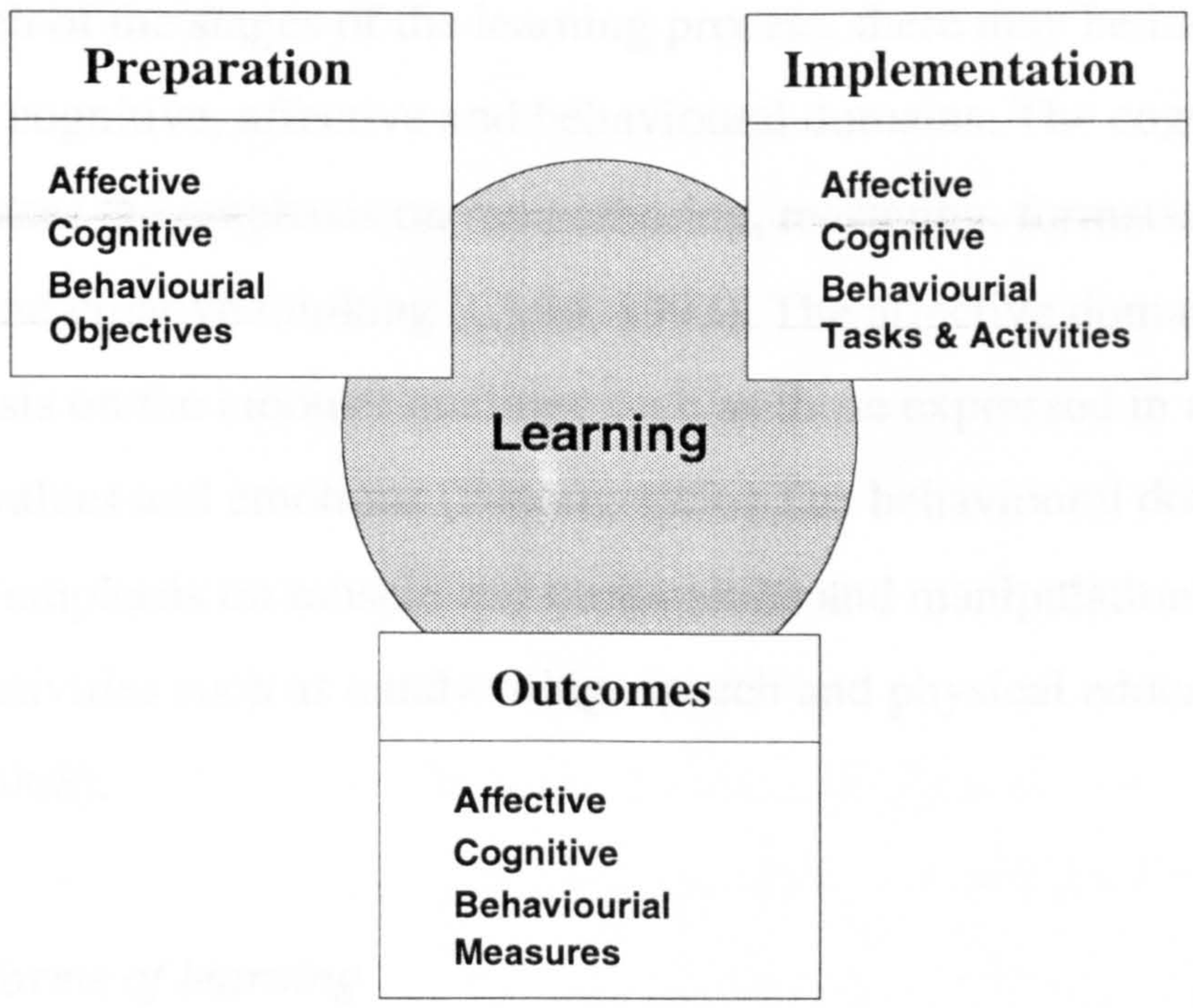


Figure 4: A generalised model of learning

The diagram above (Weare, 1990) represents a generalised model of the learning process. It identifies three stages to the learning process: preparation or planning, implementation and outcomes. The preparation or planning stage represents activities which involve the tutor or learner preparing for the learning event. This may include, for instance; resource

materials, time schedules or discussion for appropriate course content. The implementation stage involves the activities during the learning event, for instance; tutoring, carrying out tasks or private study. The outcomes of the learning event include those changes for the learner or tutor which have been brought about through the learning process. The general outline of the model above is also applicable to distance learning. A distance learning event will have preparation, implementation and outcome stages.

Within each of the stages of the learning process, there may be issues relating to cognitive, affective and behavioural domains. The cognitive domain places the emphasis on remembering, reasoning, formation of concepts and creative thinking (Child, 1993). The affective domain places the emphasis on the emotive qualities such as those expressed in attitudes, interests, values and emotions (Bloom, 1956).The behavioural domain places the emphasis on muscle and motor skills and manipulation in all kinds of activities such as handwriting, speech and physical education (Bruner, 1968).

Different forms of learning

Beard (1970) identifies two basic forms of learning: 'principal' and 'incidental' learning. Principal learning is the process by which one acquires knowledge through formalised teaching. It may occur during discussion, questioning, observation or from experiments. Talking about principal learning, Beard remarks that - "once mastered, they (the concepts, skills etc being taught) are highly resistant to forgetting" (Beard, 1970; p.51).

Incidental learning occurs when a learner gains knowledge without conscious effort. Incidental learning will often take place during interactions with other people: it involves learning through imitation, suggestion and identification. It is often considered difficult to disassociate incidental learning from principal learning (Jones, 1988).

Distance education courses have a strong element of principal learning as they involve instructed learner activities. Incidental learning is also likely due to the learner-learner and learner-tutor interaction which takes place.

The outcomes of any learning process or event may take many forms. The learner may acquire a 'skill' which is transferable to other situations (Stones, 1970). Their understanding of a concept or process may change as they learn more about it. This form of learning is often termed 'cognitive change' (Henle, 1966). Learning may bring about changes in their attitude to certain issues, 'affective change' (Sears, 1966). Combinations of all of these may lead to a change in their 'behaviour' (Patterson, 1977). It is clear that distance learning courses will also have specific outcomes which may fall within any of these domains.

The influence of past experience on learning

Possibilities for effective cognitive development are often controlled by past experiences (Mayer, 1979). Borger & Seabourne (1970) claim that a learning experience will always have an effect on the subject. If the learning experience was profitable, the learner will be able to transfer to new

situations that which they have previously learned (Coles, 1987). Experiments have shown that in general, people will try and force new information to fit previous experiences and knowledge, until they have to relinquish their previous notions in favour of overwhelming evidence to the contrary (Piaget, 1968). The possibility that the distance learning situation may be unfamiliar to the learner means that this is likely to be a factor in the case of the EA course. As a learner acquires new information and skills, they are sometimes said to build a new 'cognitive framework' (Kagan, 1963).

The role of a 'good educator' is therefore firstly to identify the learner's preconceptions, their 'cognitive framework'. Through negotiation the educator should then build on this until the required understanding is achieved, thus constructing the new 'cognitive framework' (Weare, 1992). Weare (1992) argues that if an educator tries to work outside the learner's personal cognitive framework, effective building of knowledge will not take place. Stones (1966) calls the type of learning which has no relevance to the learner's personal knowledge, 'rote' learning, "Rote learning, it is argued, tends to be more difficult, since it cannot be anchored to any existing knowledge. It is also more likely to be forgotten more easily" (Stones, 1966; p.149).

The effect of personality on learning

In addition to learning theory, one must also consider personality theory when studying learning situations (Strang, 1958). Hudson (1970) propounds that learners often have different learning 'styles' related to their personality. These learning styles will lend themselves to some topics or situations better than others (Bruner, 1966). Along with different learning styles are different teaching styles, these must be considered if one is to make any decisions about which learning scenarios are most successful. An example of this is provided by Eysenck & Cookson (1971; p. 115) who state that, "analysis by correlation and analysis of variance methods revealed that extroverted boys and girls are scholastically superior to introverted ones". The fact that some learners are less willing to learn can make a great difference to the learning outcomes (Patterson, 1977).

A model of learning for distance education

Examination of past work suggests that there is no universal theory which describes all forms of learning (Patterson, 1977), and that learners all have different learning styles which lend themselves to some topics or situations better than others (Hudson, 1970). Part of personal development is the acquisition of skills which one can apply to other situations (Stones, 1970). The learner's willingness to learn, as well as previous learning experiences, often make a substantial difference to the learning outcomes (Beard, 1970; Weare, 1992). The success of a learning situation may also be dictated by the use of an appropriate teaching style (Main, 1980). People often only

change their perception of a subject after personal reflection, and not during initial discussion (Argyle, 1973). It is clear that learning is a complex situation to study, involving a large number of influential factors (Gagne, 1970).

In an attempt to identify the component parts of learning and their inter-relationships, Kyriacou (1986) produced the following model (page 29). This model provides an initial structure which may be usefully adapted to the situation of distance learning later in this chapter.

The model identifies three sets of variables; Context variables, Process variables and Product variables. The combination of these forms a basic framework for the learning event.

The *Context variables* refer to all "characteristics of the context of the learning activity, in this case, usually a classroom based lesson, which may have some bearing on the success of the learning activity" (Kyriacou, 1986; p. 9).

The *Process variables* refer to all of the characteristics involved in the classroom situation between the teacher and student.

The *Product variables* relate to the outcomes of the learning event. They reflect the developmental change for the learner which was brought about by the learning event.

A basic framework for consideration of effective learning, Kyriacou, (1986)

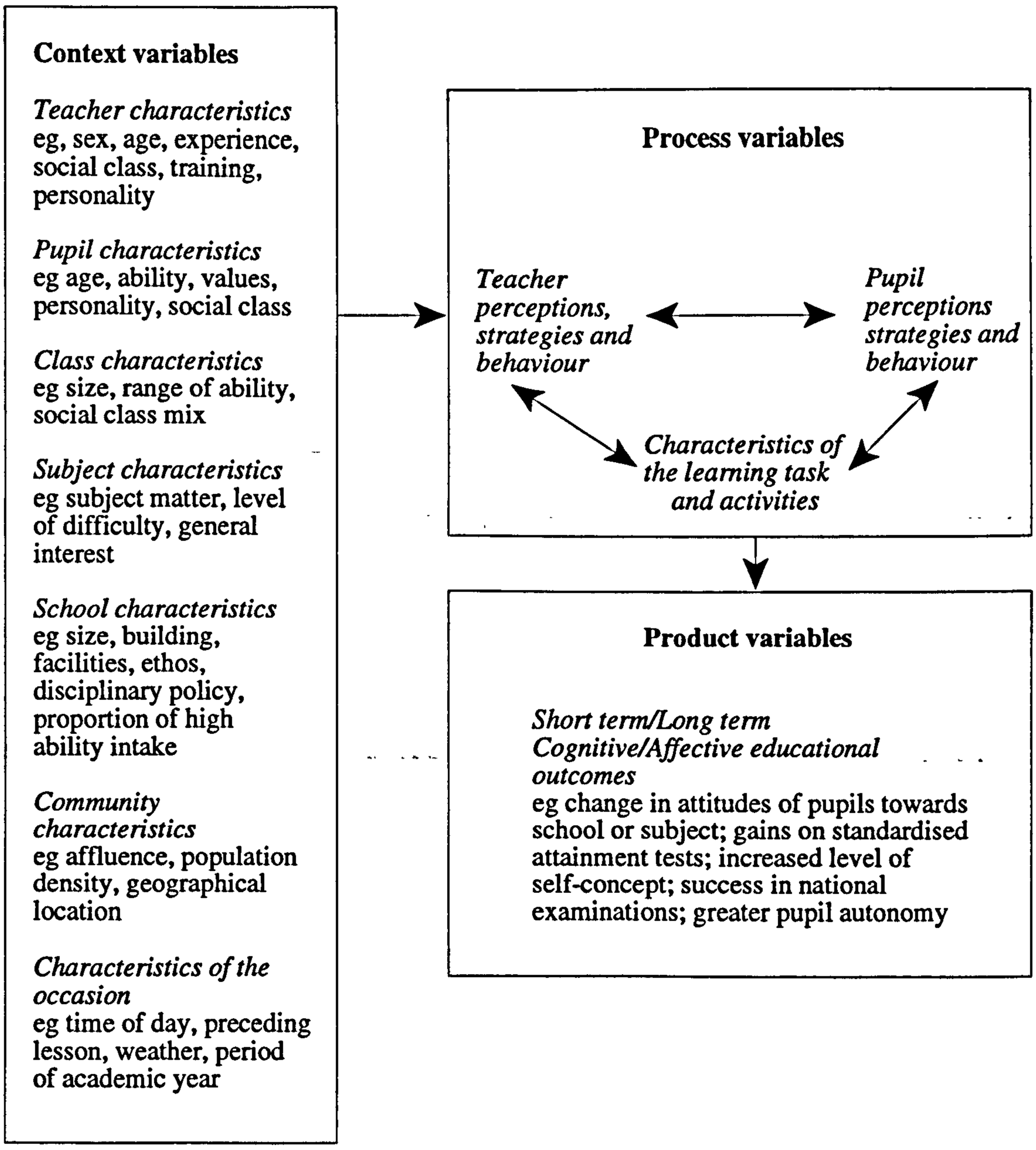


Figure 5: A basic framework for consideration of effective learning

An important area of the model from the point of view of this evaluation is that of the *Product variables:* these represent all of the desired learning outcomes. Kyriacou (1986) indicates that effective learning takes place

when the intended product variables are attained by the learners. By using the basic form of Kyriacou's model and identifying the component parts of the context, process and product variables it may be possible to identify a similar model for distance education using multimedia technology.

Identifying a model for distance education using multimedia technology

The diagram below builds on the previous discussion to suggest a generalised model of learning for distance education. The discussion which follows aims to expand upon the areas within the diagram to explore the possible issues within them. It is based upon a similar structure to Kyriacou's model, however it splits the learning process into three stages which correspond to the stages of the developmental process for course provision, identified in the introduction to this thesis.

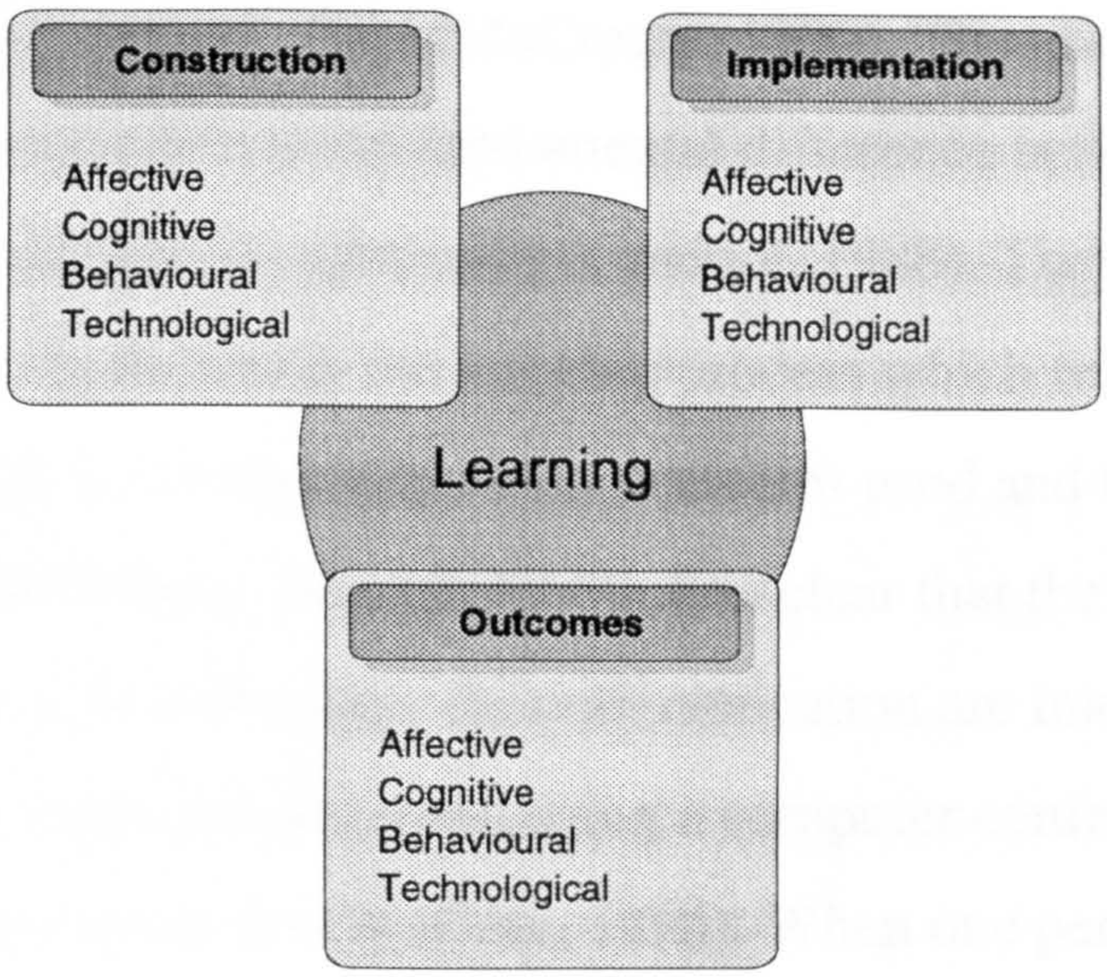


Figure 6: A generalised model of distance learning

To establish a model which is specifically related to distance learning using multimedia technology, we must begin by identifying differences between face-to-face learning and that using multimedia technology for distance education. Exploring these differences is used to identify the elements of a new model as well as the inter-relationships between them. The three stage learning process model above indicates that within each stage of the learning process it is important to consider the influence of the use of technology on the learning process.

The implications of using multimedia technology for distance education

Distance education of this nature makes use of computer conferencing to allow communication between the various participants in the course (Chapter 1). This allows them to work as a collective group with independence of time and place (McCreary, 1990). The use of technology to facilitate communication is the fundamental difference between this form of education and face-to-face education (Graddol, 1988). There are a number of implications of this within the learning process which relate to; the learner, the tutor, the teaching/learning strategies used and the time schedule which the course follows (Nipper, 1990). It is clear that the issues which arise from the use of technology for communication are inter-related (Davies, 1989). An example is that, using a computer conference system, interaction occurs more slowly (Gray, 1990). When one person makes a statement, they have to wait for the respondent to subsequently log on the system, read the statement and reply to it before logging on themselves and

reading the reply. As a result, this form of interaction requires a different schedule than a face-to-face meeting. This has further implications in terms of the types of tasks which can be asked of the learners as part of the course (Brown, 1985). What follows is a discussion of the issues relating to the use of technology for distance education.

Shared learning and communication

It has already been mentioned that computer conferencing offers the opportunity for individuals to communicate in open forum discussions (Chapter 1). In order to exploit the functionality of the technology, the EA course aimed to provide an environment for the learners which allowed them to share ideas and opinions within the conference discussions. In order to achieve this the concept of the virtual study centre was implemented (Chapter 1 & Appendix A(i)). Within the virtual study centre, learners were assigned a study group conference area, their study room labelled A to E. Within each of these five study groups, there were ten learners. This structure was intended to provide the context for the learners to share ideas.

In general terms, shared learning will involve 'a continuous reciprocal interaction between *behavioural*, cognitive and *environmental* influences' (Bandura, 1978; p. 345). Within the context of distance education of this form, the learners never actually physically meet within their study rooms. For this reason, one may argue that the most important form of interaction will be confined to written texts via the computer conference system (Brown, Campione & Day, 1981). This suggests that any evaluation of the

extent to which shared learning takes place needs to focus solely upon the discussions within the computer conference study rooms. This is discussed further within the next chapter and at length within the 'Methods' section of this thesis.

As the learners were grouped within 'virtual' study rooms, the expectation was that multi-directional interaction would take place (Dykman & Reis, 1979). Multi-directional interaction involves more than one individual within the interaction. According to Dykman and Reis (1979), the individual is said to be an active participant if they are contributing to the interaction. They are passive if they are merely observing the interaction and they are non-participants if they are absent or non-observers. Within the EA conference discussions, active participants would therefore be classified as those who initiate or contribute to conference discussions. It is also possible that some learners will log onto the system and read other peoples' discussion items but not contribute, making them passive participants. Within the terminology used for computer conferencing such activity is sometimes referred to as 'lurking' within the computer conference system (Davies, 1990). Learners who did not log onto the system would be classified as non-participants.

If the computer conference system provides opportunities for shared learning through interaction, one must consider how the information will be shared between the learners. Within the context of computer conferencing as used within the EA course, the only form of communication between the learners is through the written texts sent to the computer conference

discussions. If the learners are to convey their ideas and information then it follows that their texts must accurately reflect what they are trying to say (Salomon, 1981). In order to get the opinions of all individuals within the learner group, everyone must participate in the conference discussions (Stone & Nielson, 1982). If one is to expect all of the learners within the study groups to actively participate within the conference discussions, then motivating the learners has to be an important aspect of the course design and implementation (Zippel, 1992).

From the above discussion, it is clear that, in order to exploit the computer conference technology by providing a shared learning environment, levels of participation and learner motivation must be taken into consideration.

To establish a new set of construction criteria, the implications with respect to the learner, the tutor and the technology must be considered (Brainbridge, Bell, Smith, **et al;** 1988). What follows is a general discussion of the context, process and product variables from Kyriacou's (1986) model. It begins by considering issues which Kyriacou might classify as context variables.

The learner

The learner will be required to make use of the computer conferencing system for communication. There are many possible affective implications of this which must be considered. It is likely that some of the learners will have a feeling of apprehension about using the computer conference system

(Hamilton, Oliver & Smith, 1988). For many people, becoming used to the use of technology such as a personal computer takes some time (Gerlach, Ely & Melnick, 1980). People may have certain apprehensions about learning to use new software even if they are used to using a computer (Dunkel, 1991).

One must also consider that the majority of people are likely to have had little experience with communication using computer conferencing (Davies, 1990). It is clear that for many people, making full use of computer conferencing for communication requires experience (Mason, 1989). It is possible that, within a distance education course of this nature, the learners and tutors may never meet, so that all communication takes place in the computer conference system.

It is clear that there is a likelihood of a certain level of anxiety for the learner within this possibly unfamiliar learning situation. If a learner does not feel at ease within their learning environment they are unlikely to be able to learn effectively (Davis, Alexander & Yelon, 1974). From this we may deduce that the problems associated with constructing an unfamiliar learning environment need to be addressed. For instance the provision of an effective support structure for the learner must be an integral part of the course design (Robinson, 1988). This must take into account the learner's preconceptions of the technology to ensure that they feel at ease with the technology to allow them to operate effectively as a distance learner. It must also consider the learner's expectations of the course to ensure that they have an accurate understanding of what will happen during the course.

The fact that the learners and tutors may never meet face-to-face within the course has further implications in terms of commitment and motivation (Jones, 1988). It is difficult for a learner to avoid responding when a tutor asks them a direct question and is standing right in front of them. However, in the context of computer conferencing there is no physical presence of those involved in the discussion. This may have implications in terms of the learner's 'level' of involvement in the discussions (Lagadec, 1993). Davies (1990) indicates that, if not motivated, it is easier for a distance learner to become a non-participant in the activities of the course.

What is also clear is that to make full use of the computer conference system, the possibilities for group discussions it provides need to be exploited (Van Ments, 1983). It is important therefore that learners within a distance education course such as this have a sense of responsibility to their peers by contributing to the discussions (Esling, 1991) and that this should be a consideration when choosing the teaching strategies for the course.

Past research into communication using computer conferencing suggests that the time needed to carry out tasks which require learner interaction is often increased when compared to face-to-face courses (Mason, 1989). A result of this may be that there is more time to contemplate any contribution to a discussion. Is is possible that, working within this new learning environment with its associated differences in time schedule, different learning strategies are needed (Harasim, 1990).

The tutor

In relation to the tutor's role in the course, many of the issues already discussed will apply. The tutor will possibly have a number of affective issues to take into account, for instance, apprehensions about using technology as the medium for communication. It is possible that these pressures may be compounded by a feeling of responsibility to ensure that the learners are motivated and committed to their tasks when they have no face-to-face communication with them (Jones, 1988). If they are to make the best use of the technology for education they may also need to consider adopting different, more appropriate teaching strategies (Thomas, 1989).

Thus far we have focused upon the context variables in Kyriacou's (1986) model. In terms of the possible process variables much of these will be the same as those identified by Kyriacou. In order that the teaching and learning take place, the tutor must adopt appropriate strategies to negotiate though consideration of the learner's cognitive framework to arrive at the desired understanding (Weare, 1992). However, within the process variables one must consider that the direct link between the learner and tutor is broken by the medium of communication, the computer conference system. This in turn may have a number of implications on the perceptions, strategies and behaviour of both the tutor and learner during the learning process (Kaye, 1990). It is also possible that apprehensions about a new learning environment may have an effect during the delivery of the course (Grint,

1989). The tasks and activities during the course will also need consideration although the issues relating to them are likely to be different to those in a face-to-face course (Davies, 1990).

In relations to the product variables, there are likely to be certain learning outcomes which relate to short and long term cognitive and affective development for the learner in Kyriacou's (1986) model. However it is also likely that the course will strive to ensure that the learner develops skills to operate effectively as a distance learner. This may include gaining skills in the use of the technology or developing new learning strategies which are more appropriate to the new learning environment.

It is possible then to adapt Kyriacou's model of the learning situation to create one which is specifically relevant to distance education using multimedia technology. The diagram below represents this new model:

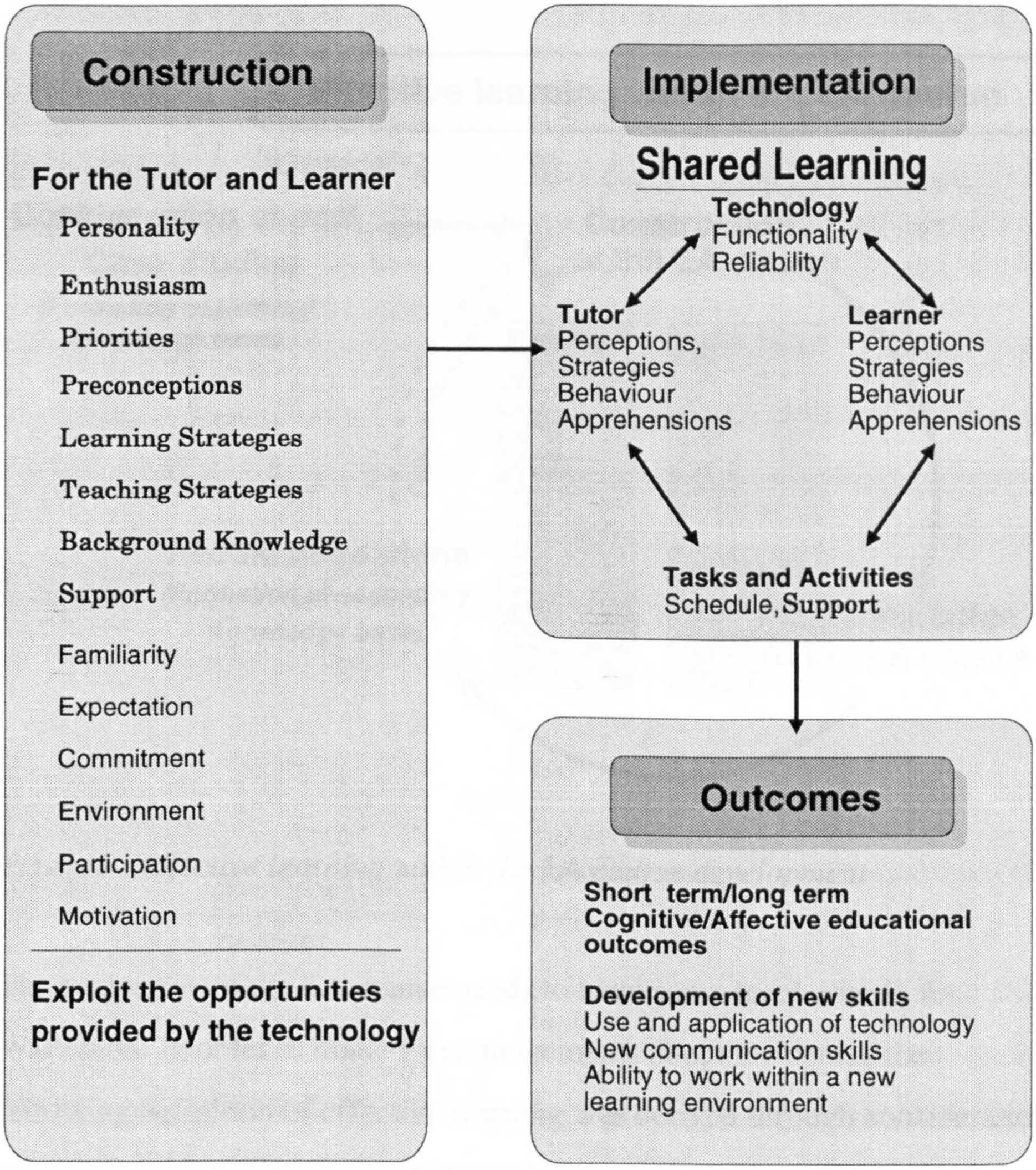


Figure 7: A basic framework for consideration of effective learning within distance education

This thesis aims to explore the nature and relationship between some of these issues through the evaluation of the EA course. It is therefore possible to merge the diagram of the ongoing process of adaptation with the issues identified in the diagram above for effective learning:

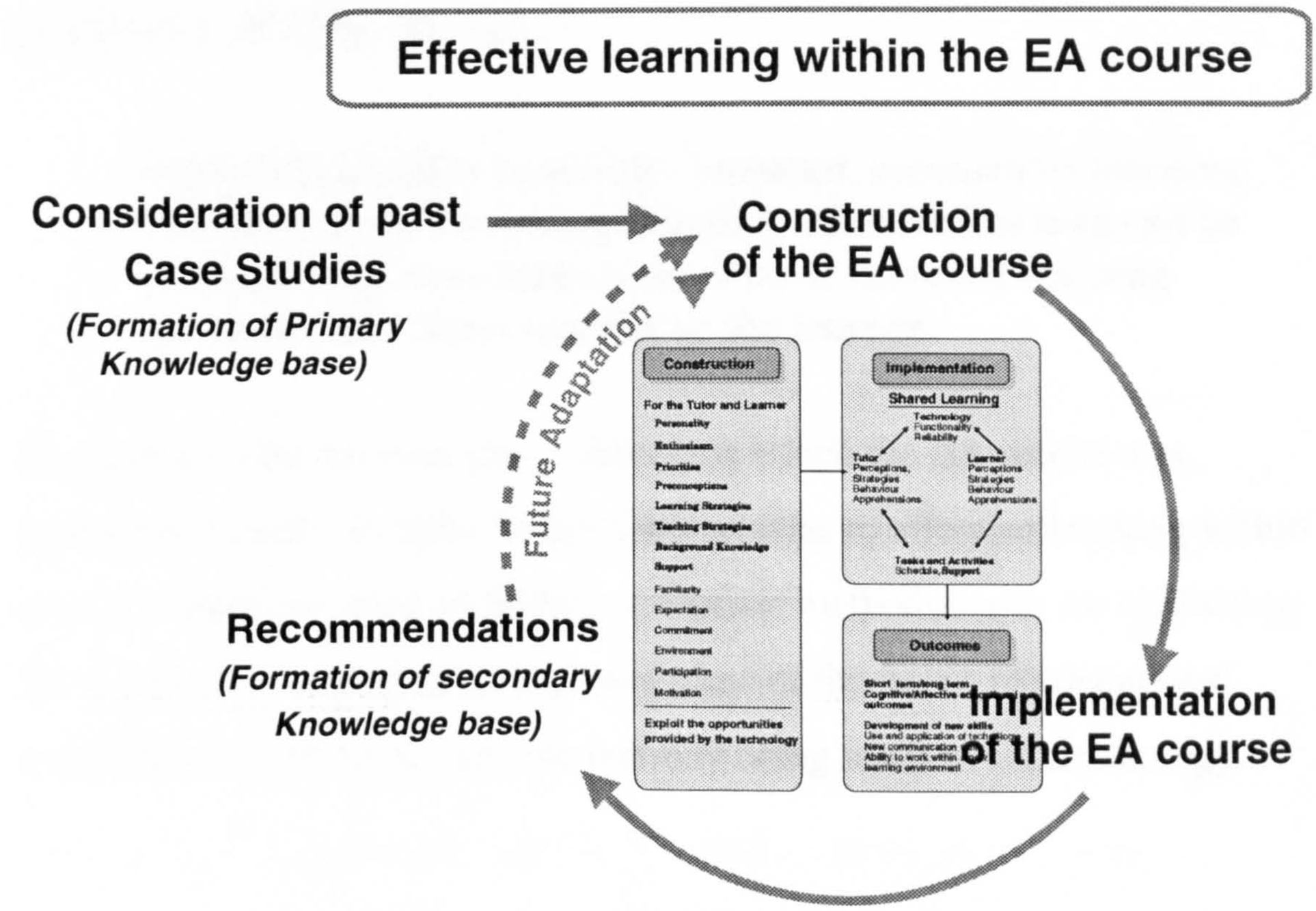


Figure 8: Effective learning within the EA course development

The evaluation of the EA course needs to have some focal criteria for evaluation. In order to make value judgements about the course the following definition of effective learning was derived through consideration of the model for effective learning outlined.

A definition of effective learning as used for the purpose of this thesis

When it is possible to identify intended, measurable learning outcomes from a learning situation, effective learning can be considered to have taken place if these intended learning outcomes have been realised by the learner.

The above definition provides a context in which the EA course was evaluated. In order to make judgements relating to effective learning within the EA course one must consider appropriate methodologies for evaluating the course. The next chapter explores some of the issues of educational evaluation in relation to distance learning using multimedia technology.

Chapter 4

Educational Evaluation in Distance Learning

This chapter attempts to provide a clear statement of what educational evaluation consists of, why it is desirable and how it should be applied and interpreted within distance education. It attempts to explore the generalised principles of education evaluation, relating them to distance education and the evaluation of the EA course. It does not attempt to specify the actual methodologies used for the evaluation of the EA course as this constitutes the 'Methods' section of this thesis. It aims instead to provide a basic framework for considering evaluation of learning in distance education.

The chapter begins by considering a basic rationale for educational evaluation as well as the generalised process of carrying out an educational evaluation. It then continues by considering different forms of evaluation and the issues relating to them. Each of the areas discussed in this chapter involves an initial consideration of generalised principles followed by a more focused consideration relating them to distance education. Finally, by building upon the work of the previous chapter, consideration of appropriate evaluation methodologies for distance education courses such as the EA course are discussed.

What is educational evaluation?

Evaluation is a process which aims to measure the extent to which the intended outcomes of the learning process have been achieved. The purpose of evaluating the EA course is to make judgements about the relevant issues in construction, implementation and evaluation of such courses, thereby constructing the secondary knowledge base.

As education and learning may take many forms and occur in many different situations, it is impossible to give explicit detail as to the 'ingredients' for constructing and interpreting all educational evaluation (Patton, 1981), but generalisations and guidelines on what should constitute educational evaluation are possible. These are outlined here to provide a generic overview of an evaluation process. Where possible, later parts of this chapter will expand upon the points made under the headings shown in bold type below.

- Perhaps the first consideration in educational evaluation must be that one must address **why** one wishes to **evaluate.** This does not mean simply stating the reasons for evaluation mentioned above, but clearly identifying why an evaluation is necessary (Tuckman, 1975).

- Having identified why one should evaluate, one must identify **what** exactly will be evaluated (Ebel, 1972; Dressel, 1978).

- The next step is to address which **evaluation processes** are the most appropriate for carrying out the evaluation (Small, 1986).

- **Validity and reliability** are two issues which must be considered within any valuable educational evaluation process.

- Having decided on the method for evaluation, one must decide on **how** the information gathered is to be interpreted (Noll, Scannell & Craig, 1979).

- Often the purpose of evaluation is not to measure simply for the sake of it; some form of **feedback**, response or judgement makes the whole process valuable (TenBrink, 1974).

Within this thesis the feedback of the evaluation of the EA course forms the content of the 'secondary knowledge base' and is presented in the 'discussion' section of this thesis. The five points listed above provide an overview to the approach taken within this thesis for the evaluation of the EA course.

Talking about more formal evaluation of modern day teaching, Gronlund (1981) says that;

> "Evaluation includes a number of techniques that are indispensable to the teacher.... However, evaluation is not merely a collection of techniques - evaluation is a process - it is a continuous process which underlies all good teaching and learning" (Gronlund, 1981; p.3).

Within the context of distance education, the evaluation process has to be an integral and ongoing part of a developmental approach to course provision (Jones, 1988). It must provide the necessary information to facilitate the cyclic process of construction, implementation, evaluation and adaptation of a distance learning course (Esling, 1991).

A second perspective on educational evaluation which relates to the aims of an evaluation is provided by Chase (1978; p.7) ;

> "evaluation lays amounts against criteria so that we may make value judgements about the observed amounts."

If we are to make value judgements about distance education we must explore the issues relating to the learning processes which were discussed in the previous chapter. This leads to the identification of a simple model for evaluation of distance education. This model is represented in the diagram below. The 'sphere' of educational evaluation is indicated in the diagram as covering the construction, implementation and outcomes of the course. This is to highlight that it must consider the elements within each part of the learning process. It represents an 'integral' part of the cyclic and ongoing

adaptation process of distance education courses, considering the issues relating to the learning process identified in the previous chapter.

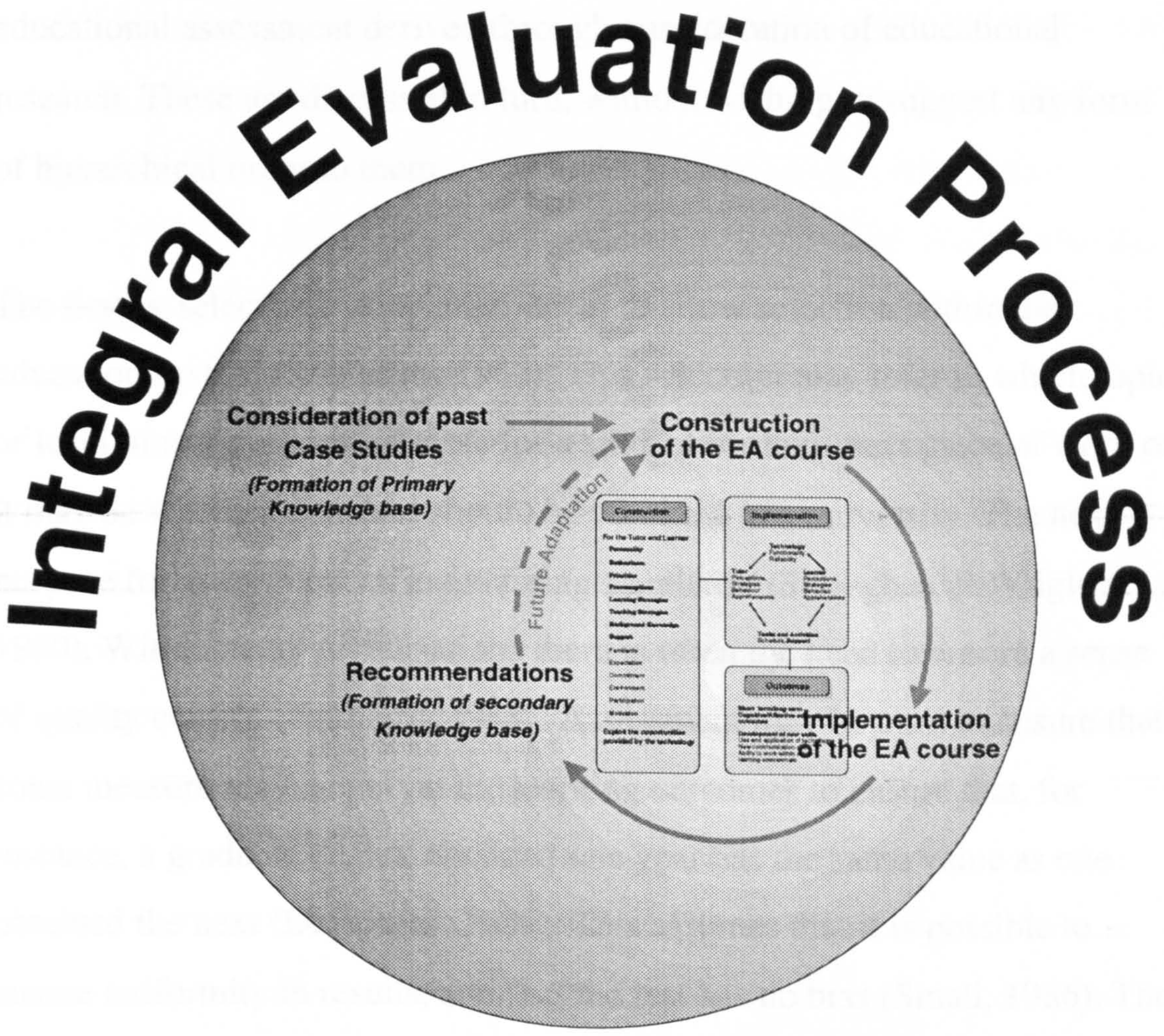


Figure 9: Integrating the evaluation with the course development

Why evaluate?

Before considering the specific reasons why one should wish to evaluate a distance education course it is valuable to begin by discussing why one may wish to evaluate any form of learning. A simple answer to this question is given by Ashworth (1982); to select, to motivate, diagnose, to report, to

compare and to predict. Ashworth does not suggest that one should test or evaluate only when all of these outcomes are desired, but for any one or combination of them. It is possible to identify six generalised "purposes" for educational assessment derived through consideration of educational research. These are discussed in turn, without wishing to suggest any form of hierarchical order to them.

The first is 'selection', using assessment to allow selection within the education system (Rowntree, 1987). This selection may refer to which topic or level of topic is most suitable for a student for their next piece of work or it may be whether a student should be admitted to a university. The next purpose for assessment is 'maintaining standards' (Straughan & Wrigley, 1980). Within many organisations there is often the need to ensure a sense of quality control (Fairbairn, 1988). Assessment may be used to ensure that some measure may be put on the learning outcomes to ensure that, for instance, a graduate degree obtained one year has the same value as one obtained the next (Desforges, 1989). This assumes that it is possible to ensure uniformity in results, and that the test has no bias (Small, 1986). The third area identified is in the 'motivation of students'; having a goal to aim for may be the only form of motivation for some less inspired students, giving rise to the quote;

"The idea of Edinburgh University becoming a three-year holiday camp, all expenses paid, galls me, and I am reactionary enough to believe that the 'threat' of exams (i.e. the inherent threat of failure and becoming an outcast) is the only reason that the library doormats are cleaned." Rowntree (1987).

The fourth area is 'feedback to the students', giving information about how the learners are progressing in their studies (Eisner, 1982). The fifth is 'feedback to the teacher'; the rationale behind this is to allow the teachers to establish whether their teaching is effective (Tight, 1991). The final purpose is 'preparation for life'. This is sometimes given less importance, as a student is unlikely to come up against the same assessment procedures in their day-to-day career (Sutton, 1992).

It is clear that it would be restrictive and possibly misleading to assume that there is only one reason for evaluating distance education (Davis, 1990). It is possible however to indicate that a significant proportion of evaluation of distance education courses in the past has been undertaken to explore opportunities which technology provides for course delivery (Robinson, 1988).

Thus far we have considered the fundamental concept of an evaluation process and possible reasons for undertaking one. Both of these areas have been discussed in relation to distance education. We must now continue to consider what constitutes an evaluation process and how this would relate to an evaluation of a distance education course such as the EA course.

Evaluation processes

Qualitative and Quantitative Methods of Evaluation

By quantitative methods, researchers have come to mean the techniques of randomised experiments, quasi-experiments, paper and pencil 'objective' tests, multivariate statistical analyses, sample surveys and the like. In contrast, qualitative methods include ethnography, case studies, in-depth interviews and participant observation (Cook & Reichardt, 1977).

These two paradigms have been widely researched (Fitz-Gibbon & Morris, 1987; Cronbach, 1987; McCracken, 1988; et al). Some proponents for each of these paradigms consider their use and application to be mutually exclusive and often that only their preferred approach should be considered valuable. The notion that these two paradigms are mutually exclusive has become less widespread over recent years (Black & Dockrell, 1988). At the present day, many researchers consider the combined use of both approaches valuable, if not essential, for many forms of evaluative research (McCracken, 1988).

For the purpose of evaluation of the EA course, adopting a quantitative approach in order to gain numerical data was considered valuable for gaining an objective understanding of what took place and formulating hypotheses. Evaluation using quantitative techniques was considered valuable for providing 'objective' numerical analysis and statistically testing for reliability.

The nature of the EA course was such that trying to gain all necessary information using solely quantitative evaluation techniques would be likely to miss vital information, leading perhaps to spurious conclusions. Many of the most recent texts on evaluation research advocate the adoption of both forms of evaluation in combination (Stecher & Davis, 1987; Brewer & Hunter, 1989; et al). The evaluation of the EA course also used qualitative interview techniques to cross reference the findings of the objective quantitative evaluation and vice versa.

It is widely considered that gaining an 'insider' perspective is a characteristic of the qualitative paradigm of research methodology (Reichardt & Cook, 1979). The fact that there is likely to be a component of subjectivity within the analysis should not be a reason to immediately dismiss it as unscientific (Frost & Stablein, 1992). This opinion is reinforced by Myrdal, 'No social science can ever be "neutral or simply "factual", indeed not "objective" in the traditional meaning of these terms' (Myrdal, 1969; p. 64). This statement is not to be interpreted as saying that one should not therefore strive for objectivity and reliability in social research (Freeterman, 1984). The nature of social research is to attempt to describe a situation which is continuously in a state of flux and one which by necessity requires a degree of subjective interpretation on the part of the researcher (Bausell, 1986).

By implementing a diversity of approaches to the evaluation of the EA course, it was hoped to develop a more global understanding of what took place. In addition to this, the fact that the author was also the EA course

coordinator would provide a valuable 'insider' perspective. This greater 'depth' of understanding of what took place was desirable as it would help to ensure that final judgements made were well founded.

Validity and Reliability

When undertaking any educational evaluation, two issues must be considered before the evaluation methods are applied (Desforges, 1989). There seems to be a consensus as to the general meaning of these two terms, although there are a number of definitions of the terms which vary according to author.

Validity

Validity relates to how well the evaluative process fulfils the function for which it is being used (Stanley and Hopkins, 1972). As the purpose of evaluating the EA course is to make judgements as to whether adopting certain strategies leads to desired learning outcomes, validity may be interpreted as how well the evaluation process leads to meaningful judgements. Meaningful judgements in this case are those which interpret observations correctly and allow inferences as to how and to what degree the strategies implemented need to be adapted. Validity refers to the *results* of the evaluation, not the instrument used to make that evaluation.

Validity is not an 'absolute', meaning that evaluation results are usually not either valid or invalid, it is more a question of degree (Gronlund, 1981).

Trying to achieve absolute validity is often most ambitious when evaluating something as complex as education (Rowntree, 1987). It is possible to break the general term validity into three separate areas: *Criterion-related validity* refers to how closely the test scores correspond with people's rankings on an out-of-test performance of interest to us. It basically involves comparing scores on tests with another measure of performance (TenBrink, 1974). *Content validity* is a measure of how the test or evaluation content is representative of the total subject matter (Chase, 1978). This often involves comparing the aspects evaluated by the evaluation process with the content of the evaluated subject. *Construct validity* is the extent to which the evaluative process corresponds with predictions based on a psychological theory. In practice, this may involve classifying people according to a theory of behaviour and determining to what degree the evaluation process classifies them in the same way (Loveland, 1980).

There are many ways to assess the extent to which an evaluative process is 'valid'; these often involve ranking the measured and predicted values and finding coefficients of correlation. Constructing expectancy tables (Chase, 1978) is another way of evaluating validity whereby test results are entered on one axis, whilst criterion scores are entered on the other.

Ebel (1972) asks "must all tests be valid?", going on to discuss the fact that often the validity of a validity test is in itself disputable and this can mean that it is a hindrance rather than a benefit to the evaluator.

"Validity has long been one of the major deities in the pantheon of the psychometrician. It is universally praised, but the good works done in its name are remarkably few. Test validation, in fact, is widely regarded as the least satisfactory aspect of test development. For this the blame is usually placed on the back of good criterion measures" (Ebel, 1972).

It would not be appropriate for this thesis to go on to argue whether validity is fundamentally necessary. It is appropriate to give at this point some idea of the meaning of the term adopted for the evaluation of the EA course. Following Egerton's definition of validation; "By 'validity' we refer to the extent to which the measuring device is useful for a given purpose" (Egerton, 1949; p.52). In the context of this research, validity indicates the extent to which the measuring device is useful for making value judgements about distance education using multimedia technology.

Reliability

The term reliability is often used to mean 'consistency' when referring to educational testing (Gronlund, 1981). There are many examples used to give further explanation to the term. One such example is provided by Chase (1978).

> 'If I measure a room with a yardstick, I should get approximately the same result every time. The measuring instrument in this case gives consistent results and may therefore be considered to be 'reliable'. If however I use an elastic yardstick, it is likely that on some occasions I will apply more tension, and thus stretch it more, than on others. This would lead to inconsistent results and therefore the measuring instrument would not be considered reliable'.

This example gives an idea of the meaning of reliability in terms of measuring instruments, although it does not mention the fact that all materials expand and contract in different environments. It also makes no mention of the fact that the measurer may apply the measuring instrument incorrectly by sliding it or misreading it.

Rowntree (1987) tries not to simply substitute reliability with consistency and goes on to say, "the basic '*reliability*' question is: Would *other* assessors agree with my interpretation of the student's behaviour? But a disturbing variant is: Would *I myself* interpret his behaviour in such a way if I saw it again?" (Rowntree, 1987; p.190).

There are many alarming statistics which show how even the most rigorous of tests often prove unreliable, with marked differences between scores for the same pupil given by different assessors (Loveland, 1980). Trying to ensure that evaluation processes are reliable often makes use of re-evaluation; varying the influencing factors in the evaluation allows one to gain some measure of the reliability of the evaluation results. Repeating the EA course and hence the evaluation of it was not possible, it was only to take place once as part of the MTS project. This meant that some other method of measuring reliability was necessary. The search for an appropriate method led to the adaptation of a technique named the Kuder-Richardson Method (Gronlund, 1981). This method involves splitting the results of the evaluation in half and comparing them by rank correlation.

As the EA course was only to take place once, it was not possible to keep

repeating the process, varying the parameters. For this reason, it was felt important that attention was paid especially to ensure that details on all aspects were given. This would hopefully allow the reader to understand fully the context of the results obtained. Giving as much detail as possible may allow similar evaluation techniques to be applied to a similar situation and therefore allow a certain degree of comparison.

In order to achieve the aim of this thesis, make use of the opportunities available for evaluating the EA course and strive for valid and reliable findings, a multi-method approach was adopted. The general principles for this are discussed here, as this approach has also been used to an extent within each of the past case study evaluations considered within the next chapter.

A multimethod approach evaluation of distance education courses

As social research has developed, new research methodologies have been created and old ones adapted or discarded (Rutman, 1977). The very fact that methodologies are often adapted to suit a certain situation highlights that any single method for making an observation is likely to be less than perfect (Schreiber & Ingenkamp, 1990). If one is to strive for greater reliability, it is often more valid to make use of more than one evaluation method, as this will allow cross comparison of results, or triangulation (Fetterman, 1984). Triangulation, or siting any values of a phenomenon from more than one methodological viewpoint, can be valuable in many

respects. When two reliable measuring instruments yield consistent results, greater confidence in their validity may be achieved (Brewer & Hunter, 1989). If the results of methodologies are conflicting, this highlights the need for further investigation before valid conclusions may be drawn. Cronbach (1982) considers that greater insight may be gained by exploring the discrepancies between two measuring instruments, even if these discrepancies are never resolved.

A multi-method approach was therefore adopted for the evaluation of the EA course primarily for two reasons. Firstly it would provide opportunities for triangulation of results, in order to achieve greater validity. Secondly, in the case where an investigation is focusing on one area of the EA course, it would allow the interpretations of the results to be considered in the wider context of investigations carried out on other areas.

The previous chapter discussed the general principles of effective education. This chapter has considered educational evaluation in relation to distance education. It is clear that there is a strong link between the elements of a learning process, the evaluation of this process and the ongoing development of distance education courses such as the EA course. These two chapters form a basis of information which was used in the consideration of past case studies, for the creation of the primary knowledge base. Following on from this it was also used in the construction and evaluation of the EA course, leading to the development of the secondary knowledge base.

Constructing a Primary Knowledge Base

(Learning from the past)

Chapter 5

Historical Overview

Past correspondence courses

This chapter and the one which follows it consider experiences of distance education from the past. By doing this, issues for consideration when constructing the EA course were identified. These issues are named within this thesis as the primary knowledge base for distance education.

Though research of this nature has been limited in the past, it is possible to gain useful information through consideration of similar work from the past. For instance, a substantial amount of research has been undertaken in relation to correspondence courses. This work provides insight into the different approaches taken by organisations to provide distance education courses using the postal system. This chapter begins by defining the term distance education before briefly exploring the history of distance education and approaches used in the past. It aims to identify issues which may relate to the EA course construction which may be derived from examining past correspondence course approaches. Where issues specifically relate to the construction of the EA course they are highlighted in bold type to indicate that they were used in the construction of the primary knowledge base.

A formal definition of the term 'distance education'

It has taken many years for the general term 'distance education' to become widely accepted; initially the word 'correspondence' was used in describing the many activities in this area. The term 'distance education' is now used to describe many varying forms of non-contiguous education. In its present form, distance education involves utilising many diverse media for communication. These include; the postal system, computer conferencing, tele-conferencing, radio broadcasts, television broadcasts and video conferencing (using cameras and monitors for interactive conferences). Along with this array of communication techniques there are many forms of study material available. Printed texts are still widely used but also audio and video tapes, computer software and study kits (for carrying out experiments, for example). The traditional term 'correspondence education' is possibly less appropriate today, as many feel that this term implies solely the use of written texts sent by post.

A formal definition of the term distance education was given by Borje Holmberg in 1977:

> 'Distance education thus includes the various forms of study at all levels which are not under the continuous, immediate supervision of tutors present with their students in lecture rooms or on the same premises, but which, nevertheless, benefit from the planning, guidance and tuition of a tutorial organisation.'

A brief history of distance education

Perhaps the pioneer of distance education was Caleb Phillips, who in 1728 advertised the opportunity to study a new method of shorthand by having lessons sent weekly by post (Battenburg,1971). The advertisement gave no mention to the student sending work back for correction or comment. Many would argue that the lack of two-way communication invalidates this as true distance education.

It is not until about one hundred years later that evidence of tutoring which includes a two-way correspondence may be identified. In 1833 a course studying 'Composition through the medium of the post' was offered in the old Swedish university town of Lund. In 1940, at the time of the introduction in Great Britain of the uniform penny postage system, Isaac Pitman offered the teaching of shorthand combined with a study of Scriptures by correspondence. He later went on to found the Sir Isaac Pitman Correspondence Colleges. In 1899, a very important development in distance education took place with the introduction of the 'Rustin Approach' (outlined later in this chapter). The Rustin approach formed a basic framework that many distance training courses were to later follow.

During the late 1800's a number of organisations were offering many academic courses: Skerry's College, Edinburgh, founded 1878, offered preparatory courses for Civil Service examinations. Foulks Lynch Correspondence Tuition Service, London (1884) offered accountancy. Diploma Correspondence College offered a preparatory course for university qualifications.

It was not only academic courses that were being delivered during the early days of distance education. In Eastern Pennsylvania, USA, mining methods and accident prevention were taught through publication of lessons in the local Mining Herald. The success of this tuition led to the founding of the International Correspondence Schools (ICS) in Scranton, Pennsylvania.

In 1898 H. S. Hermod founded Hermods, a distance education establishment in Sweden. This was later to become one of the largest distance education organisations in the world. The 19th century saw the introduction of distance education in many countries throughout the world. During the first part of the century, a number of important developments in distance education occurred. In 1910, Australia was the first country to initialise a scheme which was ultimately to offer a complete primary and secondary education to a large number of its children using a system of supervised correspondence study (Holmberg, 1985).

Supervised correspondence study entailed each pupil having a supervisor or tutor who would coordinate their work. The supervisor would not have full knowledge of all the fields taught but rather act as an intermediary between the student and the supporting organisation. This method of educating isolated children was later to be taken up by New Zealand, West Africa and Canada. Starting in 1923, the secondary school at Benton Harbor, Michigan, in America had some of its teachers acting as supervisors and using this system to supplement their existing school curriculum. It was there that Mitchell realised that correspondence courses could help to meet the educational demands of high school pupils that could not be catered for by

the average high school programme. At his high school of seven hundred students, he identified the need for further vocational courses. He approached firstly the American School and later the International Correspondence Schools who were offering vocational training by correspondence. In a report on the progress of his project it was announced that 138 pupils were taking part in vocational distance courses and that there were at that time over four hundred different courses on offer (Report of supervised correspondence study, 1934).

In France in 1939, the government realised that as a result of the Second World War, many teachers were being conscripted and children evacuated. This could have had serious repercussions for their education system. The Ministry of Education set up the 'government correspondence college' to provide education to those that were affected. This institution is now called 'Centre National d'Enseignement par Correspondence'. It has become a very large organisation which now caters mainly for adult education.

It is clear that distance education is not a particularly new idea. There are many establishments throughout the world that have offered a variety of forms of distance education in the past and present. It should be noted however that the majority of communication taking place during course delivery has been by postal correspondence. The communication links within these earlier courses only involved the tutor and learner. Since then new technologies are being used more widely now than ever before. The use of these new technologies means that it is now possible to have the whole learner group working together sharing ideas. However, until more recently,

extensive use of computer conferencing and interactive satellite transmissions, as in the EA course, has not been practicable (Davies, 1992).

Past approaches for providing distance education

There are a number of differing strategies used by education establishments to provide distance education. The University of Chicago in 1973 used a study pack sent weekly through the post. It included:

- ❒ *an instruction sheet*: which assigned any tasks to be undertaken, indicated the order in which the work should be done, offered help on points which were expected to cause problems and outlined any other review work.

- ❒ *an examination paper:* which would be constructed in such a way as to require all the tasks to be completed properly and highlight any weaknesses in the student's understanding.

- ❒ *recitation paper;* this would be completed by the learner, indicating any questions or difficulties that arose during their work.

This method would require the learner to complete their tasks by the end of each week in preparation for the next set. This form of **structured teaching does not readily allow for any external influences to disrupt its**

schedule. The learners on the EA course had to integrate their study time with their day to day working role. Having a rigid structure may be less appropriate considering that for many, their study would take a lower priority than their work related activities. Also, for distance education using multimedia technology this form of approach would not explore the possibilities for shared learning through learner interaction. William Harper, the first president of the Open University, did not see that having a rigid time schedule was a drawback. Harper went on to say,

> 'From this it will be seen that the correspondence teacher must be painstaking, patient, sympathetic, and alive; and that the correspondence pupil must be earnest, ambitious, appreciative and likewise alive. Whatever a dead teacher may accomplish in the classroom, he can do nothing by correspondence; and if a student lacking the qualities just named undertake work by correspondence, one of two things will happen: either he will acquire these qualities, and succeed; or he will remain as he was at the beginning , and fail. The man who does the work at all, must do it well' (Holmberg, 1985; p. 19).

It is perhaps difficult to see how a tutor may present an 'alive' and enthusiastic personality when they never meet the learner in a face-to-face situation. It does highlight the fact that attention must be paid to ensuring that **the teaching strategies used within the course delivery should encourage the learner to work.** This may involve presenting stimulating information for the course content in an interesting or novel way. It may involve **creating tasks which the learner will enjoy doing.** Considering that these may be considered to be characteristics of an 'alive' tutor one may better appreciate Harper's comments. It is also possible to see that the EA

course must similarly strive to encourage learner motivation and participation in the course activities.

The International Correspondence Schools (ICS) in the USA and Hermods in Sweden both used a similar method. Instead of having a fixed time period for each 'lesson' of the study, they initially sent out the first two lessons along with reply envelopes, instructions on how to carry out the work, and blank reply papers. The first lesson would be undertaken at the learner's leisure and, when the tasks had been completed, they would be sent to the tutoring organisation for criticism and comment. During the time that this took, the learner would continue with their study, working on lesson two. As soon as the tutor received the learner's work from the first lesson, the third would be sent to the learner, this would be put to one side by the learner until they had finished lesson two. This process would continue through the course. If a learner came across any difficulties during their work a note could be sent and work could stop until any problems were resolved. This 'overlap' of lessons meant that the learner could work as quickly or as slowly as they wished, the next-but-one lesson only being sent on receiving completed work. It also meant that the learner should never be in the situation of having nothing to do as they should have the next lesson as well as the one that they are working on.

This approach allows the learner to work at their own rate which is a typical characteristic of an open learning situation (Burgess, 1985). Distance learning courses often attempt to provide a learning environment which allows the learner to work at their own pace and in some instances to

explore the issues they find of interest. A totally flexible approach to learning would not be possible for the EA course as the learners were to work together on the course tasks and therefore needed to keep up with each other. Contrasting this, **the learner's course work needed to fit into a normal working day and therefore a certain amount of flexibility was needed.**

The Rustin approach

The German Rustin courses followed a set procedure for the construction of all their course units. It was this structured method which took a 'conversational' form for course construction which constituted the 'Method Rustin' referred to earlier. All course units which followed the Rustin method took the following format:

1. Subject matter presentation in a self-instructional form.

2. Conversation about the subject matter, in which the main points of the subject matter presentation are repeated by questions and answers.

3. A Summary.

4. Revising questions with references to the sections of the subject-matter presentation where the answers to the questions are found.

5. Exercises in the form of questions developed in such a way that the students must be able to answer them on the basis of what has been learnt through the preceding parts of the course unit. The correct answers to these questions are provided at the beginning of the following course unit.

6. Individual correspondence teaching aimed at developing autonomous thinking by means of a comprehensive assignment to be performed in writing (Holmberg, 1985).

Many distance education establishments offered self contained courses of study; all of the subject matter that would be required to complete the course was provided in the correspondence study material. Wolsey Hall in 1914 was using a 'study-guide' approach. A text book was carefully selected by the tutors to be used during the course. The subject matter contained in the text books was split up into a number of lessons. The student would purchase the text book or borrow it from the College lending library. They would have then have information sent to them giving the names and addresses of their course tutors, a list of the lessons, the dates on which the lessons would be sent, regulations and instructions for carrying out the work and further reading material. Students were allowed to join the course at any time but the recommendation was that they should take as much time as possible. The courses led to a final examination which the learner would only take when they felt that they were ready for it. If circumstances became less favourable for the learner's study it was possible

to organise 'holidays' from study. This form of study offers a wider spectrum of study material to the learner, as it is not restricted by the amounts of material that can realistically be sent by post.

Past approaches such as the 'Rustin Approach' offer the learner a great deal of support in terms of knowing what to expect from the course. It also allows them to work with a large degree of autonomy by providing the learner with the necessary background information they require to complete the course. For the EA course the learners would be working within an unfamiliar environment, using computer conferencing for distance education. Chapter 3 identified that this may lead the learner to have a certain degree of apprehension about taking part in the course. It was considered by the researcher that one way of **minimising the effects of learner apprehension was to provide them with clear guidelines as to the content and activities during the course.** Providing all of **the essential background information would allow them to focus their activities on the content of the course rather than having to spend time looking for information.**

More recent developments in distance education

Up until the 1970's, distance education establishments were primarily commercial organisations looked upon as less academic by many traditional establishments. It was during the 1970's that the public profile of distance education was to change dramatically. This change from predominantly commercial and vocational education establishments to more academic

public sector organisations was brought about with the introduction of the many 'Open Universities'.

The founding of the Open University of Great Britain in 1971 gave a prestige to distance education never before experienced. It provided degree courses which were constructed, delivered and examined within the organisation. With the backing of the British Government and media exposure, it was to raise public awareness and add a new level of universal acceptance to distance education.

The Open Universities were founded in order to satisfy the identified need to offer higher education to a wider public. They hoped to offer the opportunity for individuals to complete degree level courses which would fit into the time schedule of their everyday life. The British Open University was the most influential of this type of organisation, but by no means was it the only one. At around the same time and soon after, many similar organisations were forming all over the world (Holmberg, 1985)

The fact that the OUs were government backed highlighted a new degree of recognition for this form of education reinforcing the basic rationale described in Chapter 2 of this thesis. Over time, they began to make use of many new methods of communication and resources in their course delivery. The traditional correspondence material was enhanced by using television and radio broadcasts. They made use of computer based training packages, audio tapes and 'study kits', allowing practical sessions to be completed in the home. Even though during conception much was made of

the benefits that new technology could offer, correspondence was still to play the major role in the delivery of most courses. The foundation of these forms of organisations began a new era in distance education.

The situation now is that technology has advanced and become an integral part of many people's working environment (Jennings, 1993). The EA course aimed to explore the use of this technology to facilitate a new form of education allowing shared learning in a European context. The next chapter of this thesis explores case study evaluations of past distance education courses which made use of similar technology to the EA course.

Chapter 6

Identifying past problems

Case study evaluations to aid construction of the EA course *(completing a Primary Knowledge Base)*

To reiterate the main purpose of this research, the core element of this thesis is the construction and evaluation of a specific distance training course, the EA course. It was intended that the EA course would evaluate strategies for providing successful distance education, the criterion for success being that intended learning outcomes would be achieved. The findings of this evaluation would be used to derive suitable recommendations for future course development. The only way to ensure that the strategies initially implemented in the EA course were as appropriate as possible was through consideration of case studies of relevant past distance education courses.

This chapter aims to identify the issues which were considered during the construction and delivery of the EA course. The most useful information to achieve this aim would come in the form of an 'in-depth' evaluation similar in nature to this one. Unfortunately, although an exhaustive search was made for such an evaluation it was not possible to find one. The apparent futility of this search was reinforced in a report from the British Department of Employment who, at the time of this thesis, had commissioned Birbeck

College to explore the possibilities for providing distance education based upon the use of computer conferencing. A report published by Birbeck College on behalf of the DOE surmised that, "There is need for further research into the effectiveness and suitability of conferencing as a tool for course delivery, further research should identify 'best practices' and produce guidance notes to encourage more effective use of the system." (D. O. E., 1993).

Even though it was not possible to identify evaluative studies of similar nature to this one, there were a number of case study evaluations from which useful information could be gained. Using, 'ERIC', the world wide computer database of academic literature it was possible to acquire information published on such case studies. Most of this information came from America where there have been many projects to provide distance education using technology. Following an examination of these case studies three were considered to be most similar to the EA course. Similarity in this case was based primarily upon the technology used to implement the courses delivered.

What follows is a summary of the reported activities within each of the projects. This is followed by information on any evaluation reported by those involved in the project. The summaries presented are all based upon information which was published by the organisations involved. Points which may relate to the EA course are discussed throughout the summaries in order to highlight the issues for the primary knowledge base. The specific points which relate to the primary knowledge base are highlighted in bold

type face to allow cross referencing between the case studies and the primary knowledge base.

The reports gave no indication of their criteria for assessment, only providing a generalised 'overview' of the situation. Comments summarised within these reports may be considered less useful without the formal declaration of all their assessment criteria and methods used. However, they were useful for the purpose of identifying the generalised issues for consideration needed in the construction of the EA course. Following these case study summaries, the actual issues or 'problem areas' identified are presented. These issues, along with those discussed in the previous chapter were then used to form a basis for constructing and delivering the EA course (the primary knowledge base) .

A case study of the NKI Electronic College (Thompson, 1992)

The NKI Electronic College was founded in 1987, from this time until 1992 it had sold eight hundred courses, with twenty graduating students. The students completed a ten course programme, equivalent to one year's full time study delivered using computer conferencing. This indicates that the NKI College has been involved in distance education for a greater period of time than the MTS project from which the EA course came.

An overview of the NKI college

The NKI College is located in Oslo, Norway and it is one of the country's largest non-governmental educational institutions. It was started in 1959 as a correspondence school, but now comprises the College of Engineering, the College of Computer Science, the Division of Distance Education, and the Publishing House.

The Division of Distance Education offers 60 correspondence programmes and 250 correspondence courses, mainly in technical and vocational subjects. It has 17,000 students who may also make use of an extensive network of face-to-face support classes. The tutors are part-time teachers employed from all around the country.

The College of Computer Science, established in 1983, offers a course in information processing paying particular attention to programming and systems analysis. This course was offered as full or part-time, both of which ran for 2 years. At the time of the report, the course admitted 100 students onto each of the full and part-time programmes. The part-time course was offered in three modes: face-to-face classes, correspondence and, since 1987, through the Electronic College. The Structure of the Electronic College was such that all interaction was carried out using the computer conferencing system.

The EA course also made use of computer conferencing for all interaction during the course. However unlike the NKI Electronic College the reference

material for the EA course was sent as hard copy through the post before the course began. The EA course also contrasted to the Electronic College in that it did not offer any formal qualification as part of the course and did not require the learners to submit any work for evaluation by the tutors.

The idea of the Electronic College was conceived in 1985. It was further developed by research into computer conferencing systems which were already in place. This research paid particular attention to other colleges which had used computer conferencing for communication within the delivery of educational courses. In the first two years the project was propelled by a few enthusiasts working in their spare time. The basic idea was to use a central computer to allow communication between tutors and students in the delivery of the information processing course. It was also intended that ultimately the administration and support structure would use the computer conferencing system. It was even intended that an informal computer conference should make provision for general chat. Due to the fact that it had used a number of computer conferences to reflect the different aspects of a 'conventional' learning establishment it was given the title of 'Electronic College'. **The report indicated that the notion of using the computer conference system to reflect a conventional study centre was considered to be a possible way to provide a familiar working environment to minimise learner apprehension about the course.**

The learners within the Electronic College had previous experience with computer and the course content focused on computing. This contrasted with the EA course which dealt with the more emotive subject of

environmental awareness and had many learners who had little or no experience of using computer networks for communication.

At first the Electronic College utilised support from the NKI's Division of Distance Education and the College of Computer Science. Initially, it is reported, few people were convinced of the value of the Electronic College, making it difficult to integrate it into the NKI organisation. However, after a reportedly 'slow' start the Electronic College was said to have thrived. By 1992 it had in the region of 800 students enrolling on its distance education courses.

The computer conferencing software that was used by the college, EKKO, was first designed and implemented in 1986. It was first used simply as a supplement to 'on campus' teaching. The first attempt to deliver a course entirely using the computer conferencing system occurred in the autumn of 1987. Since the spring of 1990, the college has offered ten courses in the Information Processing programme every semester. From 1987 until spring 1991, the student completion rate was 71% of all students enrolled on the course. A demographic survey of the students in 1988 showed that they were aged between 19 and 62 with the majority being male. It was also noted that most of the students were well-skilled computer users. The majority (90%) of the learners on the EA course were aged between 21 and 50, with approximately an equal number of men and women.

The Electronic College had one full time worker, the administrator. The rest of the staff were part-time, and over the years the college engaged twenty

teachers to tutor their courses. It was noted in the report on the Electronic college that the most important role was played by the EKKO system operator who handled the conferencing systems hardware, software and gave technical user support. The Electronic College was estimated to require the equivalent of one or two full-time employees in order to deliver its courses to around 100 students per semester.

In terms of the administration, the EA course and the Electronic College were similar. Both had one coordinator, in the case of the EA course this person was the author of this thesis. In addition to this both courses had a number of part-time tutors.

Content of the Information Processing course

The content of the information processing course was stated in the NKI College handbook:

> "The program is primarily developed for users of computers and software applications. The responsibility for utilization of computers is increasingly transferred to the users, so there is a need for people who can assume responsibility for local computer applications. These people need-in addition to their ordinary job assignment skill-enough knowledge about utilization of computers to understand the opportunities computers provide, and to participate in the implementation of computer projects. The program provides knowledge about information processing, allowing them to take part in system analysis and development, as well as programming. They will be able to develop small scale information systems and modify existing systems. It is, in particular, pertinent that they can apply these skills in their work environment" (translated from NKI

handbook, 1991).

The operational structure used by the Electronic College

To encourage a certain level of learner group cohesion there were fixed start and end dates for the courses. This contrasts with the opinion that distance education should allow learners to start whenever they like and work at their own rate (Holmberg, 1985). However the same philosophy was used for the EA course as it was necessary to have all of the learners working on the same topic to allow cross discussion between them. One part of the Information Processing programme required the learners to compile certain information which was relevant to their jobs. They were grouped into small teams of two or three and were expected to work together to prepare a report based on their combined information. They had to make use of the conferencing system to communicate with each other in compiling this report. This required that they could all contribute to the computer conference discussion within a fixed time framework (Thompson & Borland, 1992; p.7).

Further use of the computer conferencing system was made during a Role-Play which was part of their Information Systems 1 course. The students were assigned a role by e-mail and asked to discuss their subject using a computer conference as the forum. Important issues that arose during the discussion could be highlighted by the tutor, in order to bring them to the student's attention.

Group work activities and role-play scenarios were used by both the NKI Electronic College and the EA course. The intention in both cases was to stimulate interaction between the learners.

Methods used by the NKI college for assessing students

In 1989, the EKKO computer conference system was used to allow students to download multiple choice question sheets. They could then examine them and, once completed, upload them to a database held on EKKO to be automatically scored. The organisations involved in the EA course indicated that they would not be happy to have any formal testing as part of the course as this might interfere with their employees' day to day work.

A course on computer programming using PASCAL began in the autumn of 1988. Students taking the course would write programmes on their home computers, they would then send them to the host computer for the tutor to examine. Any corrections that the tutor felt were necessary could be sent back to the student using the system. PASCAL programs were sent electronically to the students for them to execute on their home machines, adapt or enhance before sending them back to the tutors. The host computer, EKKO, was also used to send 'model' programs to the learners (Thompson & Borland,1992; p.8).

An evaluation undertaken by the NKI College on their courses

Having outlined the structure and teaching strategies that the college employ, it is important to present evidence from an evaluation undertaken by the NKI college on their own courses. Part of this evaluation involved a final four-hour essay examination which was given to students taking the course using the computer conferencing system, as well as those taking the course by correspondence and 'on campus'. The results of the examinations were averaged for students using each mode of delivery on a scale from 1.0, the best grade through to 6.0, with the lowest pass grade at 4.0.

The results for the three different forms of course delivery were as follows:

Total average examination grades from Fall Semester 1989 to Spring Semester 1991. Source: Thompson & Borland, 1992; p.8.

Student Group	Mean	Number of Students N	Semesters
EKKO	2.57	288	fall 89-spr' 91
Correspondence	3.05	125	fall 89-spr' 91
On-campus	2.89	889	fall 89-fall 90

Figure 10: Reported evaluation results from NKI case study

From these results the report concluded that using computer conferencing

was a success in academic terms. The NKI Electronic College present three explanations for their findings. Firstly, students who opted to use the EKKO system generally had a better basic understanding of the technology on which the course was based. Secondly, more compulsory assignments were demanded of EKKO students than those taking the on-campus course. Finally, the working structure of the EKKO course involved more study in a similar format to the final exam. There is no mention in the report that using computer conferencing was perhaps a better way of teaching in this instance. It may be that in teaching a course on technology, there would perhaps be some merit in the use of the technology for delivery as it requires an enhanced level of 'learning by doing'.

In addition to the hard data of the exam results above, the Electronic College also examined the opinions of the tutors, learners and administrative staff as the college developed. During 1987, an introductory year of the college, tutors felt that they were not able to teach effectively using the EKKO conferencing system. **They felt that it was difficult for them to generate a cohesive group atmosphere within their students** due to their low number, only four people. **They also felt that the students were having problems using the modems for communication, they requested the implementation of a support group for users of the computer conferencing system.** There was no formal survey of the students of the course but documentation of comments from the students were far more encouraging. One student was recorded to have said: "Generally, I evaluate the scheme very favourably. It is right on target to offer a system pairing correspondence courses and evening classes"

(Thompson & Borland, 1992; p.10). It is important to note that though this course made use of technology to teach a course based on technology to learners with some experience in its use, they still reported problems with using the modems. This was considered to be a possible problem for the EA course as the EA learners would also have to use the same technology and were not, in general, experienced computer users.

The number of students enrolled on the EKKO course increased in 1988 and the time-scales of the course were restructured, to promote student coherence as a 'group' during their study. For the EA course, groups were used to provide a cohesive working structure for the learners in order to motivate and provide familiar learner group throughout the 3 month duration of the course.

Improvements were made to the technical support structure, acting on the previous year's comments from the tutors. The new reports from the tutors of the course highlighted a different set of issues to the previous year. They were pleased to be able to work when they felt that it was convenient, although they remarked that the **tutor workload was great.** They went on to say that they would expect the workload to diminish on repeating the course, as resources could be reused and a number of skills would be already established. **Difficulty was expressed over the task of generating student interaction using the system, too much was directed towards the tutor.** The NKI tutors also felt that their subject matter required graphical materials that they were not able to deliver using the computer system.

At the end of the same year, 40 students were sent questionnaires, 28 of which were returned for analysis. In the questionnaires they were asked to give an overall rating to the course on a 1 to 5 scale, 1 being very poor and 5 very good. The average was 4.1 for the courses offered. Students said that they were interested in the course partly due to the method of delivery. They said that they felt that the use of textual materials sent through the post, which were originally designed for correspondence courses, were useful as support material. The positive feedback from the students led the Electronic College to conclude that adaptation of correspondence material for delivery via computer conferencing was an appropriate strategy for course development.

Feedback from the students in 1989 indicated that there were very few problems with technical support in the project by this time. They found this most encouraging as it meant that they could concentrate on the important aspect of teaching the course material, rather than dealing with technical problems. The most recent study in 1991 took the form of an e-mail questionnaire sent to students after their final year. It is reported that only 5 questionnaires were returned. Even though the number of replies was low, the NKI College considered that a number of important issues were raised by them. Some students were of the opinion that **the tutors needed to do more to ensure that all participants were actively involved in using the conferencing system for communication.** The tutors for the courses were active face-to-face lecturers at the college and used their spare time to tutor, using the EKKO system. Students knew this and expressed that they felt

that the tutors may be looking upon their **electronic tutoring as a secondary function for them.**

It is clear that for the NKI Electronic College the opportunity to evaluate and adapt their course over time meant substantial improvement. Repeating the EA course was not possible due to restrictions in EC funding and the scale of a pan European project such as the MTS.

A Case Study of the Northern UTAH telelearning Project, (Barker 1989)

An overview of the Northern UTAH Telelearning Project.

The UBAVC (Unitah Basin Area Vocational Centre) is one of five state vocational technical centres. It offers courses to students in the Utah area, covering 10,000 square miles. It caters for secondary as well as adult students. The UBAVC offers technical courses to prepare students for initial employment, or to upgrade their job skills. The EA course did not cater for secondary school students, it was only offered to adults working within organisations throughout Europe.

The centre has mainly offered 'on-site courses' but, since 1985, they have extended their organisation to include distance courses. Their first distance teaching project made use of a microcomputer audio graphics network, which used a modem to send computer information between sites, via a telephone line. The modem was voice switchable so that when someone

spoke, the modem would stop transmitting computer data, and begin sending audio. This method allowed speech and data to be sent along the same telephone line. The EA course only used the telephone line to send computer data to facilitate computer conferencing, it did not involve tutoring using speech over the phone.

Three sites were linked in 1985 using this system, expanding to seven sites in 1986. In 1987-88 they linked four of the sites with UHF two-way television, and in 1988-89 each site also installed a facsimile machine. It was using this technologically diverse network that they provided their distance education. The technological infrastructure implemented differs from the one used in the delivery of the EA course, however it does offer some similar functions for instance: data transfer via modem, tele-visual presentations via satellite. The audio graphics network allows linking between microcomputers and a host, and the UHF broad-band microwave television network is a localised version of the satellite broadcasting that the EA course used. The network of technology that UBAVC implemented is a more localised system than that used by the EA course.

The UBAVC had 400 students between its initiation in 1985 and 1989, the year this report was produced. In 1989 the UBAVC had 26 full time employees. This is proportionately high in comparison to the other distance education establishments considered as part of this evaluation. The large number of teachers may be explained by the fact that the UBAVC made great use of live television and video. In comparison, the EA course had 50 learners enrolled and only one full time tutor, the author of this thesis.

The courses offered by the UBAVC covered traditional secondary school subjects, for instance Maths, Chemistry, Physics, English and History. Classes were transmitted live to the various sites by UHF microwave. All students taking the classes had to be at their receiving location at the time of broadcast.

Results of a study undertaken by UBAVC on their courses

The results of a study conducted by the UBAVC, on the implementation of distance teaching to reinforce their on-campus courses, were presented from three viewpoints.

The administrators generally rated the distance courses well. Their responses to a questionnaire, asking them to grade the courses on a scale of 1 (poor) to 5 (excellent), gave an average of 3.4 for quality. They rated the overall benefit of telecourses to their governing establishments with an average of 4.7. It is clear that they thought distance education was of great value as a supplement to their traditional on-campus courses. All of those questioned were reported to have mentioned the value of being able to offer a wider variety of courses, using distance education, than would normally be possible. Criticisms made by the administrators of the various establishments included: **difficulties with incorporating the work schedules into the daily routine,** some of the **students had problems with getting in contact with their tutors,** and **students were initially enthused by the fact that the project was new, but once this had worn off they**

became less interested.

The tele-teachers delivering the UBAVC courses were full time teachers working part time on the project, and had an average of 13 years' teaching experience. They commented that the student groups were of an appropriate number, with a maximum of 25. They also reported that their workload was not too great; it took about half an hour a day for preparation, and written assignments took, on average, five days to grade. But they did feel that **more preparation was needed for telecourses than for classroom lessons.** They also mentioned that **telecourses did not involve enough interaction to explore the intricacies of a subject in depth.** Partly for these reasons, none of the tele-teachers felt that distance education would ever take the place of regular classroom teaching.

The students of the UBAVC course were asked whether, if given the choice, they would prefer taking the same course as a telecourse or as a regular class. In response, 45% indicated that they would rather be taught by telecourse. The opportunity to meet others was pinpointed as one positive aspect by 30% of the students taking the telecourses. Some (7%) felt that it took too long for the tutors to assess and return any tasks that they were set. And around 30% of the **students complained of a lack of personalised attention.**

Educational Systems through Telecommunications) (Burke & Garrard, 1989)

In the spring of 1988, staff at the Green Bay Area Public School, Green Bay Area, Wisconsin, U.S.A signed an agreement to operate the Green Bay Area (GBA) ITFS system (Instructional Television Fixed Service). By the autumn of 1988, the ITFS consortium comprised 15 member school districts, as well as 30 identified receiver sites. This summary is based upon a report on the pilot year of this project, covering the 1988-89 academic year.

An overview of the PROJECT B. E. S. T

The institutions involved in the project were high schools in the Green Bay Area. The purpose of the project was to establish a distance learning programme for high school students in the area, to supplement their usual classroom education. There is a clear difference between this and the EA course, the EA course intended to provide vocational education to working employees, whereas the project B.E.S.T was aimed at secondary school level. The communication networks set up by the ITFS system were also to be used to train the staff who were to become the actual tutors in the project.

The Director of Instructional Resources for the GBA schools became responsible for the management and operation of the ITFS system, with the help of two staff members at Southwestern High School. The GBA Public Schools proceeded to establish the Telecom Advisory Committee (TAC), made up of teachers, curriculum supervisors and administrators. The role of

the TAC was to select the ITFS program for both staff and students, and to monitor the ITFS system's operations. The actual ITFS staff included a full-time secretary, a so called 'mass media' teacher and five student assistants.

The body responsible for developing the programming for staff development and student enrichment, and for establishing the budgets and fee schedules was set up, named Newtec. This group also included a planning team for the potential future use of the system. Newtec was governed by a Board of Directors which consisted of seven superintendents from member districts. For the EA course, many of the operational decisions were made by the course coordinator. As the EA course was delivered and funded by the EC as a DELTA project, there was a rigid time framework within which certain objectives had to be reached (Appendix C).

The technology used for PROJECT B. E. S. T.

The distance teaching mechanisms used in Project Best included telephone conference bridge systems, satellite broadcasts and interactive video conferences. Staff participated first in interactive staff development programmes after the school day, using 2-way audio and 1-way video systems, as well as satellite teleconferences. Then the actual student programmes were initiated soon after. These consisted of a daily satellite broadcast of a calculus course at seven am, followed by a telephone conference bridge system. There were monthly live interactive video conferences broadcast from NASA, via satellite, on topics ranging from aeronautics, to future exploration and developing technology for new

applications in space research. A nature series produced by National Geographic was broadcast via satellite, as well as an arts programme once a week. Other monthly broadcasts covered topics of especial current interest to teenagers, during school lunch hours. A newsletter was issued every quarter, which gave information on the specific topics, and a calendar of programming to receiver sites.

Most of the study undertaken by the learners on the EA course was using the background resource material (Appendix A) and the computer conference system. The project B. E. S. T. focused upon the use of video conference and satellite broadcasts for its tutoring. In this respect it was similar to a lecture, providing information through exposition. The EA course aimed to focus on the use of computer conferencing for discussion between the learners and promote a sharing of ideas between them.

An evaluation of the PROJECT B. E. S. T.

The success of this project was assessed with the use of evaluation questionnaires filled out by participating staff and students, both at midterm and at the end of the pilot year. On the whole, the distance education course was deemed to be a 'success', both by staff and students. Teaching staff who took part in the staff development training found they were more comfortable listening and watching the programming, than using the telephone bridge system. But in contrast, students adapted more easily to the interactive technology, and found that the teleconferences, with the telephone bridge system, were especially effective. Overall, **tutors found**

that interaction was stimulated when the presenters incorporated specific activities requiring the participants' input through the system.

It was found that the **presenters who used a variety of multimedia, to maximise the effect of the interactive technology, received higher scores for their presentations**, by staff. In other words, it was generally agreed that a large proportion of the success of programmes could be attributed to the quality of the presenters. Another point which arose as **an important factor for a successful distance course was the availability of articles and support resources to accompany programmes.** In this case, this material was mailed out to staff before and after transmission of programme segments. Many expressed concern over delays between the sending out of information after a session, and actually receiving it. **Students also found the mail system, used for returning tests and quizzes, very frustrating.** They thought it was very important that they receive their test results prior to going onto the next section. A more efficient transmission of documents was therefore suggested as an essential improvement for future distance courses. Suggestions to do this included the use of facsimile machines, electronic mail, or the setting up of computer networks using modems (computer conferencing).

Other complaints were concerned with various technical problems which arose, mostly during the first semester. These initially caused some delays, and lowered programme quality, limiting the effectiveness of the system during this time. For instance, for a while at some sites, students could only watch black and white transmissions, with a lot of interference. The

technical problems were mainly due to improper alignment of receiver antennae, and to the incorrect installation of microwave transmission and receiver equipment generally. Despite these problems with the system, the ultimate goals were still achieved, and the mistakes were rectified. Some further complaints related to limitations of access to telephone lines and conference phone units.

Conclusions drawn from the case studies and the history of distance education

It is clear that organisations such as the NKI college benefited from the opportunity to repeat their courses, adapting them as they did so. The EA course was delivered as part of DELTA's MTS project and there was no opportunity to repeat the course. However, this section of the thesis has considered some of the issues from past experiences. It is hoped that the details provided as outcomes of this research will offer future opportunities for course development.

This final section draws together a number of points derived from the case study evaluations. It also includes the points highlighted from the previous chapter. These points have been grouped into sections so as to relate to the different aspect of the EA course.They have been separated into sections but they should not be considered in isolation as they relate to the whole process of constructing and delivering a distance training course.

The primary knowledge base for distance education

The areas for consideration when constructing and delivering the EA course identified by examining past case studies are:

For the Learners

- Learners must feel that their tutors are 'accessible'.

- Support; the learners need to feel that they have all of the information that they require to carry out their studies. This is most likely true of all forms of education, but in this case, the learners are likely to be working in an unfamiliar environment and therefore the problem may be more pronounced.

- Cohesive working atmosphere; it is important to ensure that there is a cohesive group feeling amongst the learners.

- Special planning must aim to allow a certain degree of flexibility to cater for learners who have difficulty incorporating their study into their daily working routine.

- Strategies to ensure learner motivation throughout the course are necessary. Initial learner enthusiasm for the course has, in the past waned as the course progressed which

may lead to a decrease in learner participation.

- Strategies to stimulate communication between the learners are necessary. Communication is unlikely to take place of its own accord, as one might expect in a classroom situation. In the past, there has sometimes been too little interaction using the computer conference system to explore topics in depth.

- Attention to ensure that the learners become familiar with the technology is necessary; expecting that the learners will feel at ease with using the technology without guidance and support may lead to frustration and student drop-out.

- The course material must be stimulating to the learner, not only to encourage communication but to sustain interest. It should include specific activities requiring participant input to ensure interaction.

- Structure; the conference structure must provide easy access to needed information to allow efficient use by the learners and tutors and keep costs to a minimum.

For the Tutors

- Personal attention to the learners will help to ensure that they feel satisfied with levels of tutor support. It also helps

to motivate them.

- Tutors must be accessible to the learners on a frequent basis and not consider their role as secondary to other commitments outside the distance learning course.

- Tutors must be aware of the new teaching situations to avoid problems such as work overload.

- In order that the tutor may exploit the facilities provided by the technology, they need to have a well founded understanding of it.

- Stimulating communication and shared learning by tutor involvement is necessary throughout the course and not just at the beginning.

- The tutors need to pay particular attention to the working structure used for the learners to ensure that they feel supported during their working activities.

For the Technology

- Technical problems must be resolved very quickly so that they do not impede learning.

- O The technology does not always work as it is supposed to, therefore contingency plans need to be part of the course design.

- O The technology must be adapted as much as possible to cater for the needs of the teaching-learning situation.

- O The technology should be used to provide a familiar working structure which will support the learning activity and reduce learner apprehension.

For the Course Material

- O Delays in arrival of course material for learners can be obstructive to the learning process and cause frustration for learners.

- O If not self explanatory, the course material can cause at the least much more work for the tutors, learner discontent and may possibly lead to student dropout.

- O If not comprehensive enough, it may also lead to too much work for the learners to do to make up for its inadequacies.

- O Not promoting communication and shared learning can preclude learner-learner interaction.

- If not interesting enough, the learners will rapidly lose interest.

The issues outlined form the major areas which were to be addressed by the practical implementation of the Environmental Awareness course. The next chapter describes how these issues were addressed as part of the practical implementation of the EA course.

The EA course, Construction and Implementation

Chapter 7

Construction and implementation of the EA course

This chapter describes how the EA course was constructed to address the issues identified in the primary knowledge base outlined in the previous chapter. It begins by outlining the general approach taken in constructing the EA course. It then goes on to provide a more detailed discussion of the course and how it addressed the issues identified within the primary knowledge base.

The EA course design

To construct the EA course, a number of working areas were identified:

- *Preparation*; before any work on creating and delivering the course was undertaken, the tutor group was to be informed of the problems with past courses, the use and functionality of a computer conferencing system and live satellite broadcasts. A working structure for the separate parts of the course was needed, as was a realistic schedule for the course production and delivery.

- ❒ *Working structure*; an appropriate working structure for the learners and tutors to work within needed to be identified.

- ❒ *Generation of the course materials and learner tasks*; construction of the course resources and tasks, including a time schedule for the course.

These working areas were not addressed in isolation as the course was constructed and delivered, they are only listed separately for clarity. Having identified the working areas, greater detail is necessary to explain the practical implementation of the EA course relating to these areas.

Preparation for the EA course

In preparation for the role as an EA course tutor, a two-day training course was set up to give details on the computer conferencing system. The researcher was the only full time course tutor but further assistance was provided by three other lecturers from the University of Southampton on a part time basis. The aims of the two-day course were to familiarise tutors with the technology, allowing them to exploit its use in the course they were later to create. It involved a practical demonstration by a representative of CECOMM, one of the technology provider partners of the MTS. During the practical demonstration the tutors were firstly shown how to connect up the hardware that they would be using. A simplified explanation of the technicalities of how the technology worked was also given. The

presentation went on to demonstrate all of the procedures involved in using a computer conference system. An explanation of the working structures which the computer conference system offers was then given as well as suggestions as to how it may be exploited to the full.

Having demonstrated the technology, the tutors were given a test login ID and allowed to try some simple tasks, using the system themselves. They were asked to join various conferences, amend items in these conferences, edit text which they had produced and send e-mail messages. These techniques were to form the basis of the skills which they would need as EA course tutors.

The second day of the course dealt with giving further information about the system which would allow them to exploit the technology as much as possible. This included details on mailing lists, response structures, batch uploading information and response time scales (Jennings, 1992).

Apart from needing enhanced knowledge of using the conference system, there was a need for some idea of the time scales involved when comparing face-to-face teaching with teaching using computer conferencing. This information was based only on the past experience in both forms of teaching undertaken by CECOMM, it was not based on any recognised method of evaluation and quantification. The tutors felt that some idea of what they could expect their learners to achieve in the time available would be valuable, even though no formal evaluation in this area had been undertaken in the past.

In preparation for the satellite broadcasts, a similar two-day course was organised. The tutors went to the Audio Visual Centre, a television studio at University College, Dublin. Here they were briefed on the 'workings' of a television studio, the roles of the people involved in the production and the organisational methods used when producing a live broadcast. Practical experience in front of the camera, both with and without an autocue, was given during the afternoon of the first day. During the evening a plan, or 'running order', was drawn up for a complete programme lasting one hour which would be similar to those in the course. During the morning of the second day the planned programme was rehearsed and in the afternoon it was filmed as if going out live.

The next time that the tutors went to the AVC centre would be for the actual live broadcast. It was considered vital that tutors were given some experience in televisual presentation, unfortunately more than two days was not possible due to other time commitments for some of the tutors.

Having gained experience in the technologies used in delivering the EA course, the next step was to bring to the attention of the tutors the problems outlined in the previous chapter. Understanding the technology was addressed firstly, in order that the explanations of past problems in its use for distance education could be fully understood in context. To achieve this, a meeting was organised during which the issues highlighted in the primary knowledge base were explained.

This concluded the initial preparation for producing the course; the next step was to produce a working structure within the conference system for the learners to use.

Preparation of a working structure for the learners on the course, the 'virtual study centre'

The virtual study centre was constructed to respond to the identified need for the learners to have a familiar and cohesive working structure. This relates back to the general principles of learning discussed in Chapter 3, as well as the primary knowledge base discussed in the previous chapter. It makes use of the facilities offered by the computer conferencing system, to mirror the more familiar working structure of a traditional study centre. A similar idea to this was used by the NKI Electronic college discussed in the previous chapter.

The computer conference system allows a number of conferences to be organised in a hierarchical structure. To reiterate, a computer conference is an area of a host computer's storage which is set aside to hold files containing text. These text files are automatically concatenated chronologically to allow discussions to take place. When logging on to the host, a user automatically joins a predetermined conference; it is then possible for the user to join any other conference to which they have been given access by the conference moderator. The 'study centre' structure implemented in the computer conference system for the EA course consisted of an administration area, which would be the first encountered on

joining the computer conference, then there were 'doorways' into a number of other areas:

- ❒ The library; was where the learner could find the references for the course as well as contact names and addresses for organisations which could help them with their study.
- ❒ The Pub; was where learners could have informal discussions.
- ❒ Support; this area held information about common technical problems that people had encountered in the past along with solutions to these problems.
- ❒ Study rooms; these areas were where learners would be able to meet in smaller groups, in groups of ten in the case of the EA course, to carry out any course assignments. This was where most of their work for the course would take place.

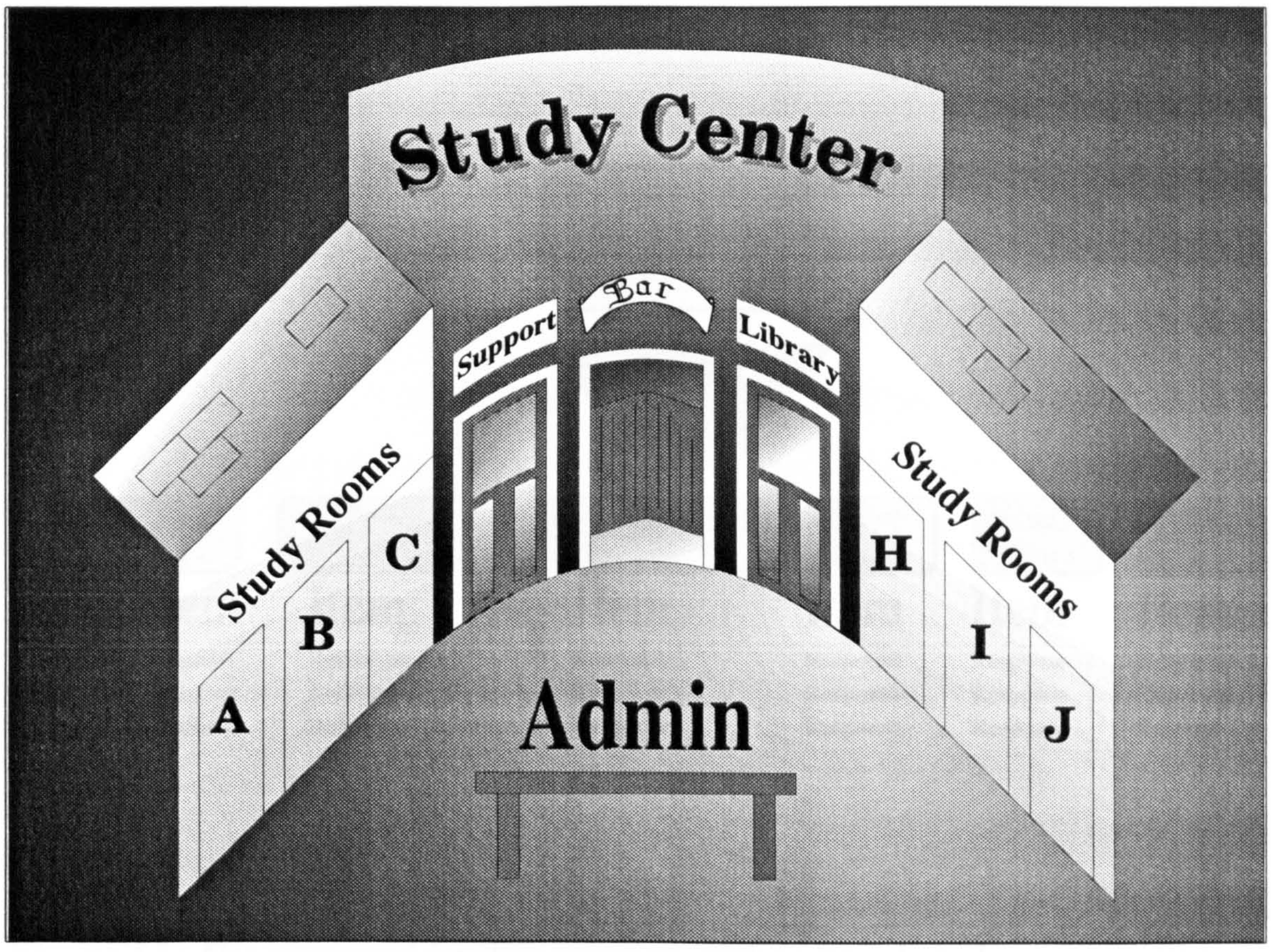


*Figure 11: The virtual study cent*er

The diagram above shows the working structure used for the computer conferencing system, the diagram was also included in the learner handbook (Appendix A). The initial conference which the user joined when logging on was named 'Admin'. This conference held public notices, course information and any other relevant material. From this conference it was possible to 'join' any of the other conferences such as: support, the bar, the library, or one of the study rooms. Once in any of these conferences, it was still possible to leave it and join any of the others. In this way it was possible for the learners to 'wander around' their virtual study centre.

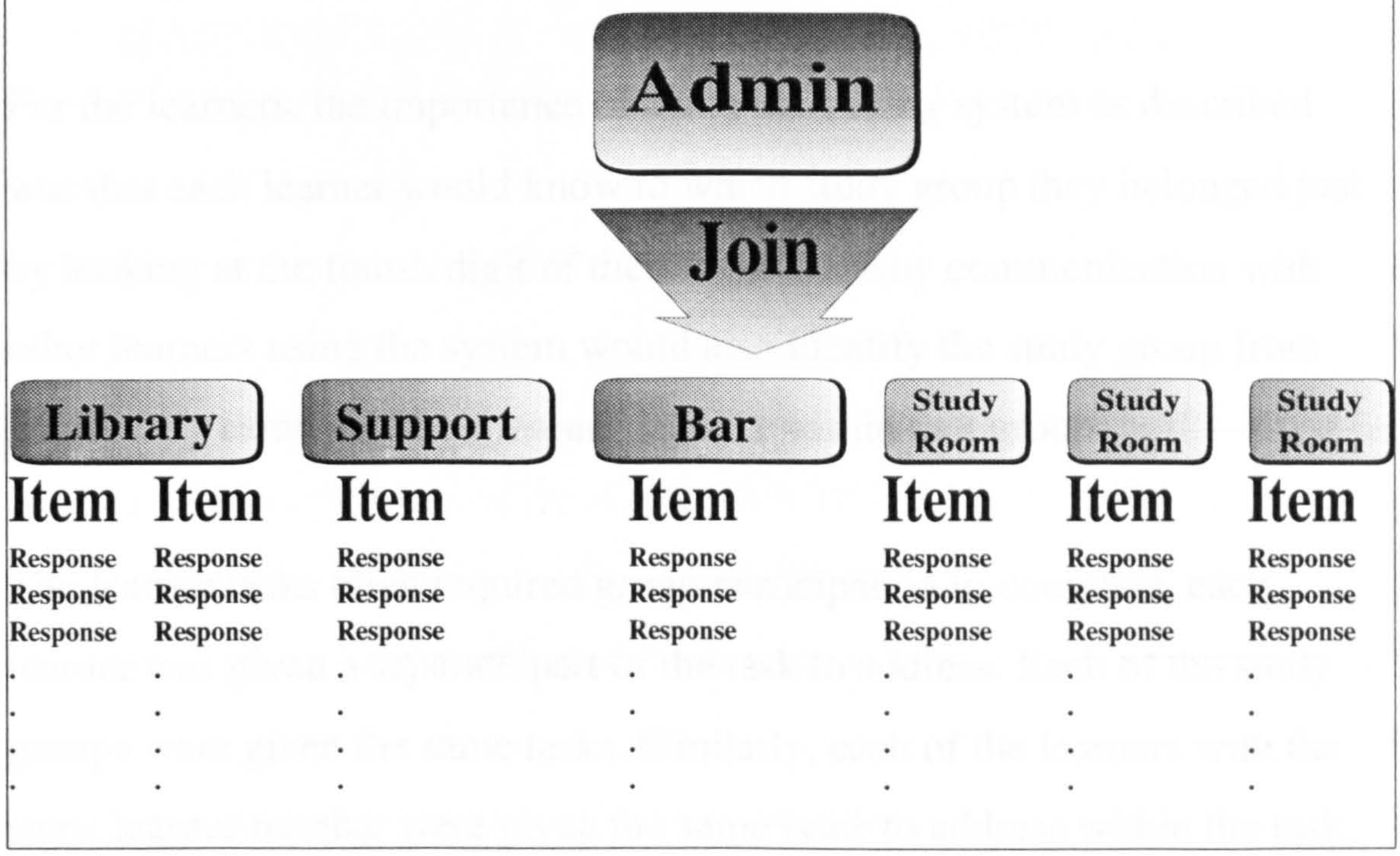


Figure 12: The practical implementation of the virtual study centre within the computer conference system

To enhance the working structure for the learners a special code for their login ID was used. Every user of a computer conferencing system had a login ID code, this code usually has no relevant meaning for the user, they are simply expected to memorise it and use it to allow the computer to recognise them as a registered user. For this course however, a special coding system was used for the login ID's. The CAUCUS conferencing system required that the login ID needed to be eight digits long. The first three digits were used to identify the EA learners as a subset of those belonging to the MTS project. The next digit was a letter, representing the study room to which they were assigned. The next digit was their learner number, ranging from 0 to 9. Each study room labelled A to E was used for

ten learners numbered 0 to 9. The last three digits of the login ID were used for the learner's initial and the first two letters of their surname.

For the learners, the importance of using the coding system as described was that each learner would know to which study group they belonged just by looking at the fourth digit of their login ID. Any communication with other learners using the system would also identify the study group from which they came and their learner number within that group.

The learner tasks often required group participation to complete, each learner was given a separate part of the task to address. Each of the study groups were given the same tasks. Similarly, each of the learners with the same learner number were given the same issue to address within the task. The intention was that the members of the learner groups would work together to complete the tasks. By adopting the coding system, when one of the learners, say learner 4, had a problem or an interesting point to discuss it was possible for learner 4 to e-mail their point to all learners with login ID *4*. The use of *'s as 'wildcards' ensured that learner 4's from all study groups would receive the message. In this way it was possible not only to have communication within the groups but also across the study groups.

Using this system for coding the login ID's was intended to be of benefit to the tutors as well as the learners, because it enabled them to communicate with all learners from any particular group or any of the learners working on the same task simply by using wildcarded ID's. The main aim of creating this structure was to provide a coherent working atmosphere, promoting

communication and presenting a familiar setting for work to take place.

Constructing the EA course content, resource material and schedule

Course resource material, 'the learner study pack'

The course material was split into four related sections or units which ran sequentially over the period from 18 March 1993 to 24 June 1993 (see course schedule, Appendix A). Each of the learners participating in the course was sent a pack of information which constitutes Appendix A of this thesis; this was sent on 9 March 1993, so that they would be able to examine it for at least one week prior to the course starting. A covering letter introducing the contents of the study pack, explaining what the learner needed to do before the course began and giving hints on how to get the most from the course was included in the pack (see document 'an introduction to the EA course', Appendix A). This was done to address the problems which learners in the past had suffered, not knowing what was happening when the course began or what was expected of them. The special coding system used for the learner's login ID was explained on a second sheet included in the study pack, which also gave them their login ID (see document 'your login ID explained', Appendix A).

To try to avoid problems with learners having difficulties logging on to the system, connection software which had all of the appropriate settings already included was sent as part of the study pack, along with a document

explaining how to load and use it (Appendix A).

To avoid the past problem of the learners not knowing what was happening next during the course or what was expected of them, the whole course schedule was included in the study pack (Appendix A). As the learners were to be able to work at their convenience, within necessary deadlines, the schedule was constructed to allow flexibility as to when the learners carried out their work, as per the Rustin approach (Holmberg, 1985). It was considered 'necessary' to have a schedule for activities within the course, as a shared learning experience would not be possible otherwise.

The content of the EA course

The EA course was split into four parts which ran sequentially and dealt with various aspects of the subject material. As the course was split into these parts or units it is appropriate to present them in the same structure.

UNIT 1

The first of the course units was designed to introduce the skills necessary to use a computer conferencing system. It did not deal with any of the environmental subject material. A study of past case studies shows that it is vital to ensure that the learner group is comfortable with the technology which they are about to use. The start of this unit, and indeed of the whole course, was a live satellite broadcast, which was used to demonstrate how to set up the hardware, how to install the software and how to use the

computer conference. This was achieved through demonstration during the programme. To reinforce the information given during the presentation, the same information was also included in the learner handbook as chapter 1 (Appendix A).

To ensure understanding of the concept and practical use of the computer conference system, three simple tasks were included (learner handbook, Appendix A; p. 17). Even though the learner tasks could be completed in half an hour, two weeks were given for this exercise. Past experience highlights that initial support is very important. Therefore two telephone contacts which learners could use for help with any difficulties were provided. The two weeks allowed the course coodinator (author) to ensure that all learners understood the use of the technology, this was established through the tasks set or during follow up telephone calls.

The tasks asked of the learners were specifically designed to require interaction between the learners and to introduce them to the use of the computer conference system. Then the learners were asked to join the 'pub' conference where they were requested to interact with the whole learner group by making up limericks (task A, Appendix A: p 17). They were also asked to join their study room conferences and introduce themselves to their working groups. The actual amount of interaction for this unit was expected to be relatively low as the main aim was to give the learners an understanding of the computer conferencing system and introduce them to one another.

UNIT 2

The second unit of the course had two main aims. One was to try to create a situation which would encourage learner interaction using the computer conferencing system in an informal setting, so that they would gain confidence in communication using the new technology. The second was that they would themselves identify the important issues and questions relevant to the subject areas which were to be dealt with later in the course.

The methodology for achieving these aims was to construct a role-play situation. As role-play requires a high level of interaction and allows those involved to explore a subject area through simulation, it was considered most appropriate for this situation. To ensure that the role-play would successfully identify all of the areas of importance, and to offer as much support to the learners as possible, it was highly structured. This involved giving learners details on the hypothetical situation for the role-play, as well as background information on all of the characters in the role-play.

Each learner was sent a map of a hypothetical area named Puedam, 'made up' spelt backwards (Appendix A). This map showed a number of features of the area including mountains, the sea (good fishing areas), nature reserve, a village, harbour, beach and roads. The map had a labelled grid on it which would allow the learners to make reference to features or points on it when discussing them using the computer conference.

Included in the learner handbook, chapter 2, was information relating to the

role-play (Appendix A). In this chapter more detailed information on all of the areas on the map was provided, for instance explaining that development on the mountain areas would be very costly. It provided information on the special value of certain areas. At the start of the chapter is an outline of the scenario for the role-play and information on what was expected of the learners. The idea was that there was to be a hotel development somewhere in the region outlined on the map. This hotel development was to be as environmentally friendly as possible. The simple task that the learners were set was to try to come up with an appropriate location on the map for the development, and also an outline on what measures they would take to ensure that the development was as 'green' as possible.

To achieve this they were also asked to identify and list all of the issues which arose during their discussion of the problem on a sheet provided in the study pack (Appendix A). They were asked to classify the issues which they identified as: economic, emotive, legislative, procedural and others. Definitions of these terms were provided within the course handbook. It was hoped that by classifying the issues in this way, the learners would understand that environmental matters are diverse in nature. It was also hoped that they would start to identify the importance of the issues to be dealt with later in the course, as well as areas where they required further knowledge.

The working structure used to allow the learners to explore the problem set was to split the learners into groups of ten. Each group consisted of learners

from different locations or organisations. Each group had a computer conference set up for their exclusive use, their own study conference. There were ten roles or characters set up to carry out the role-play, each person within the group was assigned a role which they would assume throughout the unit. The same ten roles were used for all the groups. The roles were picked so that a number of different viewpoints would be expressed during discussion. In the learner handbook, a brief description of each of the characters was given so that all the players had information about the other people in their group. The roles were assigned to the learners by e-mail and a full list of who, within the group, was playing which role was added as an item in their conference.

Further to the information in the learner handbook, more detailed private information about the character that the learner was playing was sent by e-mail. The information that was sent to the players was designed to promote conflicts of interest within the groups. The players were told this, and that they should feel free to explore these conflicts of interest, as by doing this they would gain a greater understanding of the subject matter. The learners were given four weeks to work together on the role-play.

The information which arose from this exercise was used in the satellite broadcast seminar. During the satellite seminar, experts in the relevant fields were asked to give their views on how they would have approached the problem set, and to outline the relevant issues from their viewpoint. To allow comparison between the learners' experiences using the conferencing system for the role-play and that of a group of people doing the same role-

play in a face-to-face situation, a pre-recorded film was shown. This pre-recorded material was filmed on 18 February 1993, before the course started. It involved briefing a group of volunteers before going to the television studio at the University of Southampton to be filmed. The briefing gave exactly the same information as that which was given to the learners using the conference system. The briefing took place two weeks before the recording session, which gave them time to prepare their arguments. The role-play was filmed live in the studio but was then edited to 35 minutes for inclusion in the satellite programme.

The main type of interaction which was encouraged during this unit was between learners in groups. The way that this unit was intended to relate to the other units in the course was that the learners were able to see why they were being given the information provided by later units of the course. They would also have an overview of the subject matter which would allow them to see later environmental issues in 'context'.

UNIT 3

Unit 3 of the course was created so that it would provide a number of resources which the learners could use for their work. These resources were included in chapter 3 of the course book (Appendix A). The learners were asked to complete three tasks which would make use of these resources; these tasks were sent to the learners' study room conference, the tasks sent are included as part of Appendix B.

It was hoped that the role-play of Unit 2 would identify environmental legislation as an area needing further study and more information. The main rationale for this unit was that it would not simply try to explain current legislation, but would firstly give an idea of how publicised environmental disasters and increased pressure has motivated its development. In addition to this, the structure of current legislation was explained, as well as methods which the individual could use to find out exactly what was applicable to their situation.

This approach was adopted for a number of reasons: to ensure the learners sustained interest and to explain its role in the development of Europe. As the learners were from a number of different organisations and countries, creating course materials which gave details specific to each learner's situation meant that only one small portion was of direct relevance. This was not considered appropriate for sustaining a learner's interest and could lead to many of the problems encountered in the past.

To promote interaction and a shared learning experience, the tasks required cooperation between the learners in order to complete. It was also hoped that the need for a combined effort from learner groups would ensure learner participation. If one learner was not undertaking their part of the task, the other learners would have to make sure that they did become involved, to allow the completion of the task. It was also hoped that, as the learners were aware themselves of the need for commitment, they would ensure their own contribution and involvement.

The tasks which the learners were asked to undertake are included in Appendix B; the timetable for these tasks is part of the course schedule (Appendix A) and the resource materials are included as chapter 3 of the course handbook (Appendix A).

UNIT 4

Having given a basic understanding of environmental legislation, Unit 4 was created to explain some of the new practices and procedures which have been generated to cater for the new legislation. This unit involved combinations of both types of activities described in the previous two units. As in Unit 2, it involved learners working in hypothetical situations to explore areas where real experience was not practical. In addition to this, it provided resource materials to aid the learners in completing group tasks.

This part of the course was split into four sections. Each of these sections examined a different procedure, looking at: Life Cycle Analysis,

Environmental Audit, Environmental Impact Assessment and a section on Promoting a Green Image. These were considered to cover the majority of environmental procedures relevant to commercial organisations.

The first section of the unit examined Life Cycle Analysis; background information was included in the learner handbook. This information gave details on what an LCA is, when and why it should be used and what should be included. It also gave information on who conducted previous LCA's as well as where and for what reasons they took place. The learners were then asked to pick a household item and perform an LCA on it. They were requested to send the end report of their LCA to their course tutor by e-mail for correction and comment.

The second section of the unit examined Environmental Auditing. It was the largest of the four sections in this unit of the course. Resource material was included in the handbook, describing the essential elements of an environmental audit. The learners were split into the same groups of ten and worked within the same conference study rooms as for Unit 2. They were each assigned a separate task, but had to work together to cover all the aspects of an environmental audit. To allow them to carry out the environmental audit, and to ensure that all the issues were covered, they were given a specially constructed profile of a fictitious company. This company profile described the organisation on which they would perform the environmental audit. Each of the learner groups had a different company to audit, their independent company profiles were presented as items in their study room conferences.

The third section of the unit dealt with a study of environmental impact assessments. The background material in the learner handbook included a diagram outlining the procedure, as well as a skeletal structure of content. The learners, still working in their groups, were requested to consider that the company on which they had just conducted an environmental audit wished to expand. As the company had developed a greener image through the environmental audit, they wished to ensure that any future plans were just as green. The learners were informed of the company's future plans in an article which was sent as an item to their computer conference. The learner groups were requested to work together to prepare a report on what actions they would take in performing an environmental impact assessment on the company's proposed expansion. Their final report was submitted to their peer learner groups for comment. The final reports and the comments by the other learner groups were discussed during the live satellite seminar.

The final section of the unit took the form of a satellite presentation; this was used to bring together all of the different experiences of the learners, discussing the issues which arose with experts in the studio.

It was hoped that by giving the learners the relevant information and then asking them to make use of the knowledge acquired, an understanding of the relevant background information and a practical understanding of the process would be ensured. This unit once again made use of combined tasks requiring learner interaction in order to complete. By providing all of the background information necessary, as well as interesting and interactive

tasks, the problems outlined earlier were expected to be avoided.

Further detailed information on the content of the course may be obtained through examination of Appendices A at the end of this thesis. The course described was delivered to 50 learners from throughout Europe (*see map*, Appendix A).

Evaluation of the course

Chapter 8

Evaluation methods used for the EA course evaluation

This chapter begins by briefly reiterating the rationale behind the EA evaluation, considering its primary aims and objectives. It continues by examining the practical opportunities for evaluation which were available for the EA course. Having discussed these issues, it then considers how these aims were addressed making use of the opportunities available. Following this, an outline of the structure used for the evaluation is given, along with an overview of the approaches taken.

The EA course evaluation

The main aim of this research is to take a step further in the provision of distance education using multimedia technology. Thus far, issues for consideration when constructing the EA course, which were based upon past case study evaluations, have been identified (the primary knowledge base). The evaluation of the EA course aimed to build upon this information to construct the secondary knowledge base, thereby taking a step further in the provision of distance education.

The general principles section of this thesis (Chapters 3 & 4) explored

issues relating the learning process and educational evaluation to distance education. Within Chapter 3 (effective learning, *general principles*), issues relating to the learning process within distance education were considered. The overall process of the EA course was broken down into three stages; construction, implementation and outcomes. Within each of these stages a number of factors such as: personality, learner apprehension, past experiences, the use of technology for communication as well as many others were identified. The diagram shown below was constructed to outline the issues relating to the learning event and provide a basis for consideration of learning in the context of distance education.

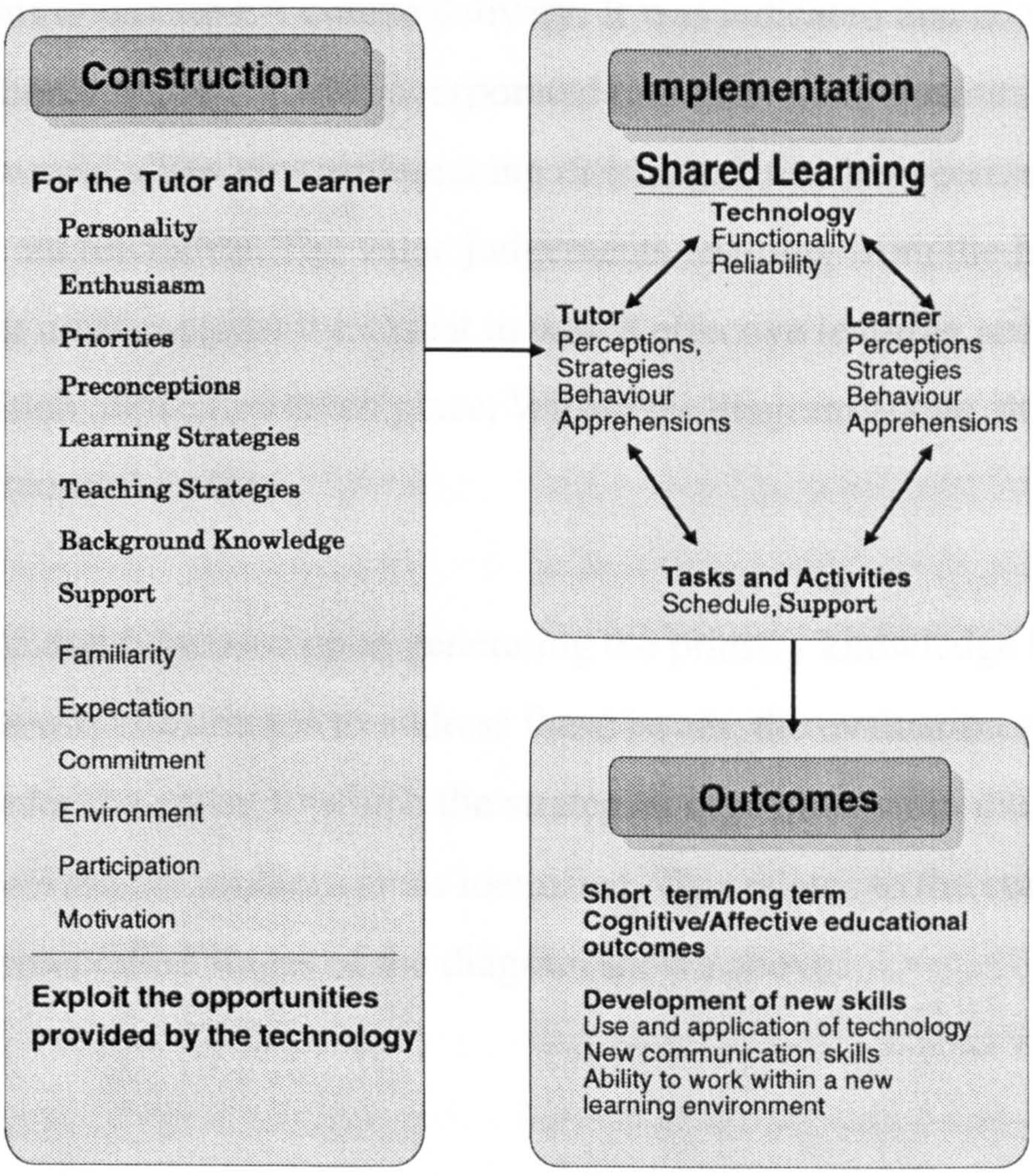


Figure 13: The diagram of effective learning (reprint, fig 7 - Chapter 3)

In addition to the model of the learning outlined above, Chapter 3 also identified a definition of the term effective learning:

> **When it is possible to identify intended, measurable learning outcomes from a learning situation, effective learning can be considered to have taken place if these intended learning outcomes have been realised by the learner.**

Chapter 4 (educational evaluation, *general principles*) of this thesis considered educational evaluation in relation to distance learning. The evaluation process aimed to provide the information needed to make value judgements about the EA course delivery. It was indicated that adopting a multimethod approach which incorporated qualitative and quantitative methods would allow cross-referencing or triangulation between sets of results to aid reliability. The value judgements resulting from the EA course evaluation must consider the extent to which effective learning according to the definition above had taken place. Within the diagram above, this refers to the 'outcomes' section.

Chapters 5 and 6 focused upon generating the primary knowledge base. As the course was constructed to address these issues, the evaluation should also consider the extent to which the strategies implemented in the EA course resolved the problem areas identified. This relates to the construction and implementation stages of the diagram shown above.

The opportunities available for the evaluation of the EA course

Before outlining the actual approaches undertaken to evaluate the EA course, the opportunities available for the evaluation must be considered.

The learner group consisted of employees from sixteen organisations located in: Spain, England, France, Ireland, Belgium, Denmark and Holland. This meant that there was difficulty in getting to meet each of the learners individually for evaluation purposes. Most of the participating organisations, though happy that their employees would have involvement in the course, were not happy that a formal written test should be included as part of it. The most common reason for this was that they saw the course as experimental in nature and did not wish to put their employees under undue pressure.

The nature of the learner group, coupled with the fact that a written test was not possible, had certain implications on the observational opportunities for the evaluation of the EA course. Due to financial constraints as well as those of time and distance, it was not feasible to gather the learner group together for any other form of evaluation. This, to a certain extent, is contradicted by the fact that the learner group were 'gathered together' within the virtual study centre of the computer conference system throughout the duration of the course. Therefore, though the evaluation could not make use of formal testing or bring the learners together for an informal group discussion, there was the opportunity to make use of information held in the computer conference system.

A useful feature of the computer conferencing system is that every time a learner contributes to any discussion or sends any e-mail, the computer will log the sender's user ID and the time and date of transmission. This meant that any interaction using the computer conference system would be stored automatically. It was then possible to download, save to disc or print out transcripts of all 'conversations' taking place during the course. The learners needed to use the computer conference for all interactions. This meant that the situation was somewhat similar to using an audio tape recording of all discussions in a traditional face-to-face classroom.

The background and reference material for the learners (the learner study pack, Appendix A) was sent by post; none of the organisations involved objected to the inclusion of a questionnaire with this pack. In addition to this, there was some opportunity for the researcher to interview learners on a one-to-one basis after the course was completed.

Even though formal written tests were not possible, the opportunities for observation outlined above provide a number of possibilities for an evaluative study.

The multi-method approach taken for the EA course evaluation

There were 6 evaluation methods used to examine different aspects of the course; these aimed to build a complete understanding of what took place by making use of all of the opportunities available.

The structure of the EA course evaluation

The evaluation was structured into two levels, the first level focused on the entire learner group enrolled on the course. Due to restrictions, which included financial resources, spatial distribution of the learners and time scales, it was only possible to evaluate the learner group as a whole using 4 of the 6 evaluation methods (see below).

The second level of evaluation aimed to provide a greater depth of information. This involved specific case studies whereby nine selected individual learners were interviewed. The case studies within the second level of evaluation were constructed to provide data in a format which could be readily compared with the findings of the 'whole learner group' (level 1) evaluations.

The methods adopted for evaluation of the EA course

A detailed explanation of the evaluation methods used is provided in the subsequent chapters. In order to avoid repetition, only a brief overview of the methods for evaluation used is provided here. As the EA course adopted a multi-method approach, the purpose of this overview is to identify how the methods adopted relate to each other and how they integrate into the evaluation structure outlined above.

Information relating to the whole group (level 1)

Method 1, The learner questionnaire

As the EA course was delivered to 'real people' working in industries spread throughout Europe, it was necessary to obtain information about them. This information allows the later evaluation of intended learning outcomes to be considered in the 'context' of the people involved (Ashworth, 1982). It aimed to provide information relating to the expectations, apprehensions, priorities and past experiences of the learner group. It also aimed to gain information on the types of organisation from which the learners came, their spatial distribution throughout Europe and some limited demographic information. It was not intended that this evaluation would provide extensive detail of these areas, but rather an overview to provide the context information needed. The method used to acquire this information was to send a questionnaire to each of the learners before the course began, as part of the study pack (Appendix A).

Method 2, Evaluation of the Technology function

The EA course used computer conferencing technology as the primary medium for communication between all of those enrolled. An evaluation of whether the technology functioned as intended was necessary to ensure that later findings were not influenced by technology failure. The aim of this part of the evaluation was to identify occasions when technology failure would have restricted communication and therefore may have had an

influence on the learning outcomes observed. In order to achieve this, anecdotal records, as described by Chase (1978), were used to log all identifiable cases where the technology did not function as expected. This monitoring took place throughout the duration of the EA course delivery.

Method 3, Analysis of the learner 'activity' using the computer conference system

This evaluation was undertaken to allow consideration of the amount and frequency of learner interaction using the computer conference system. The information obtained served two functions: it allowed comparison between learning outcomes observed and activity in using the system; it also identified learners who had made relatively high, medium or low usage of the conference system. To achieve these aims a database of all interaction recorded by the host computer was made for every person involved in the course. This database was interrogated using selective searches to identify frequency and type of interaction for each learner and within each computer conference.

Method 4, Rating scales to measure intended learning outcomes applied to the computer conference discussions

In order to identify to what extent the intended outcomes of the EA course were being realised within the computer conference discussions, an evaluation of the content of the computer conference discussion was used (Esling, 1991). This was done to identify whether the discussion within the

conferences demonstrated that the learners had the level of understanding intended by the EA course (Jones, 1988). It would, however, not prove that this understanding came about directly as a result of participation in the EA course.

To reiterate, one of the aims of the EA course was to promote shared learning of environmental issues. In order for this to take place, the computer conference discussion must reflect the issues to be learnt. The method for evaluating this was to use graphic rating scales, as described by Gronlund (1981). This involved constructing statements of criteria relating to the intended learning outcomes. A scale of levels within each of these criteria was then created, which was cross referenced with a printout of the computer conference discussions. This would identify to what extent the discussions in the conferences reflected the intended levels of understanding. In order to derive a quantitative measure of the extent to which intended learning outcomes were being realised in the conference discussions, these rating scales were overlaid with a criterion ruler, as described by Chase (1978). This provided a numerical value relating to the level achieved on the rating scale.

Learner case studies through interview, nine learners (level 2)

The interviews with a selected group of learners from the EA course were used for two main aims: to gain some measure of 'change' in understanding due to participation in the course and to identify opinions about various

aspects of the course (Beard, 1970). In addition to these aims, this evaluation was structured such that it would allow comparison with the analysis of the conference interaction, discussed in Method 5 below.

Method 5, Rating scales of intended learning outcomes through interview

In order to obtain a measure of change in understanding of the intended learning outcomes, use was made of graphic rating scales, as used for the evaluation of the computer conference discussion. Through negotiation with the learner during the interview, two 'ratings' were made: the first related to the learner's perception of their knowledge before the course had started and the second related to their knowledge after having taken the course. Negotiation involved discussion with the interviewee to ensure that they had a full understanding of the rating decided upon and, where possible, testing their knowledge to validate the rating.

In order to construct guidelines for provision of distance education in the future, it is considered vital by the author that opinions expressed by the learners about the course were taken into consideration (Zippel, 1993). This is because learners involved in the course would have their own opinions as to whether the strategies adopted in the EA course were appropriate or not.

Method 6, Gaining opinional information from selected learners through discussion

To identify the learners' opinions a questionnaire was constructed to explore

the different aspects of the EA course (Appendix E). This questionnaire was used as a guideline for questioning. If, during the interview it was considered appropriate, deviation from the questionnaire allowed exploration of previously unidentified areas. Having questioned the learners, a method for analysing their replies which would relate to the other forms of evaluation was desirable. The Developmental Research Sequence, as outlined by Spradley (1979), was used to analyse the learners' replies, structuring them to relate to the other parts of this multi-method evaluation.

Summary

The evaluation outlined was coupled with participative implementation of the EA course, forming the basis of knowledge used to construct the secondary knowledge base.

The six chapters which follow this each present one of the six evaluation methods used for the EA course. They all follow a similar format, beginning with an introduction which explains the aims of the individual evaluation. Within the introduction, the focal areas for the evaluation are represented and highlighted on a copy of the diagram indicating a model for distance education constructed within Chapter 3 (see below).

For each evaluation method, the issues considered are highlighted with a white rectangle. Those which have already been considered by previously described evaluation methods are highlighted with a grey rectangle. By examining this diagram it is possible to identify the issues considered by the

current evaluation as well as those which have been considered thus far, see example below.

Example diagram showing areas considered within an evaluation

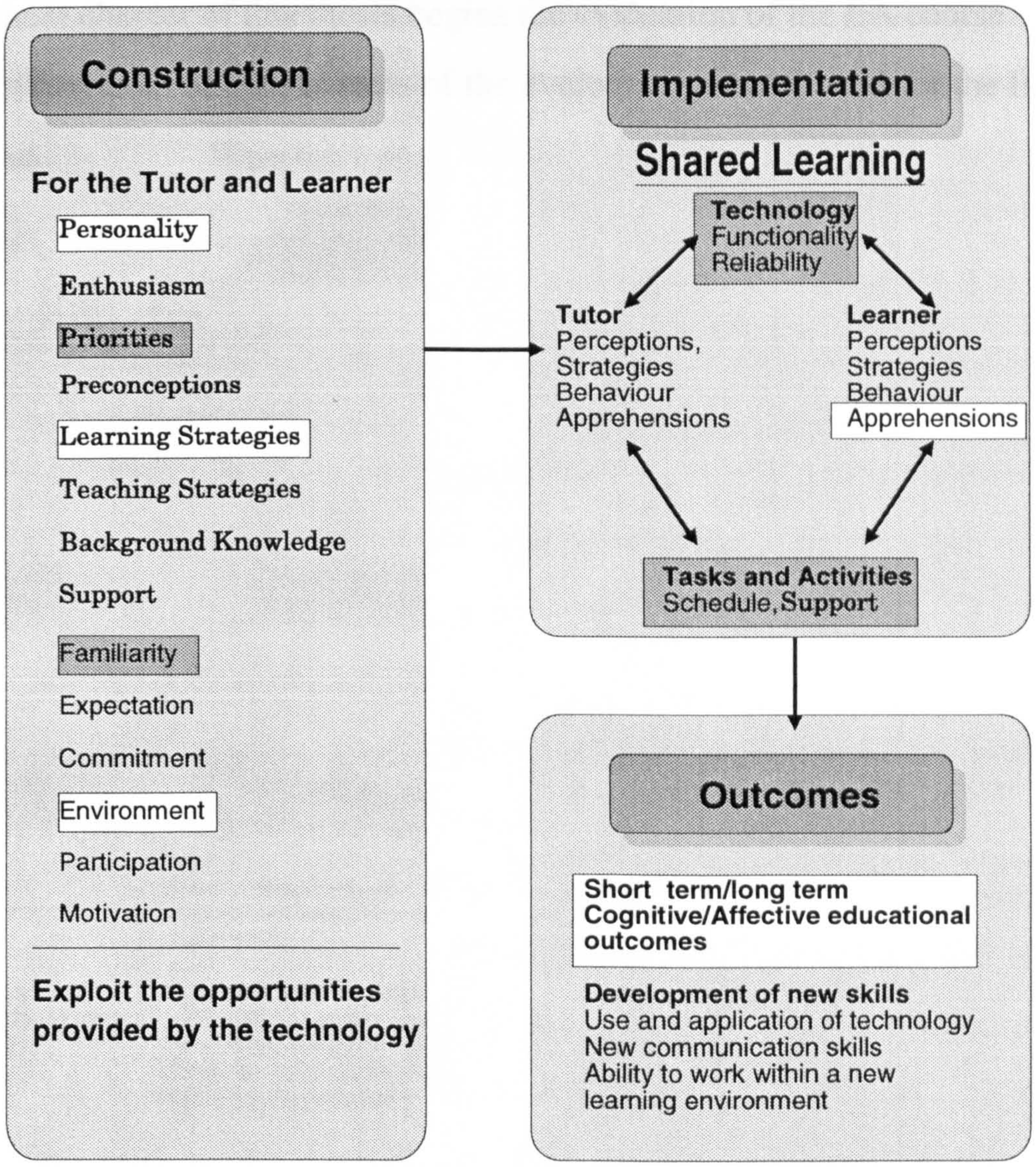


Figure 14: Diagrammatic representation of of areas considered within each part of the evaluation of the EA course

Within the diagram shown above, the issues examined by the evaluation method would be: personality, learning strategies, environment, apprehensions and educational outcomes. Those which had been covered by

previous methods would be: priorities, familiarity, technology function and tasks and activities.

The next chapter of this thesis begins the evaluation of the EA course describing each of the six parts of the evaluation process used for the EA course.

Chapter 9

Profile of the Learner Group and the Learner Questionnaire
(Part 1 of the evaluation)

Aims

The aim of this evaluation was to gain some information relating to the learners involved in the EA course. The information to be gathered by this process included:

- Information outlining the organisations from which the learners came and their distribution throughout Europe.
- Learner preconceptions about the course.
- Preconceptions about the use of technology for distance education within the EA course.
- Information about how they would prioritise issues which relate to the course.
- Their past experiences in distance education.
- Their past experience in using technology.
- Expectations about the course.
- Some demographic information about the learner group.

Within the diagram representing the model of distance learning created in Chapter 3, the areas covered by this evaluation are highlighted with a white rectangle as shown below:

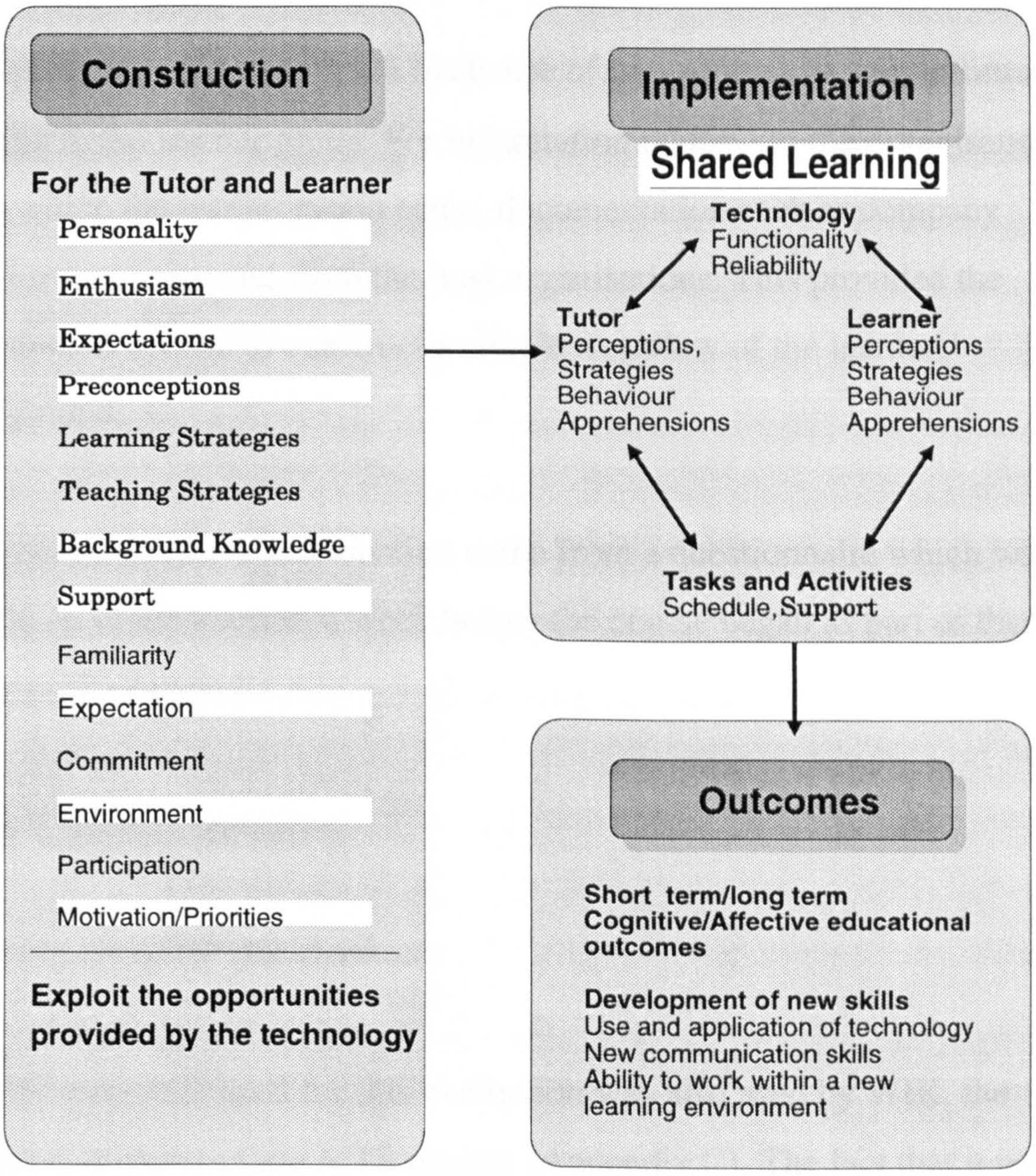


Figure 15: Focal areas of part 1 of the EA course evaluation

Method for constructing questionnaire

Sources of information

This part of the EA evaluation made use of two sources to gain information relating to the learner group. For information relating to the organisations from which the learner group came, documentation such as company profiles was requested from the host organisations. This provided the information needed to construct a simple overview of the learners' background.

The second source of information came from a questionnaire which was sent to all of the learners a week before the course began as part of their study pack (Appendix A).

The Questionnaire

The purpose of the questionnaire

The questionnaire used for this evaluation was also used by WIK, the project evaluators of the MTS project (Appendix C). The fact that it needed to serve two purposes meant that it was a compromise between the demands of the MTS project and those of this research. It was not possible to include two separate questionnaires, as this idea was not welcomed by the participating organisations.

The form of the questionnaire

The form of the questionnaire is that described by Erdos (1970) as a 'closed form' incorporating 'check marks'. This form of questionnaire is one of the most straightforward to construct and to subsequently analyse, as well as for the respondents to complete; it includes a set of statements or questions along with a list of possible replies which are ticked by the respondent. This type of questionnaire differs from the 'open form' which allows the respondent to answer questions with free text. There were a number of reasons for choosing this method of questionnaire design: it requires a minimal amount of time to complete, it is most appropriate for entry into a computer database, which allows quick and easy interrogation and it facilitates easy comparison of replies between respondents. The use of this form of questionnaire is often seen as more restrictive in terms of possible responses (Belson, 1981), but for the purpose of this evaluation the information required was often either a simple yes or no answer or a rank order and so it was not considered to be problematic.

Research by Alwin (1978) indicates that there is often variation depending on whether the same question is presented in 'allow' or 'forbid' form. A question is classified as being in the 'allow form' if it presents a positive response before a negative, conversely the forbid form will present a negative response first. The 'allow form' was used throughout the questionnaire to ensure that there was as much consistency between replies as possible.

The type of questions used in the questionnaire

Questions are often categorised according to type or usage. Question type refers to the structure of the question, or the language used to pose the question to the respondent. Usage refers to the purpose for which the question is posed, i.e. to get an overview of a situation, to validate a statement/theory or to identify similarities and contrasts with known facts. For the purpose of this questionnaire more than one form of question was used to gain information. The form for each question was chosen according to how appropriate it was for gaining the required information from the respondent.

Two basic forms of question, described by Spradley (1979), were used in the construction of the questionnaire; *Descriptive questions* which involved asking the learners to classify events or experiences they have had in the past, and *Contrast Questions* which identify differences between known information and knowledge to be gained.

The layout of the questionnaire

The layout of the questionnaire was kept simple, with each of the questions kept as concise as possible. Research by Maclean and Genn (1979) indicates that concise questionnaires which have an aesthetically pleasing layout are often answered more reliably and with greater levels of response. The construction was also intended to be appropriate for use in a computer database to allow selective interrogation of the replies, as this would allow

efficient comparison (Backstrom and Hursh, 1963).

The questions used in the questionnaire

This section lists each of the questions used in the questionnaire. It then gives a brief outline of the purpose for asking the question in relation to the aims of this part of the evaluation. The questions are presented in the same order as in the questionnaire. Only those questions which were used within this evaluation are discussed, as others were included only for use by the MTS project evaluators.

The respondents were asked to indicate their age and sex. Their age was to be given within a certain range, ie 21 to 31, by ticking the appropriate box; they were asked to indicate M or F for their sex.

AGE: ❒ *0 to 20* ❒ *21 to 30* ❒ *31 to 40* ❒ *41 to 50* ❒ *Above 50*

SEX (M or F)

This information was requested to provide an overview of the age range and sex of the learners to allow comparison between the EA course and other courses and to give some simple demographic background information relating to the learner group.

The next set of questions related to the learner's previous experience in distance training courses. The learners were asked to tick each of the boxes which described the type of training courses they had been involved in.

○ Please tick any of the types of courses which you have taken in the past:

Company run training course at your place of work ... ... ❐

A training course held at your place of work but run by another training organisation... ... ... ❐

A short course (1-7 days) run by your company which was not held at your place of work ... ... ❐

A short course (1-7 days) run by another organisation which was not held at your place of work ... ... ❐

Correspondence course taken as part of your company training scheme ... ❐

Correspondence course which was not directed by your company ... ... ❐

These questions were asked in order to provide some information relating to the learner's past experience in different forms of vocational training.

Chapter 3 of this thesis identified that a learner's past experience can have a bearing on the eventual learning outcomes. For the EA course it was considered important to have some insight into whether the learners had had any experience of distance education courses, which relates to affective factors such as preconceptions and apprehension.

The next set of questions were related to their previous experience in using the sort of technology used within the EA course.

○ Are you confident in using any of the following technology?

Fax machine	❐ YES	❐NO
Word processor	❐ YES	❐NO
Computer network or modem	❐ YES	❐NO

These questions were used to identify the learner's previous experience in using the sort of technology used in the EA course.

Following this, questions relating to the learner's apprehensions about using unfamiliar technology were asked.

○ Do you find it difficult to learn to use a new piece of technology, eg a new piece of software *(a spreadsheet or database program)* **or a new piece of technical equipment?**

❐ YES ❐NO

○ Do you enjoy learning how to use a new piece of technology, even if you may find it difficult? ❐ YES ❐NO

These questions were constructed to investigate the learner's preconceptions relating to learning about unfamiliar technology.

The next question aimed to gain some insight into the learner's priorities. They were asked to rank socio/political issues from 1 to 5, in order of importance to themselves.

○ Please number the following issues in order of importance to you, 1 being the most important and 5 being the least:

	Education
	Public Health
	The Economy
	The Environment
	Unemployment

This question aimed to identify how important they felt that environmental

and educational issues were in relation to others. This was intended to give an indication of the learner's priorities.

The next question asked about their opinion relating to their company's role in employing good environmental practice when compared to other companies.

○ How important do you think it is, that your company employs good environmental practices?

❒ More than other companies ❒ As much as others ❒ Less than others

This question aimed to explore some of the issues relating to motivation of the learners to enrol and participate in a course on environmental awareness.

The learners were then asked to rank in order of importance for them, who they felt it was most important to educate on environmental issues.

○ To bring about the most effective change in environmental practices, who is it most important to educate? *(Please rank the following, 1 most important, 5 least important)*

	General Public
	Politicians
	Company owners/directors
	Company managers
	Company employees

This question aimed to identify which group the learners felt it was most important to educate in relation to environmental issues. This would give further detail on their perceptions of environmental education as well as

their motivation for taking the course.

The next set of questions aimed to identify some of the learner's preconceptions about the course.

○ Will the fact that this course uses different teaching methods and new technology mean that you are more enthusiastic about taking it?

❐ YES ❐ NO

This question aimed to find out about the learner's initial enthusiasm about involvement in the EA course.

○ Do you think that using computer networking and satellite broadcasts is a good way of teaching this course?

❐ YES ❐ NO

This question aimed to identify the learner's opinion relating to their initial expectations about this form of distance education.

○ Do you feel that you have all the information and support that you need to start the course? ❐ YES ❐ NO

This question aimed to identify whether the learner study pack provided all of the initial information and support that the learners would need to begin working within the course.

The final question aimed to identify whether the learners were self motivated in enrolling on the course.

○ Did you volunteer to take this course? ❐ YES ❐ NO

This question aimed to identify what proportion of the learners were wholly self motivated to enrol on the course.

Piloting the questionnaire

Once the first draft of the questionnaire was constructed, it went through a process of testing and adaptation. The interpretation of questions and responses to these questions often proves to be inconsistent (Belson, 1981). Research indicates that there can be large discrepancies between the understanding of the question by the respondent and the interpretation of the replies by the author of the questionnaire. A 'well designed' questionnaire may be considered as one in which the variation in interpreting the questions and replies is kept to a minimum (Dillon, 1990). The testing and adaptation of this questionnaire involved applying it on eight separate occasions to different sized groups of people. Discussion with each respondent preceded adaptation of the questions, ensuring that they were as consistent as possible.

Findings

Findings of the learner profile obtained from documented evidence (ie. 'company prospectus')

Below, a brief summary of the organisations involved is given; this simply gives a general description of the organisation's activities, as well as the general role of the learners within the organisation.

Exxon Chemical

Exxon Chemical is a large, American owned, multinational company dealing in many areas of the petro-chemical industry. They provided eight learners for the EA course, five of whom came from the UK. Two of these were laboratory assistants based in Oxford, two were security guards from Fawley, near Southampton, and one was a training manager, again from Fawley. The training manager was the main contact between Exxon and the EA course. The view was expressed that Exxon's involvement in the EA course was experimental to the adaptation of their training methodologies. In addition to the UK learner groups, Exxon also had further involvement with two researchers in Belgium and one in France.

Earthwatch UK

Earthwatch UK describe themselves as a 'non-confrontational group giving advice and assistance in the promotion of good environmental practices'.

They are a non-profit making organisation based in Oxford. They enrolled two learners for the EA course, whose roles within Earthwatch were mainly linked to publicity of Earthwatch's activities, as well as generating funds.

BA, British Airways

British Airways are a world airline, the company is very large and encompasses a diversity of activities. Two learners on the EA course came from BA, both based at Heathrow Airport and both working in the Environment Centre. Their normal working role is to act as an advisory centre to the company on environmentally sensitive issues.

BAA, British Airport Authorities

BAA are the owners of the major airports in the UK, they provide a variety of services required to manage and operate these airports. Twelve learners from BAA were split into four groups, working from Heathrow, Gatwick and Stansted Airports, and from their Corporate offices based at Gatwick. The groups were of equal size, each consisting of three people whose company roles varied from stores manager to security guard to training manager. Many of the BAA staff were working shifts which meant that they worked irregular hours. The fourth group consisted of three people from the environment section of the Health and Safety department. Their role within the organisation was to promote good environmental practice within the company.

GATE, Gabinete para la Aplicacion de las Tecnologias a la Educacion

GATE is based at the University Polytechnic of Madrid. The main objective of the organisation is to facilitate and support the introduction of Information Technology and Telecommunications in all educational activities of the establishment. This support is provided to both undergraduate and graduate members of the University Polytechnic. There were nine participants from GATE on the EA course; they were post-graduate students of the University enrolled in a Masters degree course on Environmental Science. The EA course was not included as a requirement of the Masters degree but as an option to be taken by those interested.

CSME

CSME are a COMETT II UETP at University of Utrecht in Holland. The COMETT II project provides funds for organisations to carry out European projects in various areas considered beneficial to the community. A UETP is part of a University Enterprise Training Partnership, this means that their role within COMETT is to promote the interaction and cooperation between universities and industry.

There were three participants on the EA course from within this organisation. They were all working within the CSME organisation whilst taking a Masters degree in Conservation. The organisation showed interest in the MTS project and wished to have some involvement in order to

evaluate it for themselves. They requested to join the course half way through and so were only able to have any involvement from Unit 3 onwards.

Carl Bro Associates (A/S)

Carl Bro are a software development house from Denmark, their main activity is the creation of educational software and computer based training (CBT). One of their members was examining the possibilities of CBT on the subject of Environmental Science. They wished to enrol on the EA course to explore the possibility of enhancing CBT with distance interaction using computer conferencing.

PROJECTT

PROJECTT are a COMETT II UETP at the University of Tarragona in Spain. Eight participants of the EA course enrolled from PROJECTT, they were undergraduates studying Chemical Engineering at the University. They were not required to take the EA course as part of their studies, it was offered to those students interested.

IPC, Irish Productivity Centre

IPC are a government related organisation set up to provide training for small and medium enterprises (SME's) within Ireland. They are also partners in the European Euroform project initiated by the EC to provide

training to SME's throughout Europe. Their interest in the EA course was that they believed that distance training using computer conferencing might prove a useful method of training within their country. They provided three learners for the course, members of IPC responsible for organising training schemes for SME's.

ORFEUS

Orfeus are a government supported educational software house located in Denmark. They are one of the organisations responsible for creating educational software to be used in educational establishments. One member of Orfeus enrolled on the course, this person was a postgraduate in Environmental Science who expressed an interest in finding out how appropriate the technology was for this environmental education.

IT CERES, Information Technology Centre for Educational Research in the Environmental Sciences

IT CERES is an organisation which is part of the School of Education at the University of Southampton. It is a COMETT II UETP as well as a member of the DELTA MTS project. One member of IT CERES enrolled on the EA course. As this member was a coworker with the project manager of the EA course (author of this thesis) it was hoped that immediate feedback would be possible. This learner's commitment to the EA course was very much part time as the learner was involved in other operational areas of IT CERES.

This concludes the brief profiles of the organisations involved in the EA course. From the above, it is clear that learners had many reasons for wishing to participate in the EA course. Some were interested in learning about the environmental subject material, others wanted to explore the possibilities of technology for distance education, while others wished to learn about the use and application of computer conferencing. Many were interested in taking the course for combinations of these reasons.

Spatial Distribution of Learners

Below, a diagram highlights the spatial distribution of the learners throughout Europe. The distribution of the learners across Europe is not balanced, with 44% of the learners coming from various parts of Great Britain. A further 34% of the learners were located in Spain and the remaining 22% came from Denmark, Holland, Belgium and France.

In the diagram, the number below the organisation name indicates the number of learners from that organisation, the total number of learners being 50.

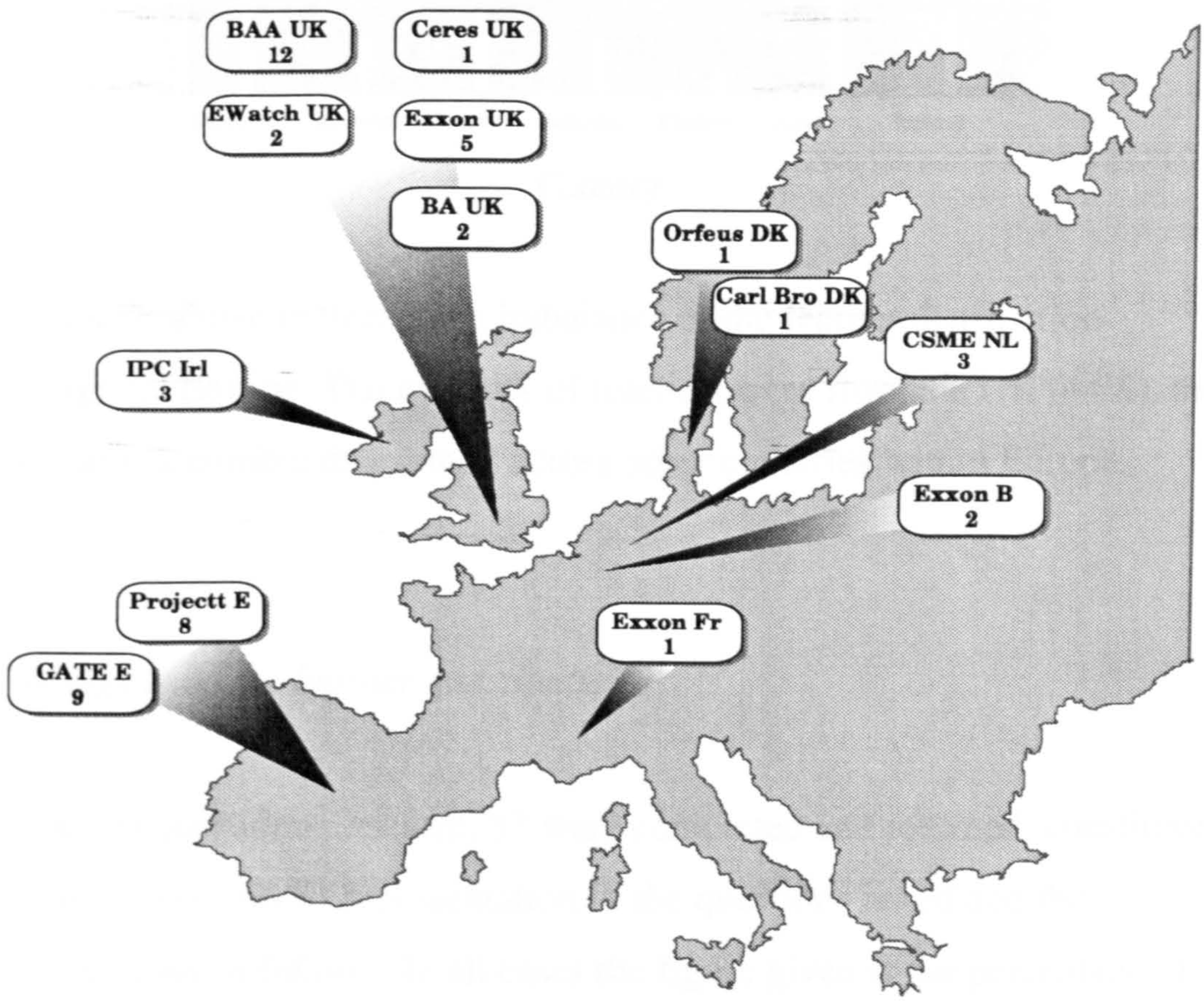
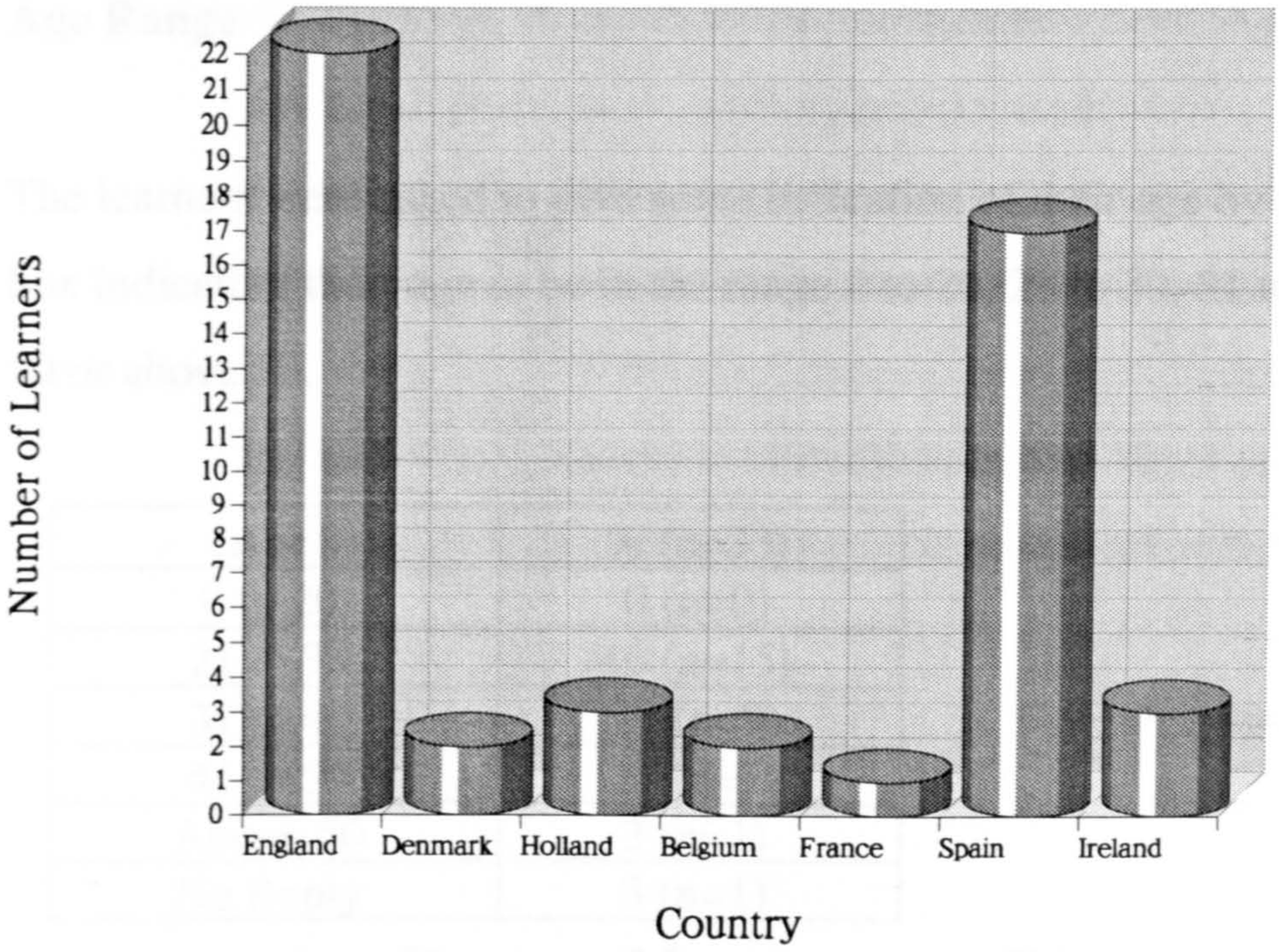


Figure 16: Spatial distribution of the learners enrolled on the EA course

Distribution of Learners Throughout Europe



The graph above indicates the imbalance of the learner distribution throughout Europe. The majority of learners were from the UK (44%), there were also a number distributed across other countries within Europe.

Findings from the learner questionnaire

Of the 50 questionnaires sent, 33 were completed and returned, constituting a return rate of 66%. A presentation of the questions asked and the responses given follows. In all cases the figure given is the percentage of the 33 respondents making that reply, as well as the exact number of

respondents (n); in addition, a further figure indicates the percentage and number of respondents not answering that question (No Reply).

Age Range

The learners were asked to give some indication of their age by marking a box indicating their age to be in the range 0 to 20, 21 to 30, 31 to 40, 41 to 50 or above 50.

Age	% (n=33)
0 to 20	0 (n=0)
21 to 30	46 (n=15)
31 to 40	27 (n=9)
41 to 50	21 (n=7)
Above 50	3 (n=1)
No Reply	3 (n=1)

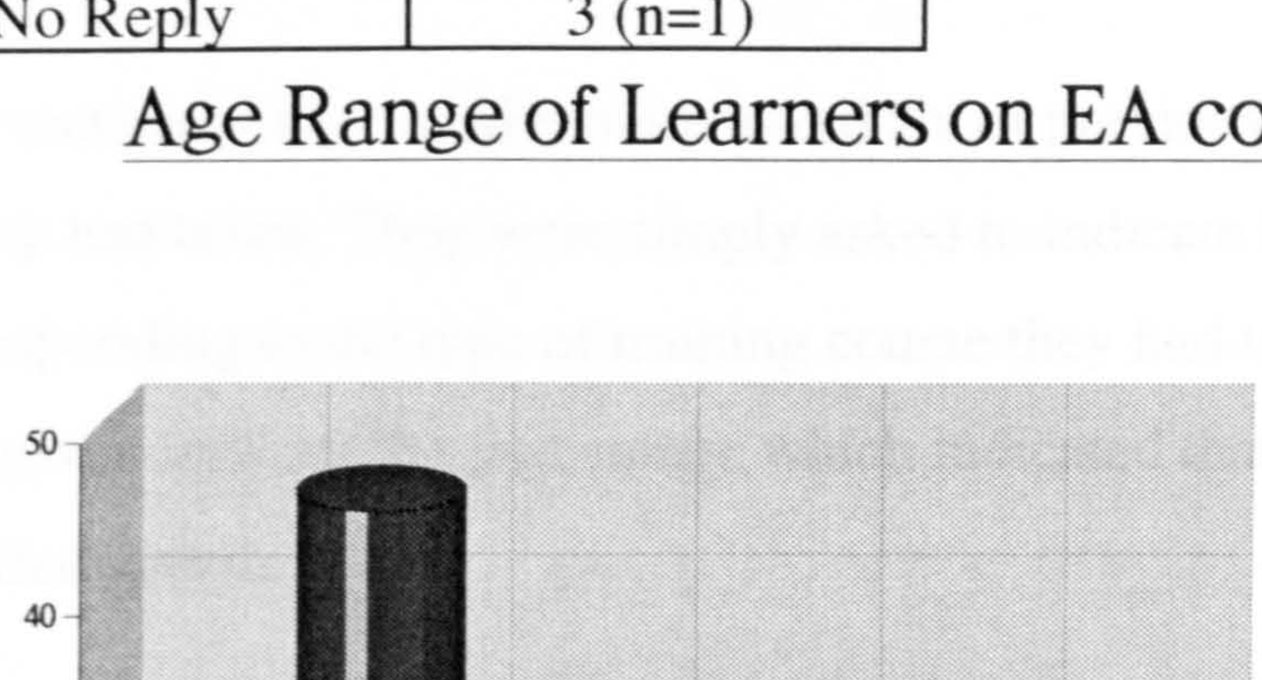


Figure 17: Age range of learners enrolled on the EA course

From the diagram above, it is clear that the majority of learners were aged between 21 to 30. Approximately 94% (n=31) of the respondents on the course were aged between 21 and 50.

Sex

The learners were asked to indicate whether they were male or female. The results received indicated that of the 33 respondents 48% (n=16) were male and 45% (n=15) were female; 7% (n=2) gave no reply to this section.

This indicates that of the respondents, there was an approximately equal number for each sex.

Previous Training Courses

The next section of the questionnaire asked about previous training courses which they had taken. They were simply asked to indicate by marking the box corresponding to the type of training course they had taken. The numbers given indicate the percentage which indicated that they had taken the specified course.

❒ Company run course held at their place of work: 70% (n=23)

❒ A training course held at work but run by another organisation: 36% (n=12)

❒ A short course (1-7 days) run by their company but not at their place of work: 55% (n=18)

❒ A short course, run by another organisation, not held at their place of

work: 52% (n=17)

❒ Correspondence course taken as part of their company training scheme: 3% (n=1)

❒ Correspondence course which was not directed by their company: 12% (n=3)

Of those that replied to the questionnaire, most of them had taken some form of vocational training. However, only 4 of the replies indicated that they had taken some form of distance education course.

Using Technology

The learners were asked to indicate if they felt confident about using the following technology: Fax Machine, Word Processor and Computer Network/Modem. They were requested to mark either yes or no to each of these.

❒ Fax Machine : Yes 73% (n=24), No 27% (n=9), No Reply 0%

❒ Word Processor : Yes 76% (n=25), No 24% (n=8), No Reply 0%

❒ Computer Network/Modem : Yes 48% (n=17), No 49% (n=16), No Reply 3% (n=1)

Confidence in the use of a fax machine, which is based upon a similar concept to computer conferencing, sending digital data along an analogue telephone line, was indicated by the majority (73%) of the respondents.

Confidence in the use of a word processor, which is similar to the text editor used to create computer conference items was also indicated by the majority of learners (76%).

There was an approximately equal split between those who felt confident in using a computer network and those who did not.

Preconceptions about the technology

The learners were asked to indicate whether they found it difficult to learn to use a new piece of software or a new piece of technical equipment, Yes or No.

❒ Yes : 30% (n=10)

❒ No : 70% (n=23)

Of those that responded to the questionnaire, the majority (70%) indicated that they did not find it difficult to learn to use new technology.

They were asked to indicate if they enjoyed learning to use a new piece of technology, even if they found it difficult, Yes or No.

❒ Yes : 88%

❒ No : 12%

Of the respondents, most of them (88%) indicated that they enjoyed learning about new technology even if they found it difficult.

Importance of, and Responsibility for, Environmental Issues

Learners were asked to rate with a value of 1 to 5 which issues were most important to them, 1 being the most important and 5 the least.

The table indicates % of respondents

Issue	Rank 1	Rank 2	Rank 3	Rank 4	Rank 5
Education	31%	24%	27%	9%	9%
Public Health	9%	15%	12%	34%	30%
The Economy	12%	15%	18%	24%	31%
Environment	34%	33%	27%	7%	0%
Unemployment	18%	18%	12%	24%	28%

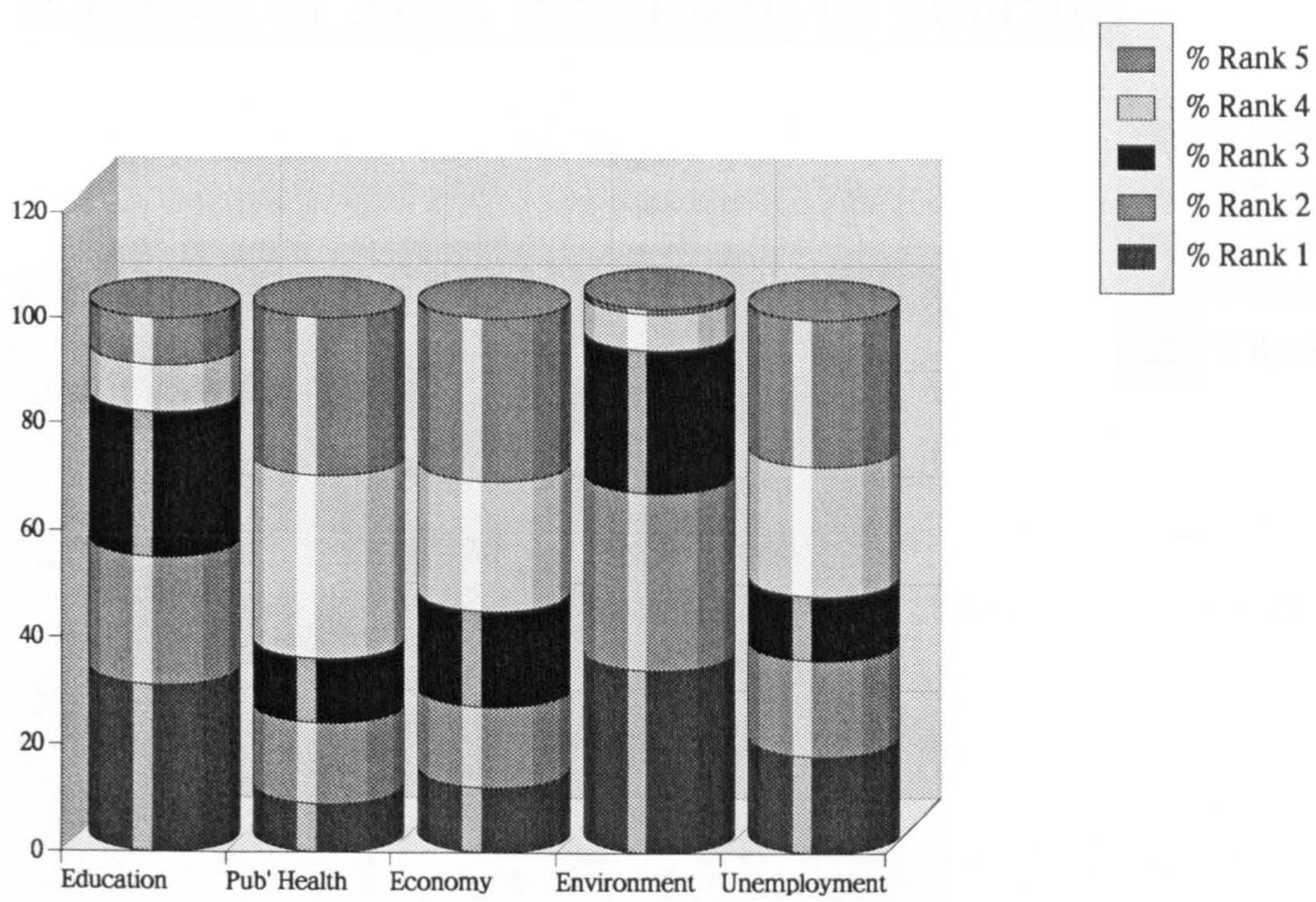


Figure 18: Ranking of importance of socio-economic issues for the learners

From the column chart above, most of the respondents indicated that, in

their opinion, the most important issues were environment and education.

Learners were asked to rate from 1 to 5, who they felt it was most important to educate in order to bring about the most effective environmental change. A value of 1 represents the most important and 5 the least.

Group	Rank 1	Rank 2	Rank 3	Rank 4	Rank 5
General Public	52%	15%	6%	21%	6%
Politicians	34%	24%	9%	12%	21%
Owners/Directors	12%	33%	34%	9%	12%
Company Managers	3%	18%	33%	40%	6%
Company Employees	3%	9%	18%	18%	52%

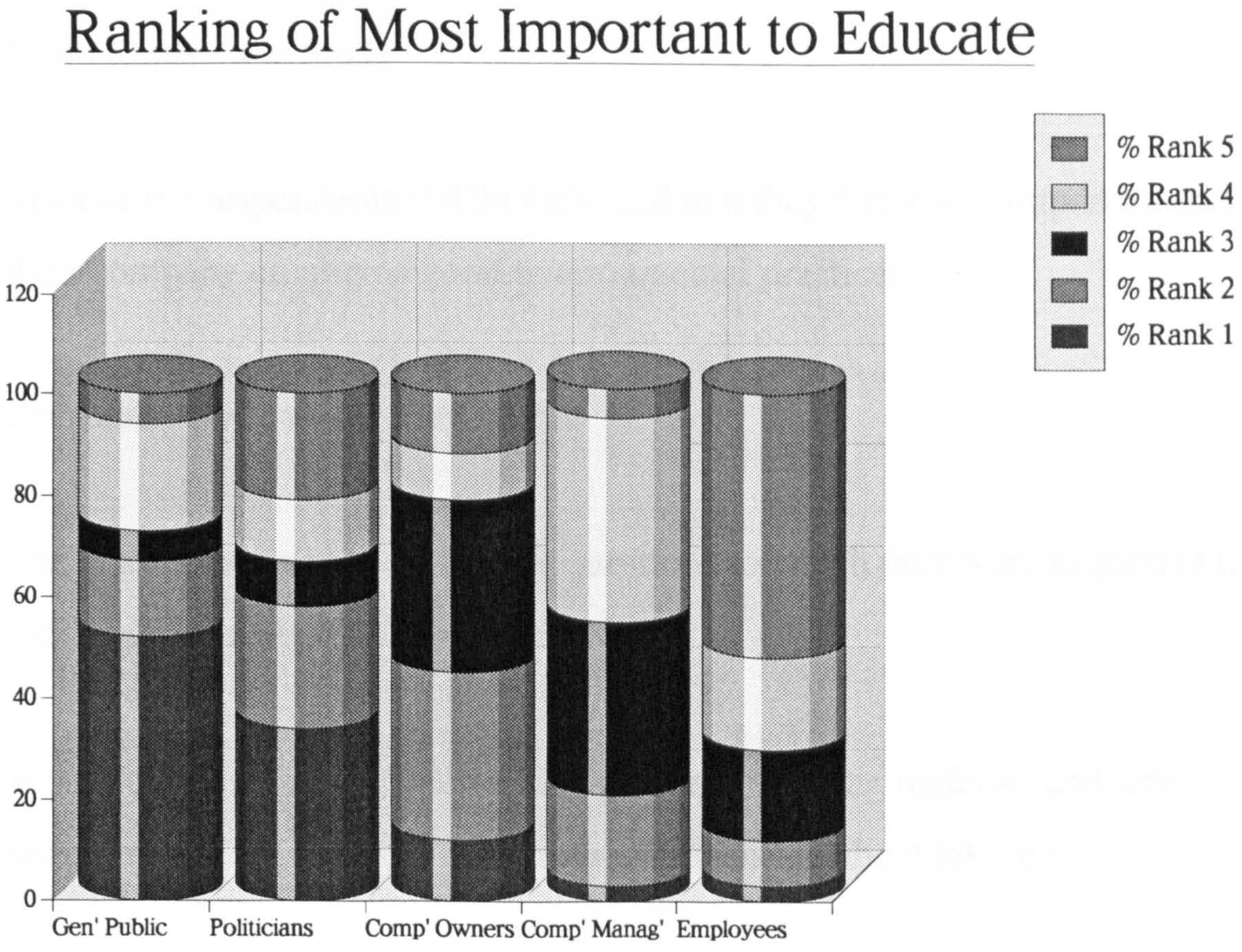


Figure 19: Ranking of most important to educate on environmental issues

The greatest majority of respondents indicated that, in their opinion, the most important people to educate on environmental issues were the general public, people such as themselves.

The learners were asked how important they felt that it was that their company employed good environmental practices. They were asked to mark one of three choices: more than other companies, the same as others or less than others.

- ❒ More than others : 54% (n=18)
- ❒ The same as others : 30% (n=10)
- ❒ Less than others : 12% (n=4)
- ❒ No Reply : 4% (n=1)

Most of the respondents (54%) indicated that they felt it was important that their company employed good environmental practices.

Preconceptions about the Course

The learners were asked 5 further questions to which they were requested to indicate with a mark, either Yes or No.

Would the fact that this course uses different teaching methods and new technology mean that they were more enthusiastic about taking it?

- ❒ Yes : 88% (n=29)

❒ No : 12% (n=4)

The majority of respondents indicated that they were more enthusiastic about the course because of the technology it used.

Did they think that using computer conferencing and satellite broadcasts was likely to be a good way of teaching the course?

❒ Yes : 88% (n=29)

❒ No : 6% (n=2)

❒ No Reply 6% (n=2)

Of the respondents, most (88%) indicated that their initial perception of the course was that using technology was a good way of teaching the EA course.

Would they rather take a course where they did not have to leave their work place, as opposed to going away to a study centre?

❒ Yes : 54% (n=17)

❒ No : 46% (n=16)

Approximately half of the respondents indicated that they would prefer to stay at their work place when studying.

Did they feel that they had all of the support that they needed to start the course?

❒ Yes : 78% (n=26)

❒ No : 22% (n=7)

Of the respondents, the majority (78%) indicated that they felt that they had all of the initial information and support that they needed to start their work on the course.

Did they volunteer to take the course?

❒ Yes : 94% (n=31)

❒ No : 6% (n=2)

Of the respondents, the majority (94%) indicated that they volunteered to take the course.

This concludes the presentation of the replies to the questionnaire. Before summarising the data collected, it must be emphasised that the summary given below is taken from the results of the respondents to the questionnaire, which constitute 66% of the learner group and therefore do not represent the learner group as a whole.

Summary and Discussion

The organisations involved in the EA course were diverse in nature, both in terms of the organisation's size and activities. They ranged from large companies such as Exxon, BA and BAA to smaller companies such as Carl Bro, IPC and Earthwatch UK. The companies' activities ranged from airlines through petrochemical companies, computer software houses to environmental consultancies. It was clear that the organisations had many reasons for wishing to participate in the EA course. Some were interested in learning about the environmental subject material, others wanted to explore the possibilities of technology for distance education, while others wished to learn about the use and application of computer conferencing. Many were interested in taking the course for combinations of these reasons. It is clear that the motivation for wishing to take part in the EA course varied between the organisations. As the companies work in different areas, it was likely that they would differ in their consideration of which issues were most important and that the learners would have different backgrounds. One of the specific aims of the EA course was to make use of the computer conferencing system in order to allow a sharing of experiences and views between the learners. It was hoped that through shared learning, the learners would be able to gain understanding about different perspectives derived from different cultures or organisational backgrounds.

Of the respondents to the questionnaire, 46% were in the age range of 21 to 30, most of the remainder were split equally into two groups, 31 to 40 and 41 to 50. Those that gave an indication of their sex were split roughly in

half, male and female; this must take into account that research indicates that females reply more readily to questionnaires than males (Belson, 1981; Maclean and Genn, 1979 et al).

Of the respondents, 70% had taken training at their place of work and 52% had taken a course not held at their place of work. Past experience of taking part in correspondence courses was indicated by only 12% of the respondents. As the majority of learners had not taken part in distance education in the past, any preconceptions or apprehension about this form of training would not be based on personal experience.

Experience of technology relevant to the EA course was indicated by the respondents as follows: the use of word processors, 75%; computer networking, 48%. As the learners would have to gain skills in using the computer conference technology in order to operate effectively within the EA course, past experience in using similar technology may have reduced apprehensions about using unfamiliar technology. Follow up telephone conversations to those learners who had indicated that they had some experience of computer networking identified that all were unfamiliar with the use of computer conferencing to allow group discussions. Their past experience was often said to have been limited and only making use of e-mail. Of the respondents, 30% indicated that they found it difficult to learn to use new technology, with 12% indicating that they did not enjoy learning about new technology. Although a number of the respondents indicated that they had difficulty learning about new technology, most of them indicated that they enjoyed the challenge. As the use of computer conferencing for

distance education was unfamiliar to the majority of those enrolled on the course, it was considered a positive sign that they indicated that they enjoyed learning about new technology.

When asked to rank issues according to importance to themselves, (1 indicating most important and 5 least) , 67% ranked the environment as 1 or 2. It is important to note that the promotional brochure for the EA course indicated that this course was likely to be of greater relevance to those interested in environmental issues. This response suggests that the learners on the course were likely to have valued the content of the environmental awareness course as an important issue for consideration. This has certain implications in terms of the learner's motivation for taking the course, feeling that it was a worthwhile subject.

The learners were asked to rank from 1 to 5 (1 most important and 5 least) who they felt it was most important to educate to ensure the most effective environmental change. Of the respondents, 65% rated the general public as 1 or 2. 58% of the respondents rated 1 or 2 for politicians and 68% rated company employees as 4 or 5. From the replies given it was inferred that the respondents felt that it was important to educate more than just the people with immediate political power. In fact as the learners enrolled on the EA course were people working within different roles from a number of organisations, they represented a section of the 'general public'. From this one assumes that they felt that the training course was appropriate to themselves as the target audience.

Of the respondents, 88% indicated that they were more enthusiastic about taking the course due to the use of new technology. Before the course started 88% indicated that they expected that the MTS techniques were likely to be good for teaching the EA course. Of those who responded to the questionnaire, 94% indicated that they were volunteers on the course. In terms of initial enthusiasm about the course, the replies given indicate that initially the learners' expectations and enthusiasm for taking part in the course were good. This was considered by the researcher as a positive approach to begin the EA course.

78% of the respondents indicated that they had all the support they needed to start the course. Past experience, as discussed in Chapter 4, has shown that when working within an unfamiliar environment such as in the case of the EA course, initial support has an important role to play in ensuring that learners feel confident to begin their study (Thompson, 1992).

The overall impression gained from this part of the evaluation was that: the learner group were likely to find the course content interesting; that they were enthusiastic about the course; that they were from differing organisations and background so that they potentially would have information to share but that they were relatively unfamiliar with distance learning or computer conferencing.

Chapter 10

An evaluation of problems with the computer conferencing system (Part 2 of the evaluation)

Aims

Within the case study evaluations (Chapter 3) it was identified that, on occasions in past courses, the computer conference system failed to operate as it was designed to (Barker, 1989). Failures within the computer conference system sometimes resulted in learners not being able to access the computer conference system, or having difficulty with unreliable data transfer. Past case studies indicate that problems with the technology can lead to frustration for the learners which may affect their motivation to continue using the system (Thompson & Borland, 1992). This part of the evaluation of the EA course aimed to gain information relating to problems with the computer conferencing technology not functioning as designed.

The diagram below highlights, with a white background, the issues within the learning model for distance education which are addressed by this part of the evaluation. The issues which are highlighted in grey are those which have already been considered by part 1 of the evaluation.

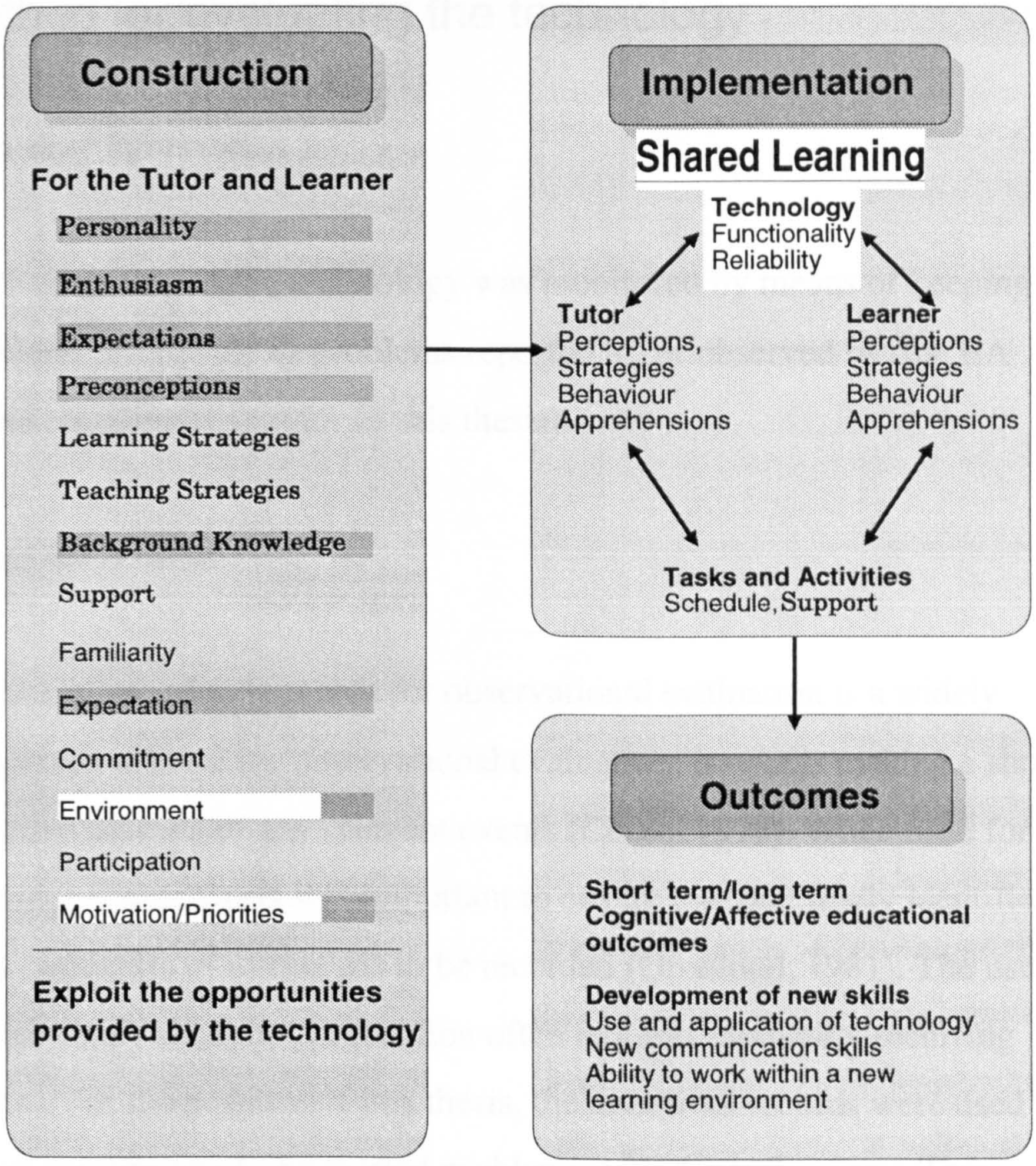


Figure 20: Focal areas of part 2 of the EA course evaluation

Within the diagram, the issues addressed by this part of the evaluation are: the learner's working environment; motivation issues relating to the learner's wish to persevere with the course and the functioning and reliability of the technology.

Method for evaluating the technology

Sources of information

The functioning of the technology was monitored by means of keeping anecdotal records on all problems reported to, or observed by, the EA course coordinator (author of this thesis).

Anecdotal records

The use of anecdotal records for observational evaluation is a widely recognised method for observational evaluation; it entails making a short, objective account of any relevant events (Chase, 1978). When used for educational evaluation it is important to ensure that one firstly identifies what categories of events are to be recorded (Gronlund, 1981). The use of this for the evaluation of education often requires tabulating recurring themes. For the purpose of this thesis, the anecdotal records were used to record any observed or reported problems with the technology. This catalogue of problems was updated by the course coordinator throughout the period of course delivery.

For educational purposes, anecdotal records will often include the date and/ or time of the observed event, a description of the event and a subjective interpretation. In this case, the interpretation of observed technological problems is only useful when considered in conjunction with the evaluation of the learning outcomes. For this reason, no other recorded information

other than the date, along with information about the particular event, was necessary.

The method for making the anecdotal records was to enter them in a table as shown below:

Date :

Name : Organisation :

Problem :

Action :

Resolution :

Figure 21: Anecdotal record sheet used for technology evaluation

The table used to record the information was constructed using a database program, information was entered as a record in this database for storage and subsequent analysis. Within the above table, the field 'Date' indicates the date on which the problem occurred. 'Name' indicates the name or names of the people reporting the problem. 'Organisation' indicates the organisation from which the person reporting the problem came. The 'Problem' section includes the record of the problem as reported. 'Action' indicates the action taken to resolve the problem. Finally, the 'Resolution'

section indicates the outcome of the problem and when it was resolved, giving an indication of how long the problem existed.

Findings

Over the duration of the Environmental Awareness course, ten problems were recorded. These have been classified into four types and summarised below:

Line Noise : This problem was reported on four occasions, each report occurring during the first month of the course. Line noise refers to the telephone line; when the telephone line is not transmitting a clear signal and there is erroneous noise on the line, it is referred to technically as line noise. The use of a modem connection to the host for the purpose of computer conferencing entails the digital signal from the computer being converted by the modem into analogue sound. This sound is then transmitted along the telephone line to the host computer where it is converted back into the digital signal. If the telephone line is noisy, it is possible that the received information gets corrupted. There are a number of effects of this type of problem. At the least, it will cause spurious characters to appear on the screen which in severe cases makes the text indecipherable; at worst it will cause the host or remote computer to stop working until reset.

Control Codes : the second type of problem was reported four times during the first two months of the course. The problem reported was with special

characters being sent by learners to the host. These characters were created by holding down the control key on the keyboard and pressing an edit key. This method of editing was not supported by the host and the resulting characters produced altered the way in which the text following it was displayed. Once a control code had been encountered by the system, the character set was corrupted, which meant that all text following the control code was unreadable. The problem was not seen by the person entering the control codes, it was only when the new text had been sent to the system and re-displayed that the character set was corrupted. Any person logging on to the system and encountering the problem could only regain normal operation by logging off the system, switching their computer off and then on again. They could then simply avoid the error recurring by choosing not to display the conference item containing the offending control characters.

Group E-mail failure : the third problem was a singular incident. To allow the same E-mail message to be sent to all those enrolled on the course, a special command script was created by the operator of the host computer. Typing the command 'eramail' and then entering the text of the message would send the message to everyone on the EA course. This facility was used by the course coordinator many times during the course to pass on general messages to all of the learners. The first time that it was tried, on 5th April 1993, the procedure failed; the failure was identified as a mistyped entry in the list of recipients. This problem was noticed the following day, the recipient list was corrected and the message re-sent.

System Failure : on the 14th April 1993, one of the learners, inexperienced

in using computer conferencing, repeatedly tried to log on to the system, without subsequently logging off correctly. This caused the host to register a number of users all with the same login ID using the system at the same time. The outcome of this was that eventually the computer conference software on the host computer stopped working, a 'system crash'. The conferencing system failed at 10:30 pm on the 14th April. It was not until the following day that the system operator returned to work to discover the problem. The host computer was then reset by the operator and restarted to clear the problem. The host computer was back 'on-line' the following morning at 11:00.

Actions taken to resolve problems identified

The problem of a noise on the telephone line is relatively common in computer conference systems but often causes a certain level of annoyance to the user. To avoid this problem recurring and thereby minimise the disruption to the learning process, a set procedure was established. The learners were requested, if they were using an extension telephone line, to try to gain access to a direct line. They were requested to configure their modem to use mnp-5 error correcting. This entailed the learners simply changing one of the settings on the modem. Using mnp-5 error correcting meant that if there was noise on the line, the host or remote computer would detect this and request that the information be re-sent; this would occur transparently to the user and only cause a slight time delay for data transfer. Once the modems had been reconfigured there were no further reports of the problem.

Although line noise can be frustrating for the computer conference user, in this case the remedy was relatively simple to implement and the number of reported cases were few. It was not considered by the researcher that this problem would have had a major bearing on the learning process within the EA course.

For the problem with the control characters, the action taken was to contact the systems operator of the host computer. This person would then remove the offending control characters from the text. This was followed up by a telephone call to explain the problem to the perpetrator to prevent the problem recurring. This problem was always dealt with as quickly as possible, once it had been identified for the first time; the course coordinator made daily checks of all of the conferences to try to ensure that the problem was rectified before any of the learners encountered it. Although this problem was not originally anticipated, it was not considered to be likely to restrict the learners to any great extent over the three month duration of the course, as it was quickly resolved.

For the group e-mail failure the effect was that about three quarters of them did not receive information for the role play of Unit 2 until a day after scheduled. This was not considered at the time to be likely to impede the learners in their task, as Unit 2 of the course was three weeks in duration.

Following the system crash, there were no reported attempts by any other learners to use the system during the 'down time' and so no further support

action was taken other than to telephone the learner who caused the problem to explain how to avoid it recurring.

Summary and Discussion

In summary, the evaluation of the technology identified that there were no reported problems which were considered to have inhibited the learning process to any great extent. The organisers of the computer conference system indicated during a personal communication that they were satisfied that the technology functioned as was to be expected over the duration of the EA course, which was three months. It is clear that, although there were some reported problems with the technology, within a real life situation such as the EA course, one should be satisfied that problems with the technology would not have been a major factor in the learning process. It must however be emphasised at this point that this evaluation did not consider whether the learners could use the technology effectively, but only that it functioned as expected.

Chapter 11

Analysis of activity of usage of the computer conference system during the EA course (Part 3 of the evaluation)

Aims

The main benefit of computer conferencing is that it allows communication over a wide area independently of time and place (Davies, 1992). For this reason, one of the aims of the EA course was to explore the possibilities for sharing ideas using the computer conference system for interaction. The EA course was split into four units, each dealing with a different aspect of the subject of environmental awareness. Each of the units of the course adopted a different approach to delivering the course material. This evaluation aimed to identify, throughout the duration of the course, the amount of usage that was made of the computer conference system by the learners. The information provided is detailed by classifying all interaction logged by the host by 'type' (see 'Methods' for type classifications).

This classification would allow consideration of the type of discussion taking place as a result of the EA course activities within the computer conference system. By undertaking detailed analysis, which considered the amount of usage each learner had made of the computer conference system,

information relating to the distribution of the amount of individual learner activity was provided. Many of the learner tasks required learners to discuss certain issues, this analysis also gives information relating to the average amount of discussion for each part of the course (Zippel, 1993).

Performing this evaluation also allowed issues to be considered such as: the amount of interaction which occurred during each unit of the course, i.e. did certain units appear to stimulate greater learner participation than others? It also helped to identify individual learners who had participated to a greater or lesser extent than others in the computer conference discussions. This was used to help identify suitable candidates for the learner interviews (part 6 of the evaluation).

The diagram below identifies the areas considered within this part of the evaluation which relate to the model of learning constructed within Chapter 3. The focal areas for this part of the evaluation are highlighted with a white rectangular background. Those which have already been addressed by previous sections of the evaluation process are highlighted in grey.

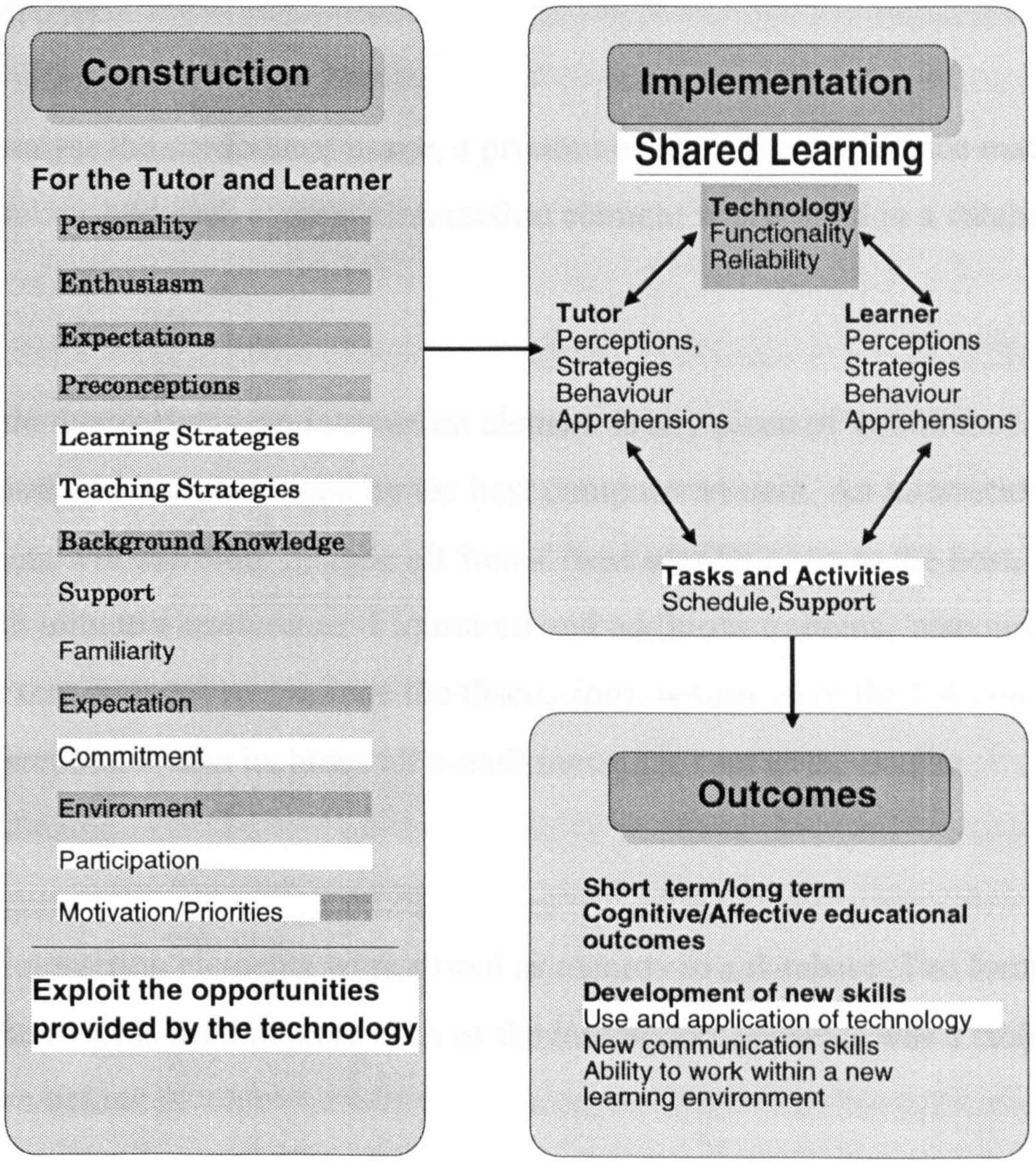


Figure 22: Focal areas of part 3 of the EA course evaluation

The diagram highlights that this part of the evaluation allows consideration of the teaching and learning strategies, the tasks and activities during the course and the use and application of the technology. This is possible through consideration of the approach taken for delivery of the EA course and the amount and type of interaction it produced.

Method

To analyse the conference usage, a printout of all of the conference material was taken, and each separate interaction element was logged in a database (Patton, 1981).

Within this analysis, an interaction element is any piece of 'conference discussion' which is logged by the host computer system. An interaction element will therefore include all 'items' (text sent by users to the host, which initiate a conference discussion) and additions to items, 'responses' (text sent by users to continue the discussion), within all of the EA course conferences. It also includes all e-mail messages sent to the course coordinator.

The interaction elements were stored as records in a database. The format for the records used to store each of the interaction elements was a table, as shown below:

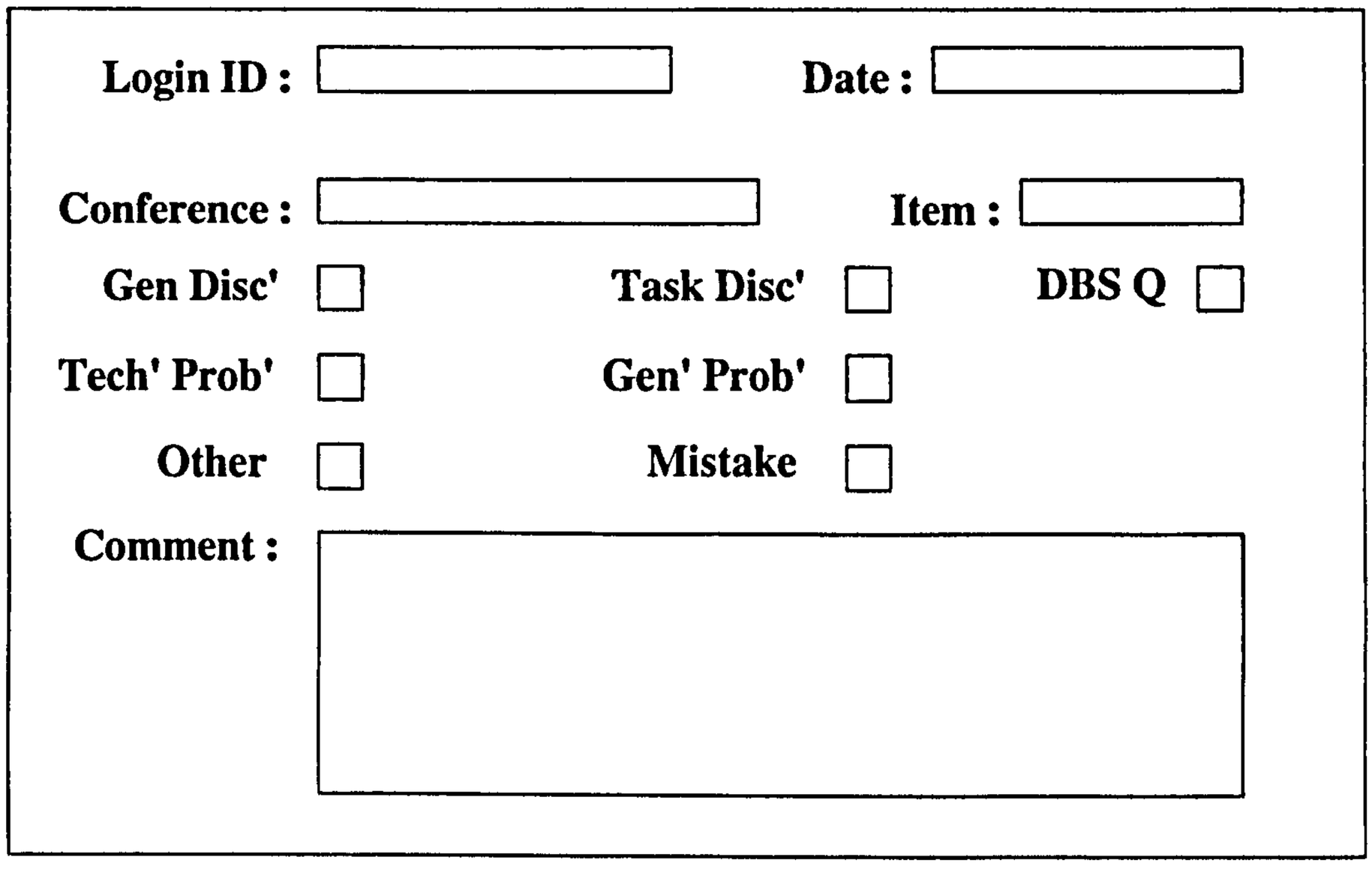


Figure 23: Record sheet to hold database of learner activity

Within each record of interaction the fields used to store the information have the following meaning:

Login ID : This was a set of alphanumeric characters representing the login ID of the person who entered the interaction element. The login ID is automatically recorded by the host as part of the item, response or e-mail message.

Date : This was recorded in 'standard' database date format, *day/month/year*, allowing subsequent selective searches to specify dates or date ranges for the search. The information recorded was the date on which the interaction element was sent to the host computer. This information was automatically logged by the host computer system.

Conference : This was a string of characters representing the name/title of the computer conference in which the interaction was stored. All e-mail messages were stored as 'mail' in the 'conference' field.

Item : This was a numerical value. Each interaction element is automatically given an item number by the host computer. These numbers run sequentially, according to the order that they were entered. When a new item is initiated, it is given a new number; replies to this new item are given a suffix number separated from the first by a period. For example, the fourth item entered within a conference will be numbered '4', the third reply to this item will be numbered '4.3'. E-mail messages are numbered in the order that they were sent and have no further suffix.

The following fields took a boolean value, ie they were set with either a value of true, represented by the binary value one, or false represented by a binary value zero. In all cases, if the interaction was classified according to the definitions below, a 'true' value was recorded in the appropriate field.

General Discussion : Any text message sent to the host which was intended to promote a response from other people or was a reply to another message, but which had no direct relevance to any of the course tasks, was classed as general discussion.

Task Discussion : Any messages which were relevant to the tasks, as outlined in the conference system or course booklet.

DBS Question : Any questions sent via the computer conference system to be addressed during the live satellite broadcasts.

Technical Problem : Text sent to the system which made reference to problems with any of the technology. This includes problems with the computer conferencing system and problems with the hardware used to access it.

General Problems : Any interaction elements indicating that a learner was obstructed from continuing their study by any problem not related to technology.

Other : Any interaction elements recorded on the system which could not be readily placed into any of the other categories.

Mistake : Any recorded interaction with no recognisable content, usually in the form of a new item or reply either with nonsense or completely blank.

Interrogation of the data recorded in the database

Once all of the information was recorded in the computer database, selective 'query forms' were used to interrogate the data in order to obtain the information. A query form, as used for this analysis, consisted of a table with the same layout as the ones used to enter the data. Instead of entering data into the fields of the table, examples to be searched for were entered. These examples may include ranges, for example entering, 01/05/93><01/

06/93 into the date field of a a query form would cause the database program to search for all records dated from 01/05/93 to 01/06/93 exclusively.

By using more than one selection criterion, it was possible to identify records using more complex 'and-or' searches (Thompson & Borland, 1992). An 'and' search would identify records which satisfy one search criterion *and* another. An 'or' search would identify records which satisfy one search criterion *or* another.

The aim of the analysis of the data was to identify numbers of interaction elements which satisfied certain selection criteria. This would allow questions such as:

- How many times did learner *x*, or learner group *y* use the system over a given period?
- Within conference *x* how much of the discussion was classified as discussion about the tasks set?

These questions were addressed by generating selective search queries which were constructed to count the number of records which satisfy the criteria, rather than find specific records. The facility of counting the number of records within a selective search is a function provided by the database software.

Findings

The following findings were obtained through selective searches of the data held in the database of interaction elements from the EA course computer conference.

Total number of interaction elements : 675

The total number of interactions included all interaction elements of all types including e-mail. This figure was obtained by a global search to identify all records within the database. As there were 50 learners on the course the total figure would indicate that on average, each learner contributed 13.5 interaction elements over the 14 week duration of the course. This represents 0.96 interaction elements per learner per week during the course.

Interaction elements breakdown into type :

Type	No. logged
General Discussion	132
Task Discussion	385
DBS Questions	41
Technical Problems	38
General Problem	27
Mistake	40
Other	12

Figure 24a: Breakdown of learner interaction into type

For the table above, selective searches of the database were made to identify the number of interaction elements which were classified as each type.

The column chart shown below presents this table in graphical form:

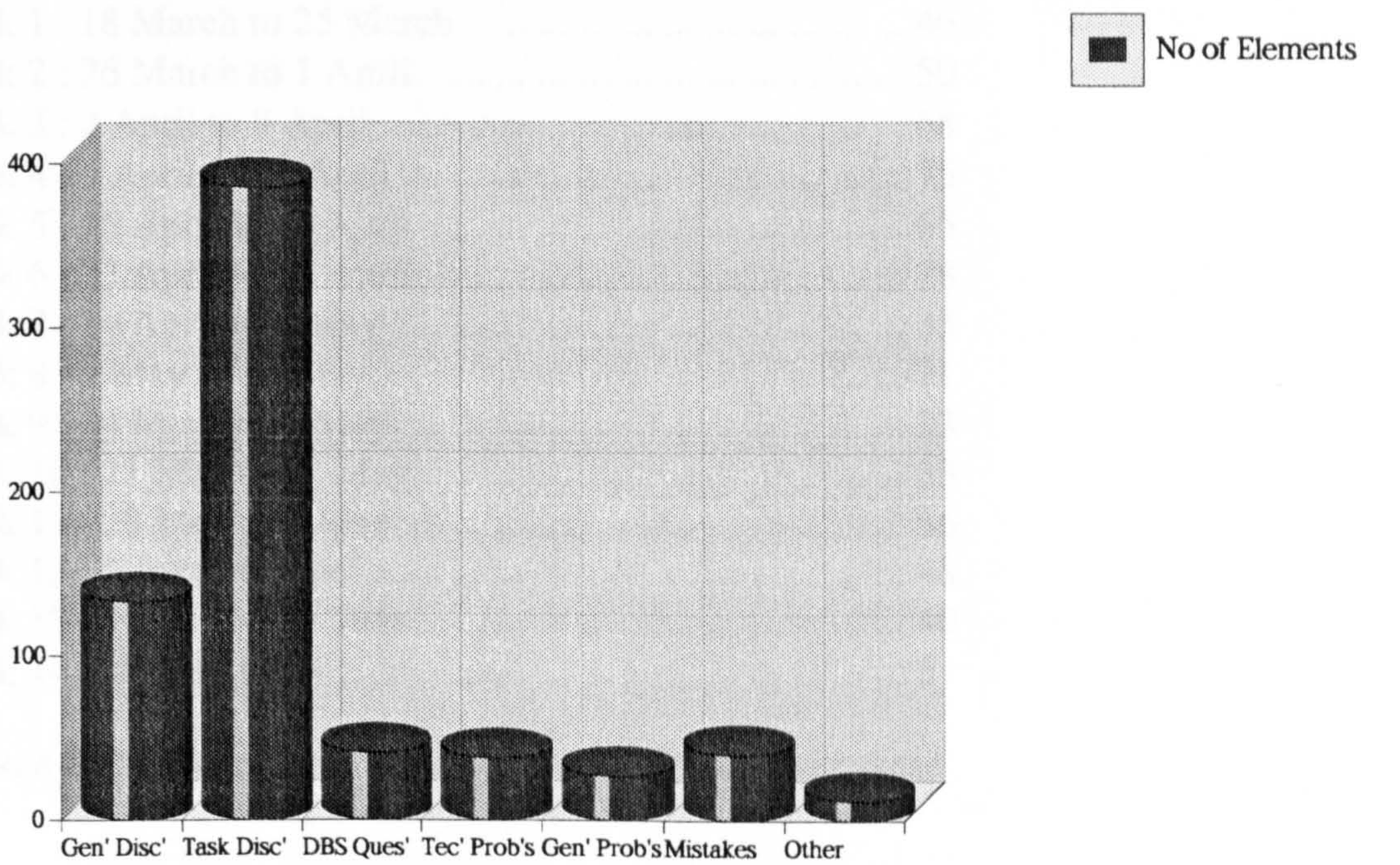


Figure 24b: Graph of breakdown of learner interaction into type

From the data it is possible to identify that the largest proportion, 385 elements, which represents 57%, of interaction elements were related to the course tasks. General discussion which was not related to the subject of environmental awareness constituted the second largest number with 135 elements logged, this represents 20% of the course discussions. Questions posed via the computer conference system during the satellite broadcasts constituted 41 of the interaction elements logged (6%). Problems with the technology constituted 38 of the interaction elements logged (5%). General course problems constituted 27 of the interaction elements (4%). Mistakes and interactions classed as 'other' contributed a total of 52 interaction elements (7%).

Interaction elements week by week breakdown, year : 1993.

Tutor preparation Time : 10 March to 17 March 33
Week 1 : 18 March to 25 March 46
Week 2 : 26 March to 1 April 50
Week 3 : 2 April to 8 April 68
Week 4 : 9 April to 15 April 75
Week 5 : 16 April to 22 April 65
Week 6 : 23 April to 29 April 78
Week 7 : 30 April to 6 May 35
Week 8 : 7 May to 13 May... 21
Week 9 : 14 May to 20 May 23
Week 10 : 21 May to 27 May... 33
Week 11 : 28 May to 3 June 55
Week 12 : 4 June 10 June 48
Week 13 : 11 June to 17 June... 40
Week 14 : 18 June to 24... 5

Figure 25: Interaction element breakdown over time

In the above table, selective searches of the number of interaction elements recorded within the specified dates was used. This gives an indication of the amount of computer conference usage for each week of the course.

If the number of interaction elements was equal for each of the 14 weeks of the course, it is possible to calculate that there would have been:

Total number of elements (675)/ Number of week (14) = **48.21** interaction elements each week.

Below is a graph of these results shown within the table:

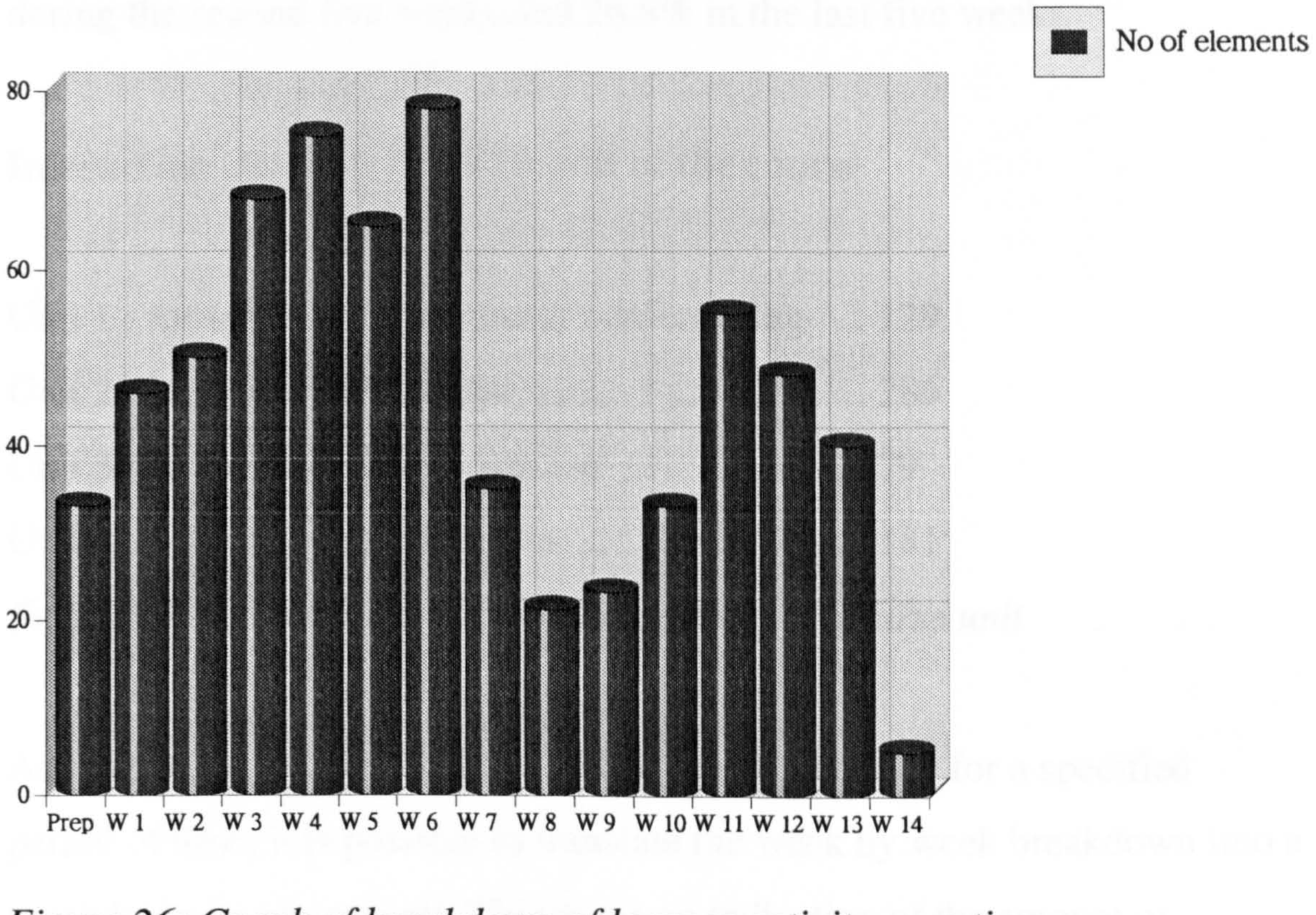


Figure 26: Graph of breakdown of learner activity over time

From the data it is possible to identify fluctuations of learner activity throughout the duration of the course. During the period from week 3 through to week 6, there was a relatively high number of interaction elements, greater than 60 per week, recorded by the host computer. This contrasts with other periods when there was relatively low interaction using the computer conference system, such as weeks 7 through 9, where the number of interaction elements logged was less than 35. These figures compare with an average number of 48.21 interaction elements per week.

Breaking the fifteen week period into three equal time periods of five

weeks, it is possible to notice a downward trend in conference activity with 40.3% of the total activity occurring during the first five weeks, 32.9% during the second five weeks and 26.8% in the last five weeks.

Interaction elements for each unit of the course

Unit 1 : Introduction to computer conferencing ... 129

Unit 2 : Environmental Issues 286

Unit 3 : Environmental Legislation 79

Unit 4 : Environmental Practices 181

Figure 27: Breakdown of learner interaction by course unit

As each of the four units of the course ran sequentially for a specified period of time, it is possible to translate the week by week breakdown into a breakdown by course unit. This gives an indication of the amount of computer conference activity within each of the course units. From the above table it is possible to identify that Unit 2 of the course made up the majority of the interaction elements.

The graph below indicates the number of interaction elements recorded throughout the duration of each of the course units.

Analysis of Interaction Over Units

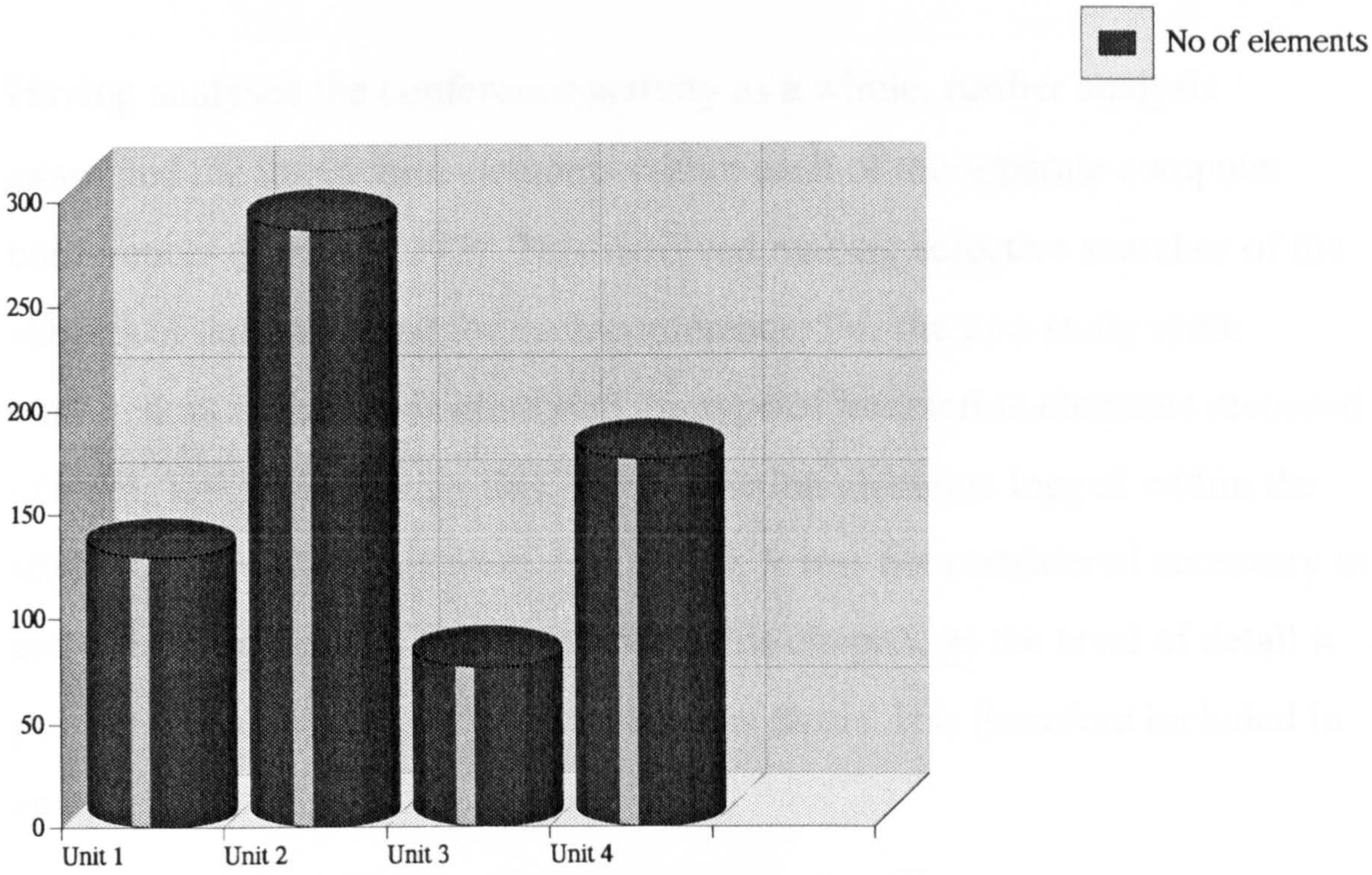


Figure 28: Graph of breakdown of learner interaction by course unit

It is clear from the graph above that the most interaction took place during Unit 2 of the course, constituting 42.4% of all of the interaction during the course. During Unit 4 of the course, 26.8% of the interaction was recorded conflicting with the overall downward trend previously identified. Unit 1 of the course had 19.1% of the conference discussions and Unit 3 had the remaining 11.7%. It should be made clear that these figures only relate to the number of interaction elements. It gives no information as to the content or the 'quality' of the discussions taking place.

Discussion elements in each conference:

Having analysed the conference activity as a whole, further analysis examined the interaction elements within each of the separate computer conferences (Zippel, 1993). This involved making selective searches of the subsets of data recorded for each conference. For the non-study room conferences the analysis identified the type of interaction elements recorded (Zippel, 1993). Following this, the interaction elements logged within the study room conferences were considered. It was not considered necessary to include the complete set of data within this chapter, as the level of detail it provided was not directly used within this thesis. It is therefore included in an appendix to this thesis (Appendix G).

The table shown on the following page summarises the data collected:

Total number of interaction elements for each learner

Learner No.	Group A	Group B	Group C	Group D	Group E
0	10	18	0	5	15
1	53	21	16	12	7
2	0	31	9	0	6
3	5	14	0	4	0
4	24	2	9	3	11
5	12	4	4	1	0
6	7	0	0	17	16
7	1	10	14	0	6
8	36	0	0	17	17
9	0	17	0	12	12

Figure 29: Learner interaction by individual learner

Examination of this table identifies that a minority of learners provided the majority of the computer conference discussion. Consideration of the data detailed in the table allowed the following statistics to be generated:

O The ten learners who made most usage of the conference system in total contributed 251 of the total 478 discussion elements within the study room conferences. Converting this into percentages, 20% of the learner group contributed 52.5% of the total number of discussion elements within the learner group conferences.

- The ten learners who had made second most usage of the computer conference system contributed 134 discussion elements out of the total 478. This meant that the second 20% of the ranked learner group contributed 28% of the total discussion.
- Taking the remaining thirty learners, their contributions to the computer conference discussions numbered 93 discussion elements. This indicates that the final 60% of learners contributed to 19.5% of the conference discussions.

This highlights the fact that, taking the top twenty learners, 40% of the learner group were responsible for 80.5% of the discussion elements within the computer conference.

Discussion

As there were a total of 675 interaction elements during the course, it was somewhat disappointing that on average this meant that each learner only contributed 0.96 interaction elements per week. The EA course aimed to stimulate shared learning through discussion using the computer conference system. If each learner was only contributing an average of less than one comment to this discussion per week it is difficult to imagine a meaningful and in depth discussion taking place.

The findings of this evaluation indicated that only 5% of the conference discussion related to problems with the technology. This goes some way to

supporting the previous evaluation of the technology function where it was summarised that the technology was, in general, as reliable as expected. The fact that 57% of the computer conference discussion was related to the course activities suggests that the design of the course and the use of the computer conferencing system focused the learners' discussions predominantly on the course content. This was considered to be a positive indicator of the evaluation.

From the week by week breakdown of the conference interaction it was clear that the amount of computer conference usage varied over the duration of the course. The overall downward trend in the amount of learner interaction suggests that the initial enthusiasm indicated in the questionnaire of the previous part of the evaluation waned as the course progressed. The fact that Unit 2 of the course constituted 42.4% of all of the conference activity suggests the possibility that Unit 2 was better at stimulating the learners to use the conference system. Unit 3 of the course had the lowest level of interaction at 11.7%, this suggests that there were some problems with this part of the course. The fact that the final part of the course, Unit 4, had a higher level of learner participation (19.1%) than Unit 3 suggests that the reason for the low level of participation in Unit 3 was not solely due to diminishing learner motivation.

It is clear from the summary table of individual learner participation that some learners were far more active within the computer conference discussions than others. The fact that 40% of the learners contributed 80% of the conference discussion indicates that, for some individuals, motivation

and commitment to the course was at a higher level than others.

Even though the overall participation within the EA course was low, the fact that some learners were actively involved allows later evaluation to consider the impact of differing levels of participation on the learning outcomes.

Chapter 12

Evaluation of the computer conference discussions during the EA course (Part 4 of the evaluation)

Aims

This chapter presents an evaluation of the content of the computer conference discussion elements logged by the host computer during the EA course. This part of the evaluation seeks to evaluate the extent to which the discussions taking place within the computer conference system indicated that the intended learning outcomes of the EA course were realised by those involved. By focussing on the discussions which took place, this part of the evaluation also considers the opportunities for sharing of ideas through the conference discussions (Stone & Nielson, 1982).

The resultant data of this part of the evaluation provides quantitative data 'scores' which aid in the formation of reliable judgements relating to the implementation of the EA course (Tuckman, 1975). Within Chapter 4 of this thesis it was discussed that generating quantitative information may help to provide reliable data on which to base the value judgements about the EA course (Fetterman, 1981).

It must be emphasised that the results of this evaluation could not give any

measure of 'change' in understanding due to participation in the EA course. In order to gain a measure of change in understanding it would be necessary to have some measure of the learners' initial understanding before the course began. It was not possible to obtain this information for the whole learner group as there was no opportunity for pre-testing all of the learners. Later case study evaluation of individual learners through interview (part 5) represents an attempt to consider the change in understanding of the issues within the EA course.

The diagram below indicates the issues covered within this part of the evaluation from the learning model for distance education identified within Chapter 3. From the diagram, those issues which are considered by this part of the evaluation are highlighted with a white rectangle, those which have been considered by other parts of the evaluation are highlighted with a grey rectangle.

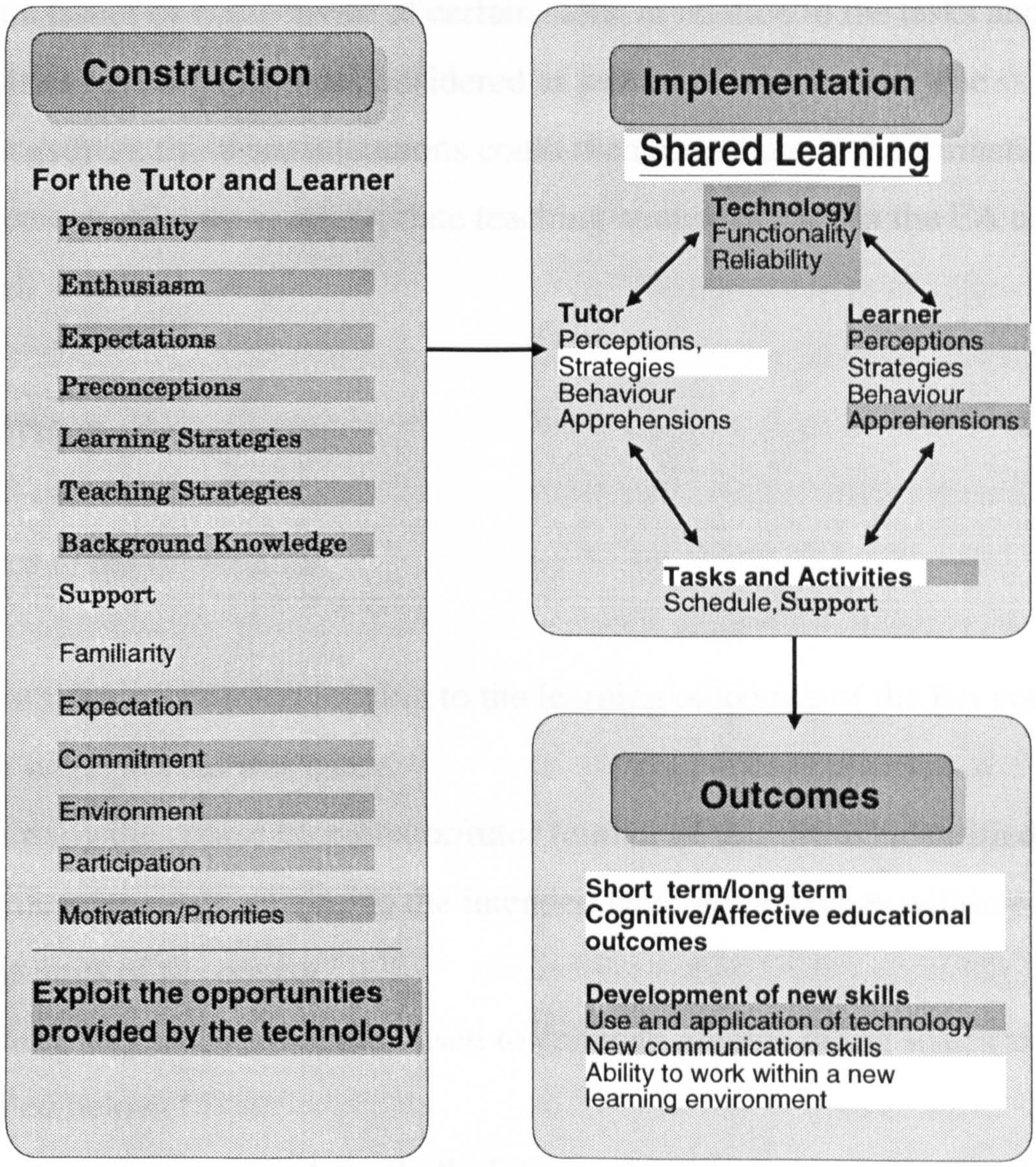


Figure 30: Focal areas of part 4 of the EA course evaluation

This part of the evaluation mainly focused upon the outcomes of the learning process (Kyriacou, 1991). Each unit of the EA course had specific cognitive issues of which the learners were supposed to gain an understanding. For instance, issues relating to environmental decision-making were part of Unit 2, while Unit 1 of the course specifically dealt with skills needed for using the technology for communication during the course. The extent to which the learners demonstrated understanding of

certain issues or competence of certain skills in relation to the tasks and activities for each unit was considered as part of the evaluation. The findings from these considerations could then contribute in the formation of judgements relating to appropriate teaching strategies used in the EA course (Small, 1986).

Method

Source of the information

To gain the information relating to the learning outcomes of the EA course a three stage process was used:

- Initially the course coordinator/tutor (author of this thesis) identified specific statements relating to the intended learning outcomes within each of the units of the course.
- These statements were then used to generate graphic rating scales as detailed below.
- By referring to a printout of all of the conference discussions, the graphic rating scales were used to evaluate the extent to which the intended learning outcomes were reflected within the conference discussions. The rating scale values were generated by the researcher.

The excerpts of computer conference discussion used to award the rating values, or 'scores', are included within this part of the evaluation to help identify the basis on which the ratings were made. This information is explained within the following 'analysis' section of this chapter.

Generating the graphic rating scales

This evaluation made use of 'rating scales' as described by Gronlund (1981). The most common use of the rating scale is to assess the attainment of definite learning outcomes. They provide a common set of evaluation criteria for all of those being evaluated, in this case, the individuals within the learner group. The most common form of the rating scale is to list the qualities or characteristics to be judged and then create a scale for each. This scale is then used to indicate the degree to which the attribute is present (Tenbrink, 1974). Within this evaluation, the characteristics to be judged were the intended learning outcomes for each unit of the course. The rating value was intended to reflect the level to which these intended learning outcomes were realised within the computer conference discussion.

There are a number of different methods for creating rating scales which are widely recognised:

Numerical Rating Scale; This is perhaps one of the simplest forms of rating scale, it involves the rater choosing a number to indicate the degree to which a characteristic is present. Typically, each of the numbers on the rating scale has a verbal description which remains constant from one characteristic to another (Chase, 1978; Gronlund, 1981; Small, 1986, et al).

Example:

Directions: Indicate the degree to which this pupil contributes to class discussions by encircling the appropriate number. The numbers

represent the following values: 5 - *outstanding*, 4 - *above average*, 3 - *average*, 2 - *below average*, 1 - *unsatisfactory*.

1. To what extent does the pupil participate in discussions?

1 2 3 4 5

2. To what extent are the comments related to the topic under discussion?

1 2 3 4 5

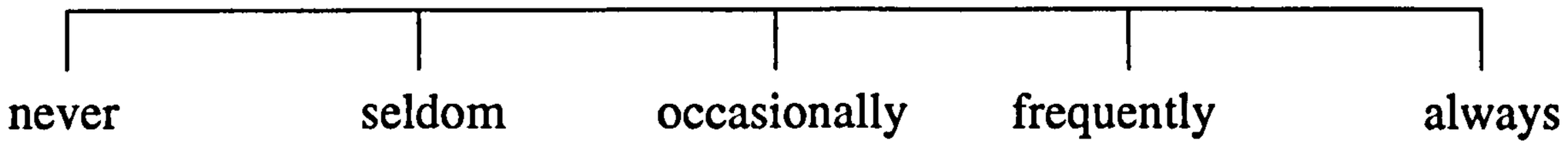
The problem with this method of rating scale is that the numerical values are only vaguely defined, this can lead to inconsistency of interpretation and problems with reliability of results (Ashworth, 1982). It also requires that the characteristics under observation must be put into the correct form for the rating scale (Patton, 1981) As the desired learning outcomes for the EA course are diverse in content, it was felt that using this form of rating scale would be too restrictive and would lead to the creation of evaluation characteristics appropriate to the scale, rather than the other way around.

Graphic rating scale; This method of rating scale is distinguished from the numerical form by the fact that the categories are listed, spaced equally along a line in order of degree; the rater marks the appropriate place on the line with a mark, often a tick or cross. The rater is free to mark any point along the line, thus allowing the possibility of marks to be put between categories (Fetterman, 1981).

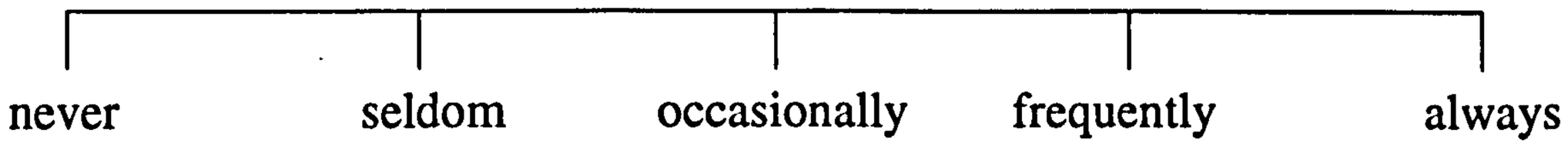
Example:

Directions: Indicate the degree to which this pupil contributes to class discussions by placing an *x* anywhere along the horizontal line.

1. To what extent does the pupil participate in discussion?



2. To what extent are the comments related to the topic under discussion?



The scale shown uses the same categories for each of the characteristics. It is sometimes referred to as a *constant - alternatives* scale (Chase, 1978; Popham, 1981). The main difference between this and the numerical scale is that it allows the rater to choose any point on a continuum. An adaptation to this form of rating scale is the *changing - alternatives;* in this case each characteristic may have a different set of categories in its scale.

The Descriptive Graphic Rating Scale; this is perhaps, in terms of choice of characteristics and categories, the least restrictive rating method. Descriptive phrases are used to identify points on a graphic scale. The descriptions should give the rater a general understanding of what type of activity should be observed in order to attain that point on the scale. The points along the scale would normally have some notion of order from left to right with the midpoint on the line representing the change from, for instance, 'less desirable' to ' more desirable' (Small, 1986). The rater is then

asked to place a check mark at one point on the scale. As with graphic rating scales, the rater may place the check at any point along the line. The descriptive graphic rating scale allows the categories for each criterion to be changed, as with the changing - alternatives scale, but the category descriptions give more information about what should be observed, in order to award that rating.

Example:

Directions: Make your ratings on each of the following characteristics by placing an *x* anywhere along the horizontal line.

1. To what extent does the pupil participate in discussion?

Never participates; quiet, passive	Participates as much as other group members	Participates more than any other group member

2. To what extent are the comments related to the topic under discussion?

Comments ramble, distract from topic	Comments usually pertinent, occasionally wanders from topic	Comments are always related to topic

"The more specific behaviour descriptions also contribute to greater objectivity and accuracy during the rating process" (Gronlund, 1981; p.443).

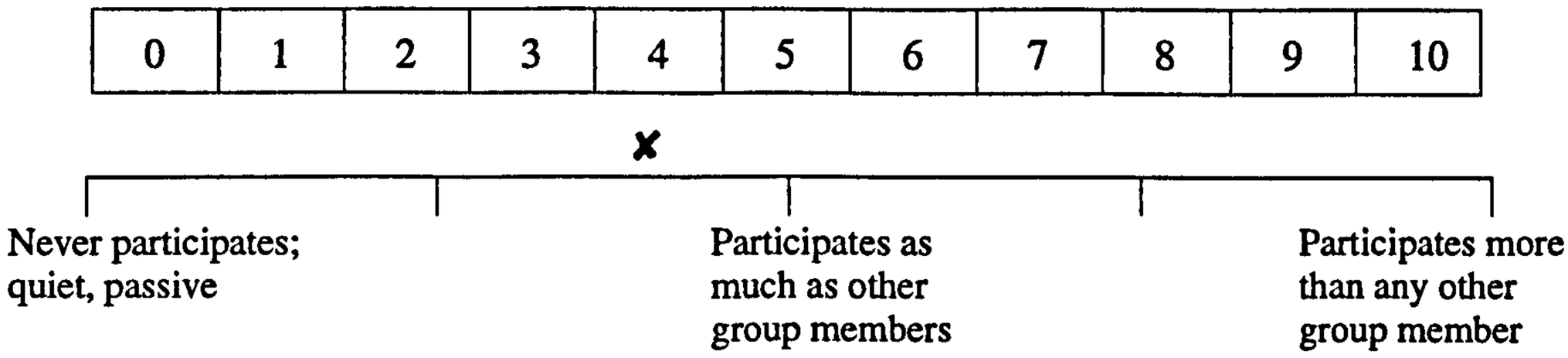
This method of observational evaluation was used for assessing the learning outcomes of the EA course identifiable in the conference discussion. There

are a number of reasons for this: it allows for flexibility in the categories for each criterion; as the categories are descriptive it is hoped that greater reliability was attained, and it is possible to have a different number of categories for each of the criteria. The third of these points requires a little more explaining; one of the other benefits of the descriptive graphic rating scale is that it is not necessary to have the same number of categories for each criterion. It is usual to have an odd number of categories in any rating scale, as this allows a central category. It is also usual to have at least three and not more than eleven categories (Popham, 1981). Within these guidelines it is possible to have any number of categories.

The graphic rating scale as described above yields no quantitative data, but there is a simple method by which useful quantitative data may be derived. This is by making use of a *criterion ruler* (Chase, 1978).

The criterion ruler involves 'overlaying' a numerically scaled ruler above the line for the graphic rating scale; it is then possible to attribute a numerical value to the checked point. This process was applied to the graphic rating scales generated through the evaluation of the EA course.

Example:



The rating scale shown above shows that the rater has placed their check mark *x* to the left of centre, the criterion ruler gives this a rating value or score of 4. The criterion ruler used for the evaluation of the EA course used the numbers 0 to 10, as in the diagram.

Construction of the rating scales for this part of the EA evaluation

Initially there were twenty rating scales created. These consisted of five rating scales identifying intended learning outcomes for each of the four units, as well as five general intended course outcomes. They were derived from the different issues or procedures contained in the course content. Applying these rating scales, when different learning outcomes for each unit were considered, proved difficult in practice. This was due to the low number of discussion elements logged for some of the learners (part 3 of the evaluation). As many of the learners did not record many comments on the system, trying to find evidence for each of the specific issues identified on the rating scales was often difficult or, on many occasions, impossible.

Instead, a single rating scale for each of the four units was constructed. Each

of these rating scales was constructed to cover all of the aspects previously covered by the five original scales. For example, for Unit 1, the statement generated was, 'Competence in use of conference system'. Instead of considering the learners' ability to use and understand the individual concepts of the computer conference system, these were all grouped together into one rating scale.

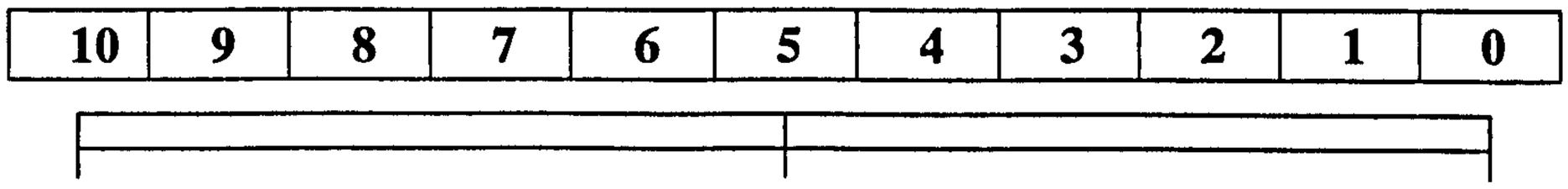
Once the four rating scale criteria had been identified, three 'levels' of attainment were constructed to complete the rating scale. The lowest level was created such that in all cases it identified learners who demonstrated no understanding or ability in the issues or procedures for that criterion/unit. The second, middle rating was created such that it identified people who had demonstrated some understanding of the issues but did not understand all aspects intended by the course. The third and highest level was constructed such that it identified learners who had demonstrated a maximal level of understanding that involvement in the course could achieve. Each level assumed that the previous level had already been attained.

The rating scales used

The four rating scales used for this part of the evaluation were constructed to relate to the content of each of the units of the course, detailed in Chapter 5:

Rating scale 1

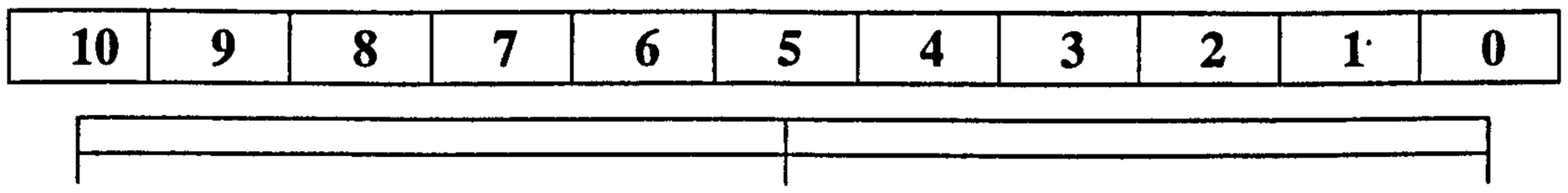
❒ Competence in use of conference system.



Rating scale 1 relates to Unit 1 of the course. It aims to measure the extent to which each learner demonstrated within the conference system their ability to use the facilities the system offered.

Rating scale 2

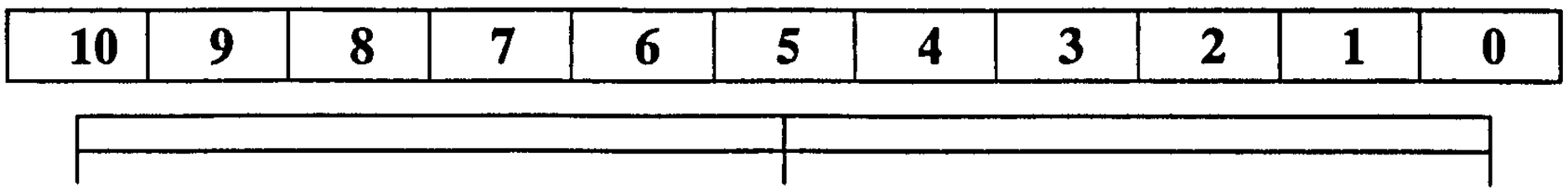
❒ Understanding of the issues and factors relating to an environmentally sensitive hotel development.



The second rating scale refers to Unit 2 of the course. It aims to evaluate the extent to which the learners demonstrated the desired understanding of the issues involved within environmental decision making, in relation to an environmentally sensitive hotel development.

Rating scale 3

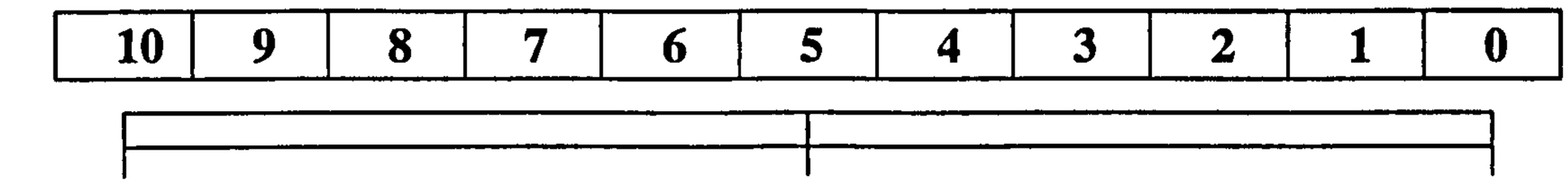
❒ Understanding of the nature and role of EC environmental legislation.



Rating scale 3 refers to Unit 3 of the EA course. It aimed to evaluate the extent to which the learners demonstrated understanding of the issues related to EC environmental legislation, as detailed within the learner handbook (Appendix Ai).

Rating scale 4

❒ Understanding of environmental procedures.



The final rating used within this part of the evaluation relates to Unit 4 of the EA course. Unit 4 of the course focused upon environmental procedures, which relate to the environmental legislation addressed within Unit 3. This rating scale aimed to gain insight into the extent to which the computer conference discussions reflected the learners' understanding of these environmental procedures.

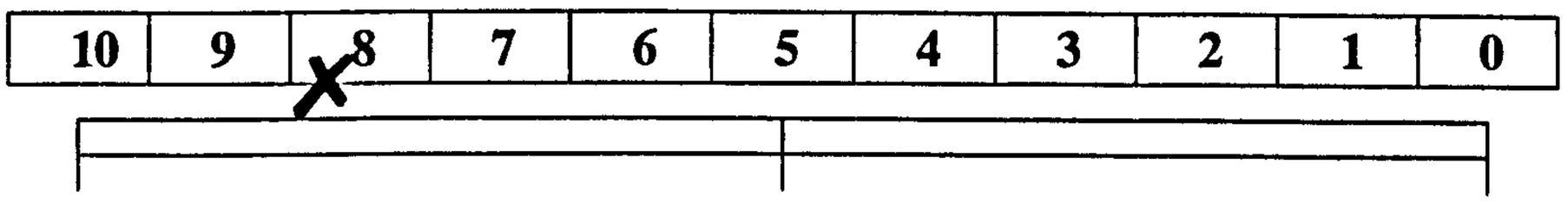
Method for assigning a rating

The assignment of the ratings was undertaken during the month immediately after completion of the course. A printout of all of the conference discussions and e-mail messages logged by the system was produced, having downloaded the information to computer disc. For each of the learners a rating was then given on each of the rating scales. The rating was made by searching the conference items for discussions which were considered to identify a certain level within that rating. Once a judgement

had been made that the observed level had been attained, a check mark 'x' was placed at that point along the line. Once all the ratings had been made, the criterion ruler was overlaid to give a value from 0 to 10 for each rating. The criterion ruler was applied after all of the ratings had been made, in order to allow freedom of constraint which the discrete values on the criterion ruler might suggest.

Example

❒ Understanding of the nature and role of EC environmental legislation.



Analysis of rating scale data

The researcher, having constructed and applied the graphic rating scales to the computer conference discussions, then presented them in tabular form. These tables were cross-referenced to the computer conference discussions. A separate table was constructed for each of the five learner groups (labelled a to e), which indicated the ratings made for each of the learners in

that group (numbered 0 to 9) within Appendix F. The ratings were cross-referenced to excerpts from the computer conference printout, to increase reliability by providing an example of the actual discussion elements used to make each rating. This was to help provide the necessary background information for anyone wishing to repeat the evaluation or to examine the data in greater detail. The method for cross-referencing the rating to the conference discussions is described within the introduction to Appendix B. The data included within these tables was then collated in two different formats.

The first set of summarised results tables, *results 1*, presents the data in a format which allows comparison between the different learner groups. The second set of results tables, *results 2*, presents the data to allow comparison between the different units of the course.

Findings

Description of presentation format for results 1

The first set of summary tables contain data for each of the study groups (a-e). The tables indicate the number of people in that group who attained each of the specified rating values, obtained by overlaying the criterion ruler. There are four of these tables, one for each of the course units. There is also a stacked column chart associated with each of these tables, in order to help visualise the data.

Example of results table 1, comparing the different learner groups.

❒ Rating scale criterion.

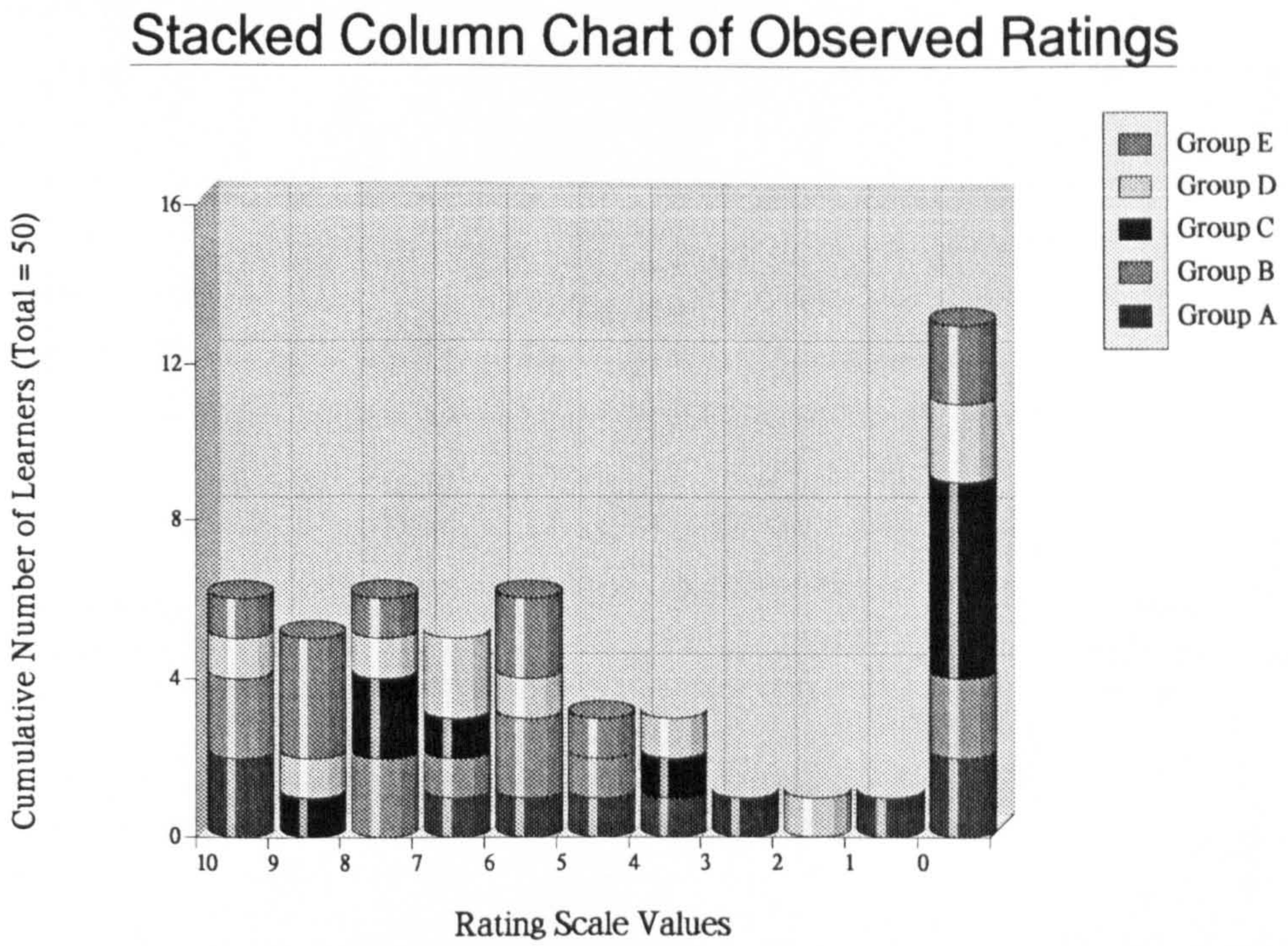
a	2	-	-	1	1	1	1	1	-	1	2
b	2	-	2	1	2	1	-	-	-	-	2
c	-	1	2	1	-	-	1	-	-	-	5
d	1	1	1	2	1	-	1	-	1	-	2
e	1	3	1	-	2	1	-	-	-	-	2
T	6	5	6	5	6	3	3	1	1	1	13
	10	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**0**

High level observed. Medium level observed. No observable reading.

Within the tables the rating scale criterion is presented first, followed by the summary table of results. The letter in the left hand column indicates the study group; each study group consisted of ten learners. The numbers in each of the columns to the right of the study group letter indicates the

number of learners identified with the corresponding rating value. As each learner was given a single rating for each of the criteria, the total number in each row is always ten, as it is equal to the number of learners in each group. At the base of the table, the sum total (T) of learners obtaining that rating is given.

It should be noted that if a learner had not contributed to any discussion for that part of the course, a rating of 0 was recorded. Below the scale the three levels identified for the rating scale criteria are indicated. Below each of the results tables, a stacked bar chart is included :



Each of the columns within the chart consists of sections representing the data for each of the groups. Comparing the comparative proportions of each section gives an indication of the proportions of learners from each group

obtaining that rating scale value. Comparing the overall height of the columns indicates the distribution of learners obtaining each of the rating scale values.

Results Tables 1. Rating Scales Applied to the Conference Printout, comparison by learner group.

Rating scale values for Unit 1 of the course.

This unit aimed to bring about affective behavioural change by providing the learners with skills in using the computer conference system. It was intended that they should be able to use the system to participate in computer conference discussions and move around the system within the virtual study centre.

❒ Competence in use of conference system.

a	2	-	-	1	1	1	1	1	-	1	2
b	2	-	2	1	2	1	-	-	-	-	2
c	-	1	2	1	-	-	1	-	-	-	5
d	1	1	1	2	1	-	1	-	1	-	2
e	1	3	1	-	2	1	-	-	-	-	2
T	6	5	6	5	6	3	3	1	1	1	13

10	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**0**

Shows ability to use all facilities offered by conference system. (e-mail, show and add to an item, start a new item, move around conference structure to take part in many conference discussions).

Shows ability to show an item and add to it to take part in conference discussion.

Shows no ability to use conference system.

From this table it is possible to identify that the largest proportion of rating values were 0, so no ability to use the conference system was demonstrated in these cases, specifically due to lack of active participation. Within the body of the table the highest number of rating values was within study group e, for learners with a rating value of 9, demonstrating competence and

a very good ability to use most of the facilities offered by the conference system. Within this rating scale, learner group c had the lowest average rating score and the highest number of 0 ratings, therefore the highest number of non-participating learners.

The content of the table shown above is represented within the column chart below:

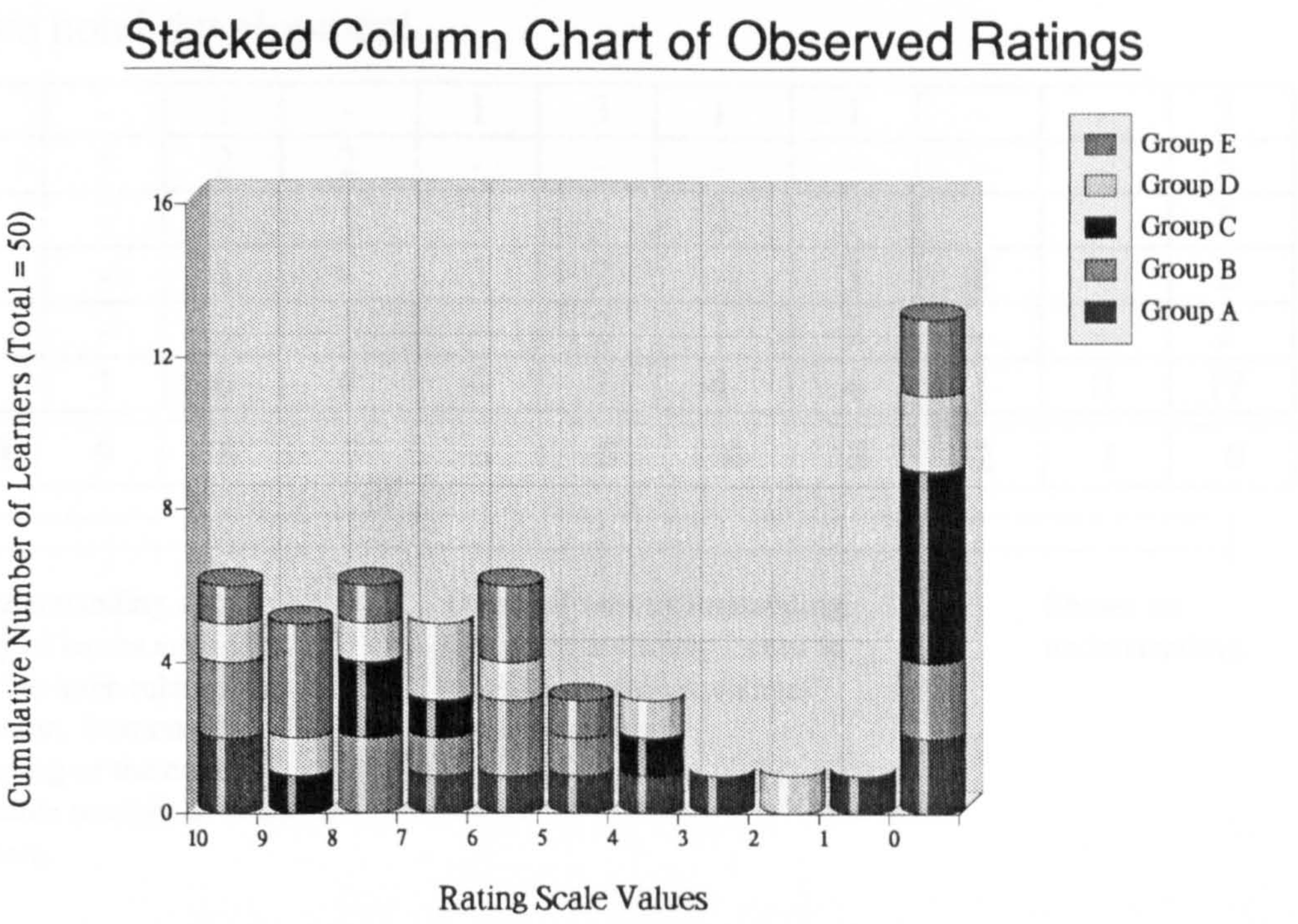


Figure 31: Graph of rating scale values for rating scale 1, Competence in use of conference system

The fact that the highest number of rating values awarded was 0, caused by learners not participating, is indicated by the far right hand column. Discounting this column, the distribution of rating values is concentrated around the higher rating values of 5 and above, showing at least a reasonable ability to use the conference system for discussion.

Rating scale values for Unit 2 of the course

This unit aimed to explore general environmental issues by focusing on a specific example. It involved the learners taking part in a role-play scenario whereby they had to decide upon a development plan for a fictitious environmentally sensitive hotel development.

❒ Understanding of the issues and factors relating to an environmentally sensitive hotel development.

a	-	-	1	-	1	3	1	1	-	-	3
b	-	1	2	2	-	-	-	-	-	-	5
c	-	-	-	1	1	-	2	-	1	-	5
d	-	-	1	-	2	2	-	1	2	-	2
e	-	-	2	1	-	2	1	2	-	-	2
T	0	1	6	4	4	7	4	4	3	0	17

10	9	8	7	6	5	4	3	2	1	0

Shows understanding of a diversity of issues and indicates the inter-relationship between them. Demonstrates understanding of the concept of sustainable tourism as outlined in the course.

Demonstrates understanding that there are many issues to consider in environmental decision making.

Shows no understanding.

From the table it is possible to identify that the largest number of learners obtaining a single rating were those with a rating of 0, resulting from a lack of input, therefore a lack of evidence. No learners were awarded a rating score of 10 for this unit, with one learner gaining a rating of 9, which was the highest, showing an excellent understanding of the various issues associated with an environmentally sensitive hotel development. Learner groups b and c both had the largest number of learners with 0 ratings,

although group c had the lowest overall average rating values, again as a result of low levels of participation within the group. The diagram represents the content of the previous table in graphical form:

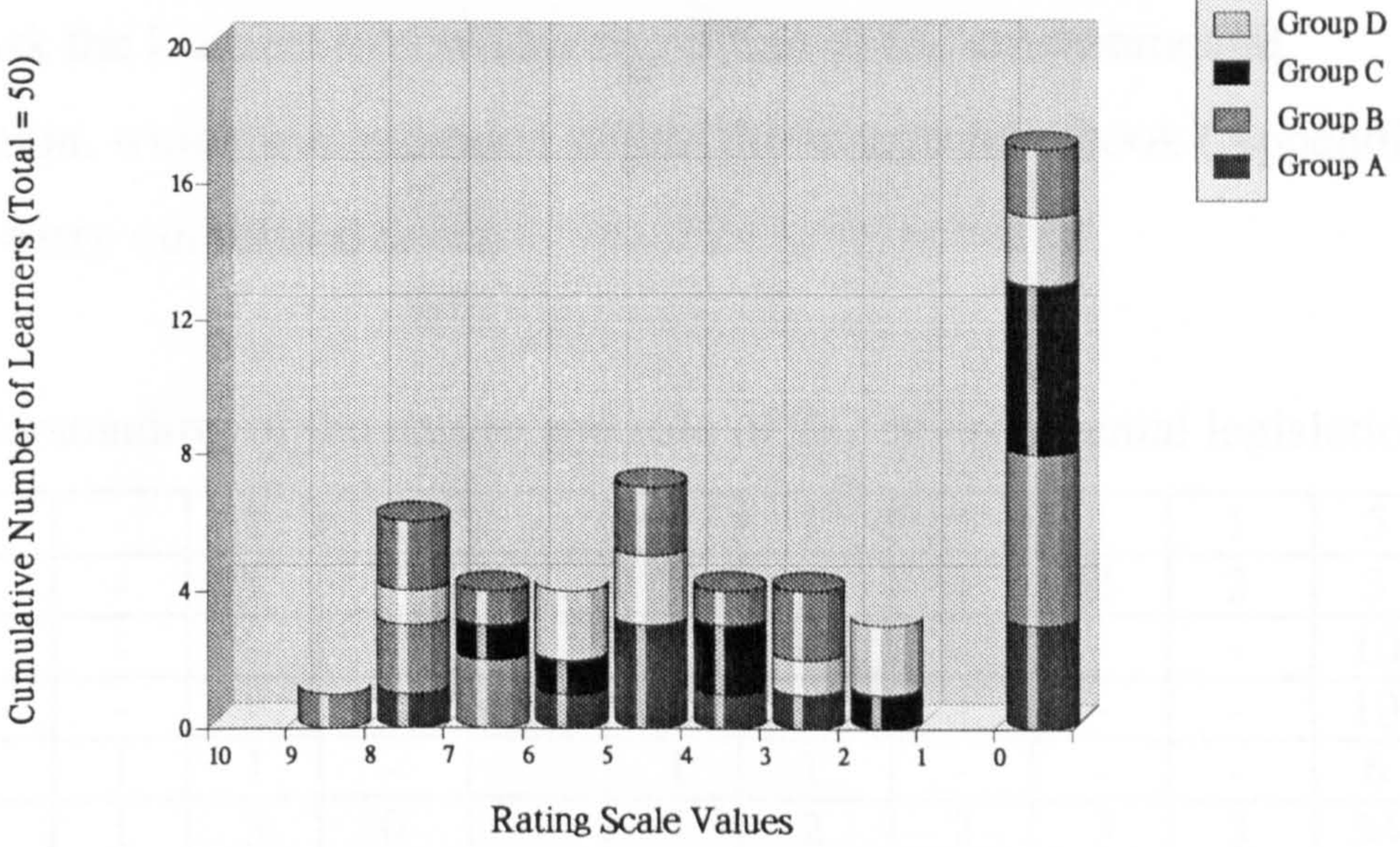


Figure 32: Graph of rating scale values for rating scale 2, Understanding of the issues and factors relating to an environmentally sensitive hotel development.

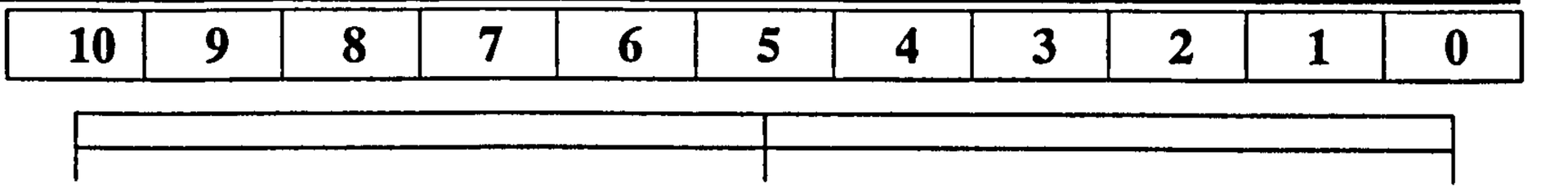
From this table it is possible to identify the distribution of rating values. It is clear that the largest proportion were for a value of 0, which predominantly represents the learners who did not take part in the conference discussions. The remainder of the rating values are distributed approximately evenly between rating values of 1 through 7, ranging from very little understanding to a reasonably good understanding of the environmental issues involved in planning a hotel development, taking sustainable tourism into account. Notable exceptions are with the number of learners gaining a rating value of 5, midway along the scale.

Rating scale values for Unit 3 of the course

This unit focused upon the impact of legislation on environmental issues. It began by looking at raised public awareness of environmental disasters which may have motivated the creation of environmental legislation. It went on to ask the learners to consider an outline of EC environmental legislation, which was provided within the learner handbook (Appendix Ai), and to carry out related tasks.

❒ Understanding of the nature and role of EC environmental legislation.

a	-	-	1	-	-	-	1	1	1	1	5
b	-	-	1	-	1	-	-	1	2	2	3
c	-	-	-	-	-	-	-	-	-	-	10
d	-	-	-	-	-	-	-	-	-	-	10
e	-	1	1	-	-	1	1	-	-	-	6
T	0	1	3	0	1	1	2	2	3	3	34



From the table it is possible to identify that most of the learners (n=34, 64%) were awarded a rating of 0, demonstrating a lack of participation in this unit. Within learner groups c and d every learner within the group was awarded a rating value of 0.

The graph below reflects the data within the previous table:

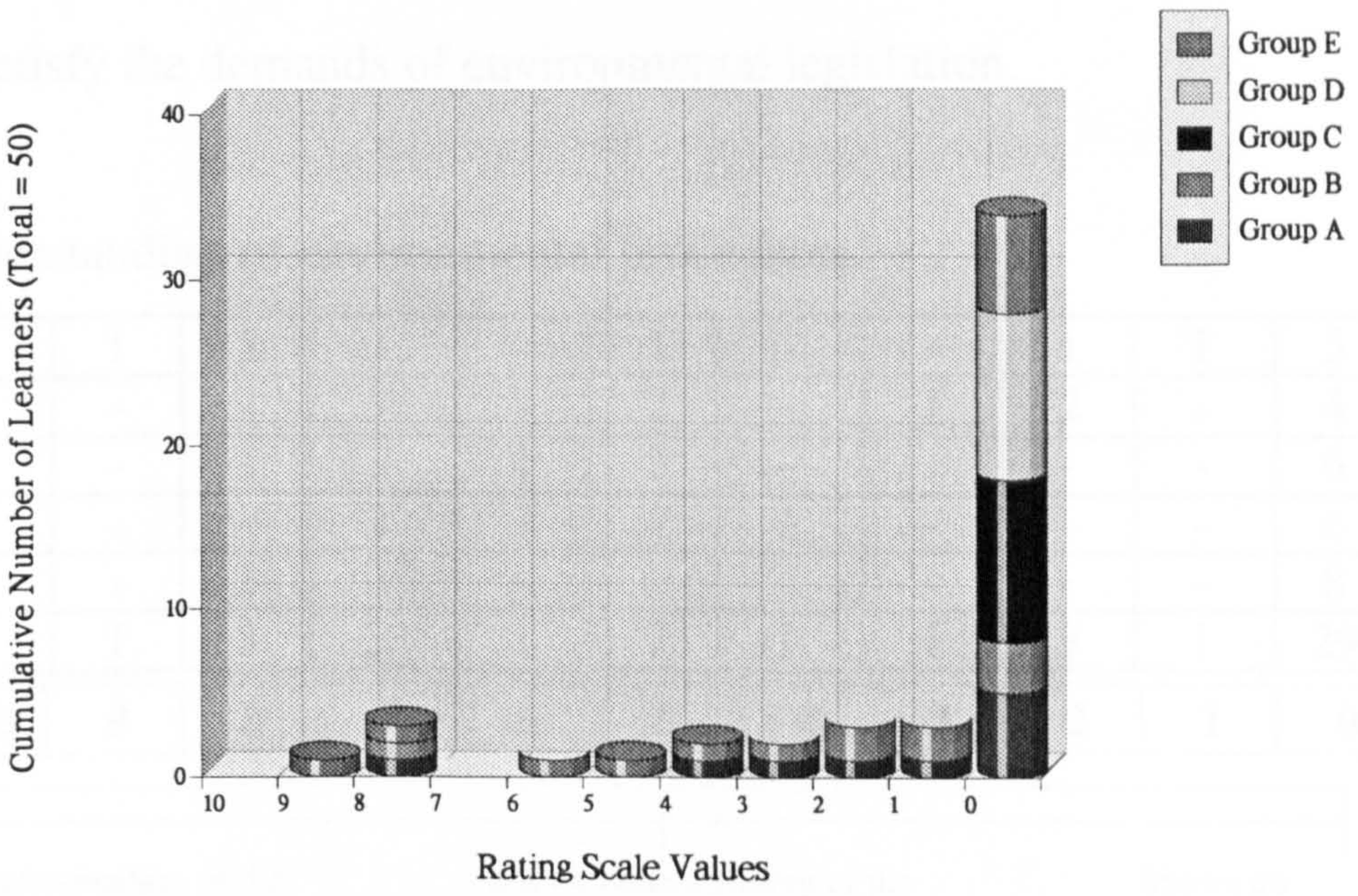


Figure 33: Graph of rating scale values for rating scale 3, Understanding of the nature and role of EC environmental legislation.

From the graph it is clear that the overall rating values were very low for this unit of the course, with only five learners from the fifty gaining a rating of 5 or above. This shows that only five learners demonstrated a reasonable or better understanding of the history, structure and implications of EC environmental legislature. It is also notable that thirty-four out of the total learner group took very little part in this unit.

Rating scale values for Unit 4 of the course

This unit of the course aimed to consider environmental procedures which have been created to measure an organisation's environmental performance, or to satisfy the demands of environmental legislation.

❒ Understanding of environmental procedures.

a	-	1	1	-	-	1	-	-	1	1	5
b	1	-	-	-	-	2	-	1	2	-	4
c	-	-	1	-	1	2	-	-	-	-	6
d	-	-	-	1	-	2	1	-	-	-	6
e	-	-	1	1	-	-	-	-	-	-	8
T	1	1	3	2	1	7	1	1	3	1	29
	10	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**0**

Shows understanding of the aims and objectives of; Environmental Audit, Environmental impact Assessment and Life Cycle analysis. Demonstrates knowledge of practical process for implementation of above and shows the ability to implement the process in a hypothetical situation.

Shows understanding of the aims of the various processes. Demonstrates knowledge of the core elements of each.

Shows no understanding of environmental procedures.

Within this table the largest number of learners were awarded a rating value of 0, arising from a lack of participation in the computer conference. There were, however, learners awarded rating values from 7 to 10, demonstrating a good to excellent understanding of various environmental procedures and the practical applications involved. A proportion of the learner group also gained a rating value of 5, demonstrating basic knowledge of the elements and objectives of the environmental procedures covered. The lowest average rating value was obtained by learner group e and the highest was

obtained by learner groups a and b.

The graph below represents the data within the previous table for Unit 4 of the EA course:

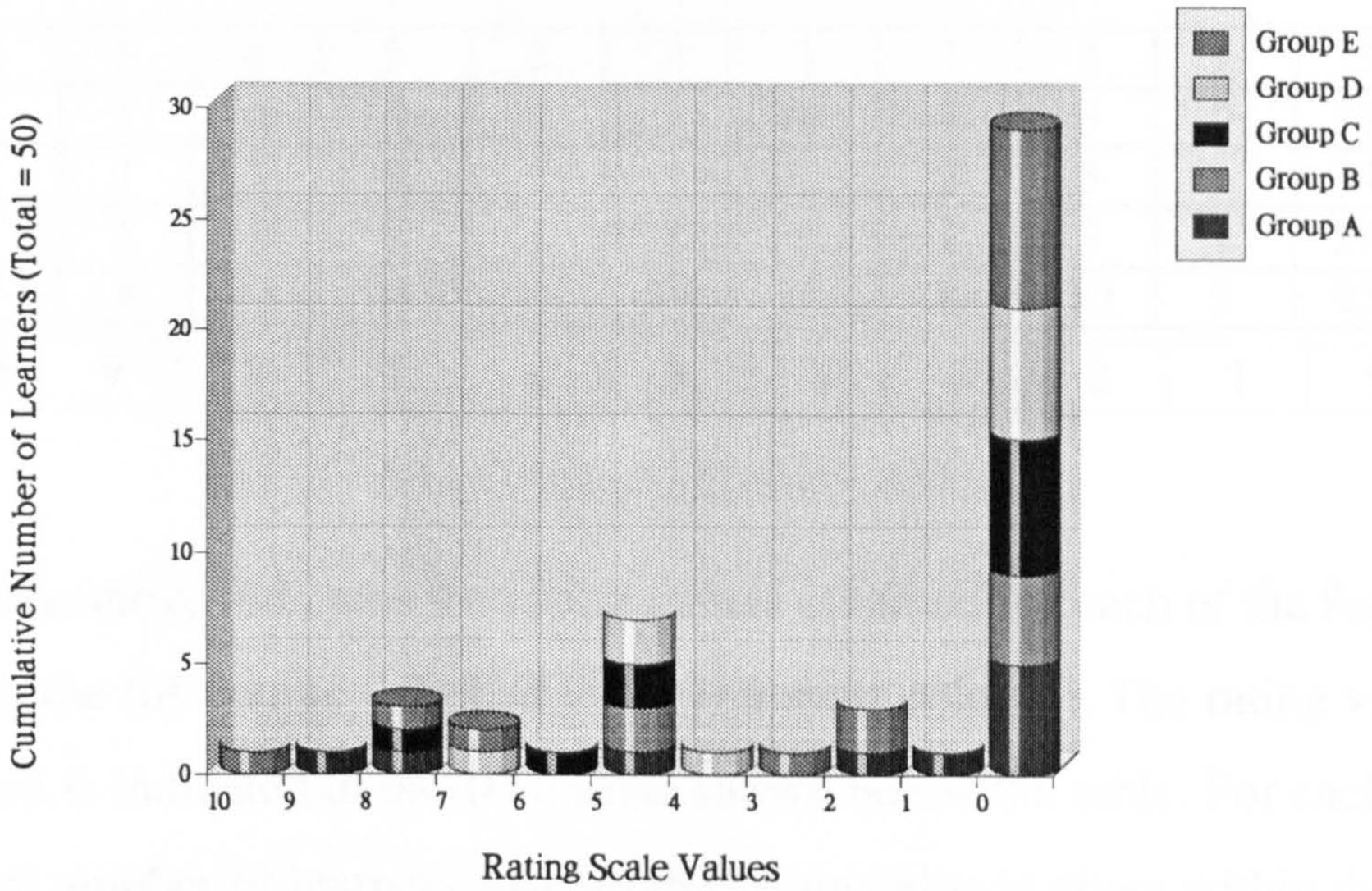


Figure 34: Graph of rating scale values for rating scale 4, Understanding of environmental procedures.

From the graph it is possible to identify that there is an approximately even distribution of learners gaining each of the rating values. There are two notable exceptions to this; there are a larger number of learners obtaining a rating value of 5 and the majority of learners were awarded a rating value of 0.

Summary table for Results 1

The table presented below includes the total number of learners within each unit gaining each of the rating values.

Summary table of ratings awarded for each unit of the course.

1	6	5	6	5	6	3	3	1	1	1	13
2	0	1	6	4	4	7	4	4	3	0	17
3	0	1	3	0	1	1	2	2	3	3	34
4	1	1	3	2	1	7	1	1	3	1	29
T	7	8	18	11	12	18	10	8	10	5	93
	10	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**0**

The table above indicates the rating values obtained for each of the four units of the EA course (labelled in the left most column). The rating value obtained is indicated in the 10-0 scale shown below the table. For each unit the total number of learners gaining the rating value is given within the body of the table. For example, looking at the third row down, it is possible to identify that, for Unit 3 of the course, the number of learners gaining a rating value of 8, on the scale below the table, was three. A fifth row indicates the total number of learners gaining each rating value for all units of the course.

Graph of summary table above.

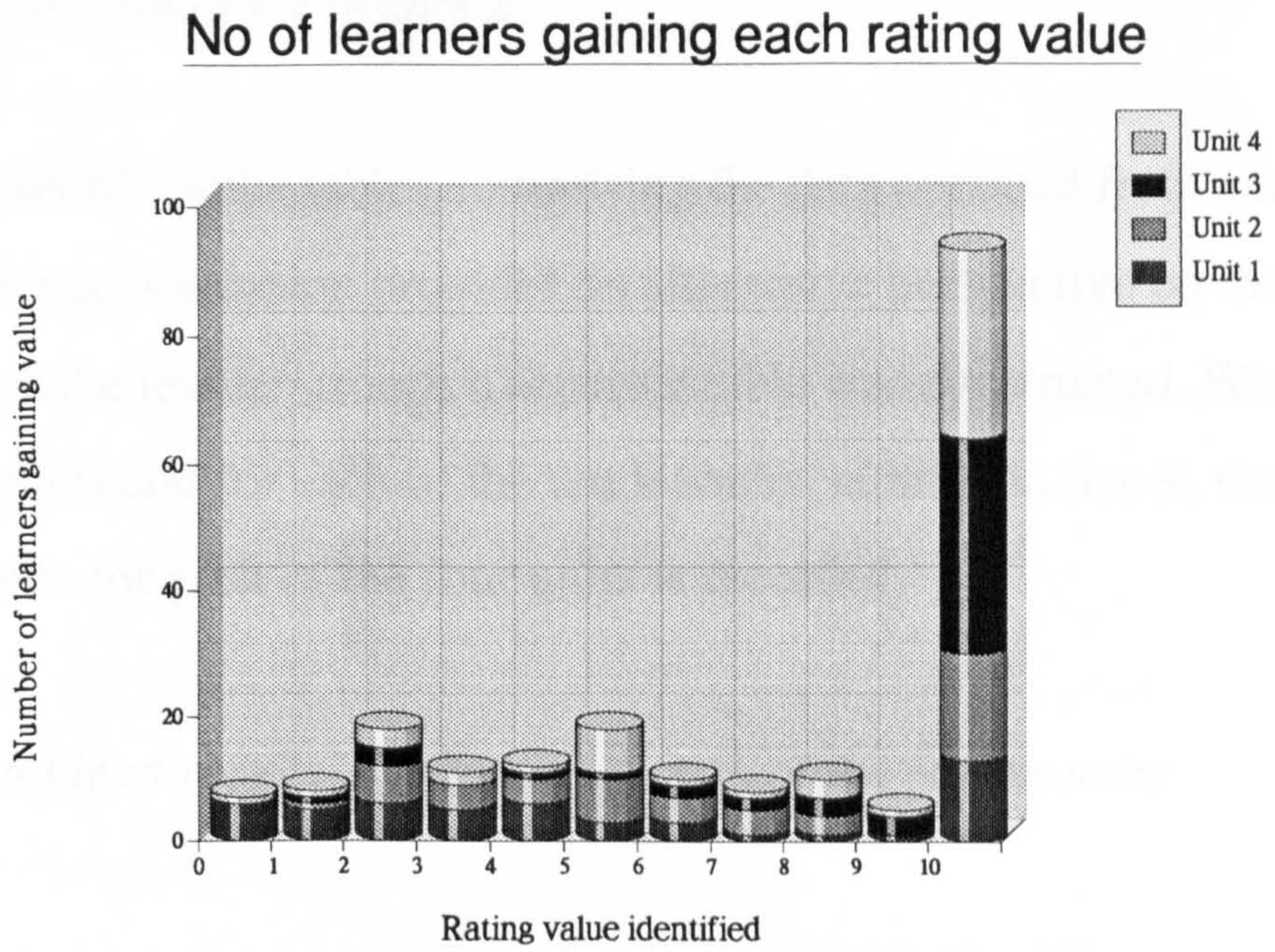


Figure 35: Graph of overall rating scale values for all units of the course

The graph above presents the data in the table as a stacked column chart. Each of the cylinders indicates the number of learners gaining the rating shown on the scale below. The total height of the columns indicates the total number of learners gaining that rating value over all four units of the course.

From the graph shown above it is clear that the highest proportion of learners gained a rating value of 0. The graph also suggests that Unit 1 of the course obtained the highest rating values overall, with many learners gaining a rating value of 5 or above, demonstrating competence and ability in using the computer conference system. It would also appear from the graph that Unit 3 of the course generated the lowest rating values. The overall shape of the chart, excluding the 0 rating value, approximates to a statistically normal distribution.

Presentation format for results 2

A second set of results tables comprising the data obtained from analysis of the conference discussion provides an alternative perspective on the data. For each of the learner groups a separate table was constructed. Within each of these tables and for each of the ten learners, numbered 0 to 9, their ratings value for each of the four units is recorded.

Example table of results 2, comparing each of the course units

rating value for each unit (0 - 10)

Learner	Unit 1	Unit 2	Unit 3	Unit 4	Total/40	% Rating
0	6	4	2	0	12	**30%**
1	10	8	4	8	30	**75%**
2	-	-	-	-	-	-
3	3	6	0	0	9	**23%**
4	7	5	3	5	20	**50%**
5	5	5	1	2	13	**33%**
6	4	3	0	1	9	**23%**
7	1	0	0	0	1	**3%**
8	10	5	8	9	32	**80%**
9	-	-	-	-	-	-
Average	**5.8**	**4.5**	**2.3**	**3.1**	**15.8**	**39%**

As there were four rating values, each with a maximum of 10, the maximum total which could be obtained was 40. The total rating across all units for each learner, the rating 'score', is indicated in the sixth column. To help visualise the results, a further column converts this score into a percentage. At the base of the table, averages for the group indicate the average scores for each of these columns. For example, within the table above for learner

group a, learner number 5 was awarded a rating of: 5 for Unit 1, 5 for Unit 2, 1 for Unit 3 and 2 for Unit 4. This gave learner number 5 a total 'score' of 13, which equates to a percentage score of 33%. The information provided by these tables helps to identify within each group which of the units recorded the highest rating scores. This in turn gives an indication as to the units where intended learning outcomes were reflected in the conference discussions.

Results Tables 2. Course intended learning outcome rating scales applied to the conference printout, categorised by unit.

Group a

rating for each unit (0 - 10)

Learner	Unit 1	Unit 2	Unit 3	Unit 4	Total/40	% Rating
0	6	4	2	0	12	**30%**
1	10	8	4	8	30	**75%**
2	-	-	-	-	-	-
3	3	6	0	0	9	**23%**
4	7	5	3	5	20	**50%**
5	5	5	1	2	13	**33%**
6	4	3	0	1	9	**23%**
7	1	0	0	0	1	**3%**
8	10	5	8	9	32	**80%**
9	-	-	-	-	-	-
Average	**5.8**	**4.5**	**2.3**	**3.1**	**15.8**	**39%**

Figure 36: Table of conference rating scores for learner group a

From this table it is possible to identify that the ranked order of average rating values for each unit is: Unit 1, Unit 2, Unit 4, Unit 3. The highest rating scores were 30 and 32, which represents percentage scores of 75%

and 80%. The lowest rating value was 1 which constitutes a rating percentage score of 3%. The average rating score for this group was 15.8 (39%). From this group, two learners did not take part in any of the course activities.

Group b

rating for each unit (0 - 10)

Learner	Unit 1	Unit 2	Unit 3	Unit 4	Total/40	% Rating
0	7	8	1	5	21	53%
1	10	8	6	2	26	65%
2	10	9	8	10	37	92%
3	8	7	3	5	23	58%
4	5	0	0	0	5	13%
5	6	0	1	0	7	18%
6	-	-	-	-	-	-
7	6	0	2	3	11	28%
8	-	-	-	-	-	-
9	8	7	2	2	19	48%
Average	**7.5**	**4.9**	**2.9**	**3.4**	**15.8**	**39%**

Figure 37: Table of conference rating scores for learner group b

Within learner group b, the highest rating score was 37 (92%). There is a relatively large gap between this, and the next highest rating score which was 26 (65%). The lowest rating score for this group was 5 (13%). The ranked order for the average rating values for each unit of the course is: Unit 1, Unit 2, Unit 4, Unit 3; the same order as for group a. The overall average rating score for this group was 15.8 (39%) which is also the same average as for learner group a. From this group, two learners did not take part in any of the course activities.

Group c

rating for each unit (0 - 10)

Learner	Unit 1	Unit 2	Unit 3	Unit 4	Total/40	% Rating
0	-	-	-	-	-	-
1	8	4	0	8	20	50%
2	9	7	0	6	22	55%
3	-	-	-	-	-	-
4	8	4	0	5	17	43%
5	4	2	0	0	6	15%
6	-	-	-	-	-	-
7	7	6	0	5	18	45%
8	-	-	-	-	-	-
9	-	-	-	-	-	-
Average	**7.2**	**4.6**	**0.0**	**4.8**	**16.6**	**42%**

Figure 38: Table of conference rating scores for learner group c

From the table, five out of the total of ten learners were not awarded a rating value for any of the units, as they did take part in any computer conference discussions relating to the course tasks. Of the remaining five learners, four obtained rating scores between 17 (43%) and 22 (55%). The lowest rating score was 6 (15%) and the highest rating score was 22 (55%). The average rating score for this group was lower than the previous two units, at 16.6 (42%). For this group, Unit 3 did not have any learners gaining a rating score above 0. The ranked order of average rating scores for the whole learner group is: Unit 1, Unit 4, Unit 2, Unit 3. This differs from the order for the previous two units, where Unit 2 was ranked higher than Unit 4. From this group, five of the learners did not take part in the course.

Group d

rating for each unit (0 - 10)

Learner	Unit 1	Unit 2	Unit 3	Unit 4	Total/40	% Rating
0	8	5	0	0	13	33%
1	9	3	0	5	17	43%
2	-	-	-	-	-	-
3	6	5	0	0	11	28%
4	4	2	0	0	6	15%
5	2	2	0	0	4	10%
6	7	6	0	5	18	45%
7	-	-	-	-	-	-
8	10	8	0	7	25	63%
9	7	6	0	4	17	43%
Average	**6.3**	**4.6**	**0.0**	**2.6**	**13.9**	**35%**

Figure 39: Table of conference rating scores for learner group d

From the table, group d obtained the lowest average rating for learners who took part in the course, with an average of 13.9 (35%). The lowest rating score for learners within this unit was 4 (10%). The highest rating score was 25 (63%). The ranked order for the average rating values for all learners within this group is: Unit 1, Unit 2, Unit 4, Unit 3. This is the same as in learner groups a and b. As in learner group c, none of the learners within this group scored above 0 for Unit 3 of the course. From this group, two learners originally enrolled on the course did not take part.

Group e

rating for each unit (0 - 10)

Learner	Unit 1	Unit 2	Unit 3	Unit 4	Total/40	% Rating
0	8	8	0	0	16	**40%**
1	6	5	8	7	29	**73%**
2	5	4	0	0	9	**23%**
3	-	-	-	-	-	-
4	9	7	5	0	21	**53%**
5	-	-	-	-	-	-
6	9	3	0	0	12	**30%**
7	6	3	0	0	9	**23%**
8	9	8	4	0	21	**53%**
9	10	5	9	8	32	**80%**
Average	**7.8**	**5.4**	**3.3**	**1.9**	**18.6**	**47%**

Figure 40: Table of conference rating scores for learner group E

From the table, the average rating score for this learner group was 18.6 (47%). This was the highest average rating score for all of the learner groups on the EA course. The lowest rating score for this group was 9 (23%) which was obtained by two of the learners. The highest rating score was 32 (80%). Two of the learners did not take any part in the computer conference discussions.

Summary of results tables 2

From results tables 2: The rank order of rating values for each learner group was, in order: Unit 1, Unit 2, Unit 4 then Unit 3. This was the case in all groups except learner group c where the ranked order was Unit 1, Unit 4, Unit 2 and Unit 3. The average rating score per learner for the whole course was 13.2 (40%).

Testing the rating scores for reliability

Descriptive graphic rating scales were used because they are considered by some to be more reliable (Chase, 1978; Gronlund, 1981). This is attributed to the fact that giving more descriptive detail for the categories provides clearer understanding for the rater. To test the resultant data for reliability, the Kuder-Richardson method as described by Stanley (1971) was used. The Kuder-Richardson method may be used in a number of forms, the formula used for the purposes of this thesis is referred to as formula 21 by Stanley (1971), and takes the form:

$$\textit{Reliability estimate } (KR21) = \frac{K}{K-1}\left\{1-\frac{M(K-M)}{Ks^2}\right\}$$

Where:

K = the number of items in the test

M = the mean (arithmetic average) of the test scores

s = the standard deviation of the test scores

This formula yields a value between 0 and 1; the closer to 1, the more reliable the test is considered. The KR 21 formula yields an equivalent to the average of all possible *split half* estimates for the same group, it is therefore likely to be more accurate (Stanley, 1971). The split half method for estimating the reliability of a non-repeated test involves splitting the test results into two halves and calculating the correlation coefficient between the ranked order of the two halves (Gronlund, 1981).

The KR 21 formula may be applied to the evaluation of the EA course, as the criterion ruler provided quantitative data on each of the learners for each of the learning outcomes. This gave test scores appropriate for use in the KR 21 formula.

Applying the test for reliability

The 'results 2' tables above indicate the 'scores' obtained by each of the learners for each of the criteria, which are summed to give an overall score out of 40 for the course. It is possible to apply the Kuder-Richardson test to any set of test scores which yield a numerical value (Stanley, 1971).The table below indicates the total scores for each of the learners over the whole course.

It should be noted that learners who did not, at any time, participate in the course were not awarded a rating score and so were not included in this test.

12	30	9	20	13	9	13
2	21	26	37	23	5	7
11	19	20	22	17	6	18
13	17	11	6	4	18	25
17	16	29	9	21	12	9
21	32					

Figure 41: Aggregated rating scores awarded to participating learners

The Kuder-Richardson test for reliability, formula 21 (Stanley, 1971):

$$Reliability\ estimate\ (KR21) = \frac{K}{K-1}\ 1 - \frac{M(K-M)}{Ks^2}\ \}$$

Where : K = number of test scores recorded.

M = arithmetic mean of the test scores.

s = standard deviation of the test scores.

From the data there are 37 test scores ∴ in the above formula, **K=37.**

Calculate the arithmetic mean of the data, $\overline{x}$

$$\overline{\chi} = \frac{\sum_{i=1}^{n} x_i}{n}$$

$$= \frac{638}{37}$$

$$= 17.24$$

In the KR 21 formula the arithmetic mean **M = 17.24**

Calculate the standard deviation of the data, *s*

$$s = \sqrt{\frac{\sum_{i=1}^{n} x^2 - \frac{\left(\sum_{i=1}^{n} x\right)^2}{n}}{n-1}}$$

$$= \sqrt{\frac{14762 - \frac{638^2}{37}}{36}}$$

$$= \sqrt{104.47}$$

In the K-R 21 formula $\mathbf{s^2 = 104.47}$

Putting these values into the formula we get:

$$\textit{Reliability estimate } (KR21) = \frac{K}{K-1}\left\{1 - \frac{M(K-M)}{Ks^2}\right\}$$

$$= \frac{37}{36}\left\{1 - \frac{17.24(37 - 17.24)}{37(104.47)}\right\}$$

$$= \frac{37}{36}\left\{1 - 0.088\right\}$$

$$= 0.937$$

The Kuder-Richardson yields a value between 0 and 1; the nearer the value is to 1, the more reliable the test is considered. A value of 0.937 indicates that the results obtained above are reliable, according to the KR 21 test.

Discussion

This evaluation aimed to consider the extent to which the intended learning outcomes were observable within the discussions taking place in the virtual study centre.

Unit 1 focused upon providing the learners with the necessary skills to utilise the computer conference system within the EA course structure. This unit of the EA course consistently had the highest average rating values of all of the course units. From the learner questionnaire (part 1 of the evaluation), many of the learners on the course indicated that they were enthusiastic about learning to use new technology. Many of them also indicated that they were relatively new to computer conferencing technology. The fact that the learners needed to acquire these skills and that they indicated that they were enthusiastic about learning to use new technology are probable contributing factors to the high rating values obtained. These contributing factors are not applicable for the remaining three units of the EA course, which focus on the subject of environmental awareness.

Unit 2 of the course was based upon a role-play designed to explore the environmental issues associated with the development of a hotel complex. This unit consistently gained the second highest average rating values. From the evaluation of learner participation (part 3 of the evaluation), it was possible to identify that the largest number of interaction elements was logged by the host computer during Unit 2. This leads to the hypothesis that

there may be a relationship between the amount of learner participation and the learning outcomes identifiable within the conference discussions. This is further substantiated by the fact that Unit 3 of the course, based on environmental legislation, consistently had the lowest ratings values and the lowest learner participation. Unit 4, which looked at various environmental assessment techniques, similarly followed this trend, obtaining the third highest rating values with the third highest amount of learner participation.

One of the overall aims of the EA course was to stimulate shared learning through discussions within the computer conference system. The computer conference discussions needed to reflect ideas, opinions and experiences if they were to be shared within the learner group as a whole (Salomon, 1981). The above discussion of this part of the evaluation may suggest that, where there are high levels of learner participation, the discussion better reflects the ideas to be conveyed. This leads to a possible conclusion that it may be desirable to ensure greater learner participation if shared learning is to take place. Factors such as: learner motivation, support and tutor participation, amongst others, are likely to have an influence on levels of participation (Salomon, 1981). The final part of this evaluation considers these issues in greater depth.

Overall, the average rating rating value for all learners was 13.2 (40%) this was considered to be much lower than originally hoped for by the course coordinator (the researcher). It is clear from this evaluation that within every group there were at least two learners who did not take part. Within some groups, there were as many as five learners who did not take part.

This links directly to the low levels of learner participation identified within the previous part of the evaluation. It also has possible links with tasks and activities of the course, the support and motivation of the learners and the possibilities of shared learning. The learner interviews which constitute the final part of this evaluation explores these issues.

Chapter 13

Evaluation of Interview Rating Scales (part 5 of the evaluation)

Aims

Having made a general examination of the complete learner group, further detail was needed to make reliable judgements about the course. This was obtained by interviewing a group of nine selected learners. The learner interviews formed the third tier of the evaluation structure used for the EA course. The aim of these interview ratings was to obtain some measure of the extent to which participation in the course had stimulated learning. To gain some measure of 'change', this required having information relating to the learners' understanding before and after the course. One of the aims of the EA course was to provide a shared learning environment whereby learners would share information with each other through communication using the computer conference system. As the learners were to be involved in a shared learning activity, it was considered desirable that the conference discussion reflect the learners' actual understanding as closely as possible.

From part 3 of the evaluation it was clear that, although the overall participation in the EA course was low, there were some learners who made significantly greater usage of the computer conference system than others. The evaluation of the rating scales obtained through interview aimed to explore some of the implications of different levels of learner activity in

relation to the intended learning outcomes of the course, as well as the opportunities for shared learning taking place.

The diagram below highlights, in white, those issues which are explored by this part of the evaluation.

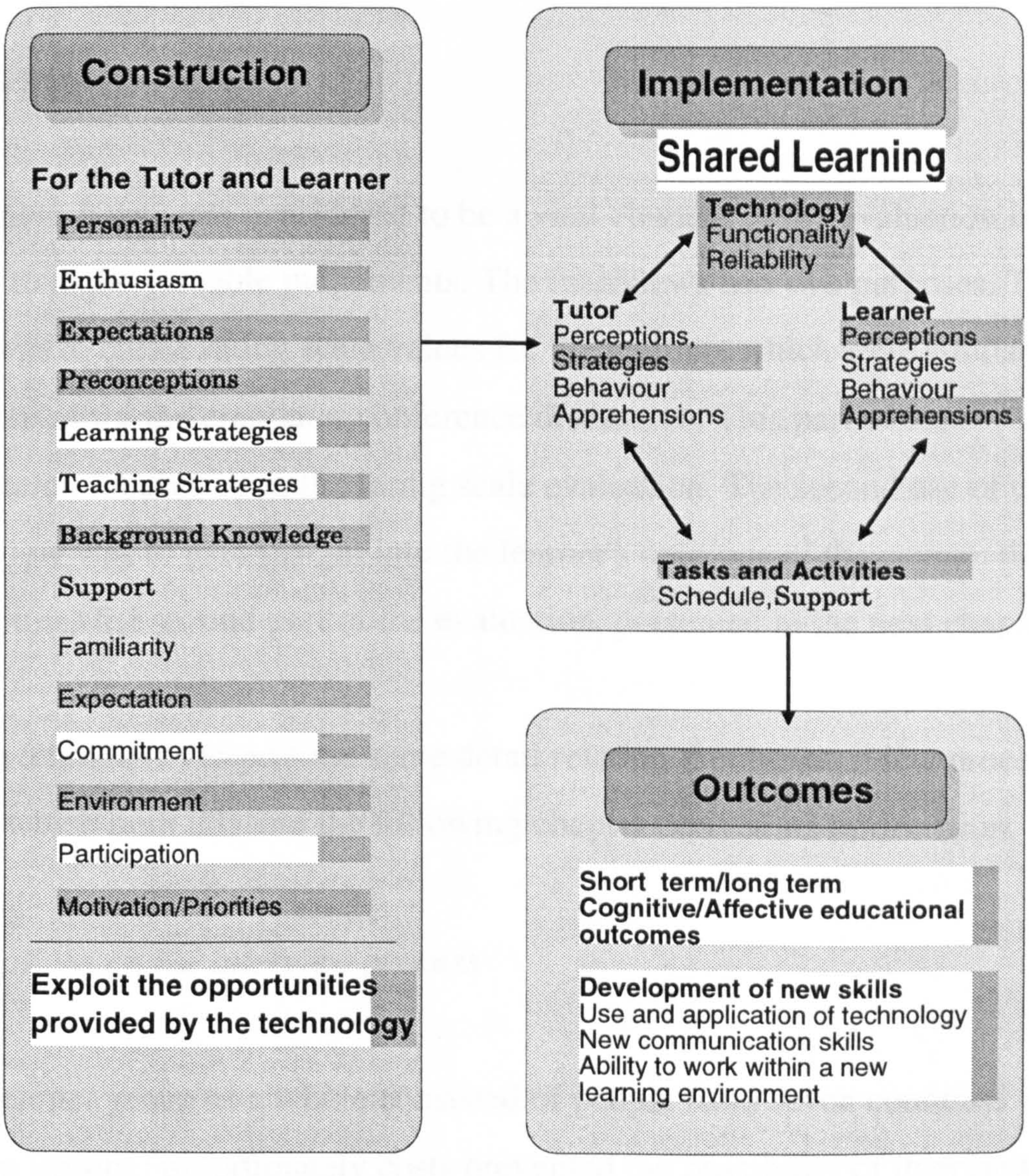


Figure 42: Focal areas of part 5 of the EA course evaluation

This part of the evaluation will consider the learning outcomes in relation to

the learners' levels of participation. By doing this it is possible to consider the implications of learner motivation and commitment on the learning outcomes. It also allows consideration of the extent to which the course exploited the opportunities provided by the EA course structure in general and, specifically, by the technology used.

The Interviews

The interviews were considered to be a vital element of the evaluation in order to make valuable judgements. The interviews had two purposes. The first was to create rating scale values for the learners which were similar to those used for the computer conference discussion. This part of the evaluation focuses upon the rating scale evaluation. The second use of the interview was to gain insight into the learner's opinions of the course; this constitutes the second part of the evaluation, presented in the next chapter.

This section aims to provide some detail relating the the interview process from which both this and the following chapter derived its information.

Limitations on the interview process

The learner group as a whole consisted of people from seven countries within Europe; unfortunately costs prevented the possibility of interviewing learners outside the UK. In addition, the learners involved in the course were working full time; this led to restriction on the amount of time available for the interview. In some cases people involved in the course

indicated that it would not be possible for them to take part in the interview at all. Any research which does not have a 'captive audience' for the evaluation is likely to have some form of restriction put upon it (De Gruijter & van der Kamp, 1976). However, within the UK a number of learners indicated that they would be able to spare some time to participate in an interview relating to the EA course.

The interview process

As with many interviews, one of the initial parts of the interview process involves detailed identification of the aims of the interview. It is often recommended that a general indication of these aims is given to the interviewee (Moore, 1941). It was considered appropriate to inform the interviewees of the general purpose of the interview, but at the same time care was taken not to influence their responses by informing them of exactly what was required. Many of the texts written on ethnographic interviewing, of the nature needed for the evaluation of the EA course, begin by identifying ideal interview situations (Gibbs, 1989; Garret, 1972; Habeshaw, 1989; et al). The physical setting for the interview should be comfortable with a relaxed atmosphere and should offer some degree of privacy without too many distractions. The interviews for the EA course evaluation were held in the interviewee's office at their place of work or in a conference room, in all but one instance (when no quiet room was available and a reception was all that was available).

It is often considered important to make notes at the end of each interview

(Garret, 1979). Making records of the proceedings of an interview may take many forms. These may vary from short written notes to a full ethnographic record as described by Spradley (1979), which involves gathering written notes, tape recordings, pictures, artifacts and anything else which describes the cultural scene under study. For the purposes of this interview, three methods of recording the events of the interview were used: rating scales similar to those used to evaluate the computer conference discussions, hand-written notes taken during the interview and a cassette tape recorder to record each of the interviews. The use of written note taking was kept to a minimum as it was not wished to disrupt the interview with note taking (Bingham, 1941).

Before conducting an interview, greater value may be gained by spending time preparing for it in terms of setting aims, time constraints, questions and question techniques (Willmott & Fowles, 1979). The interview for the EA course was intended to satisfy a number of evaluation needs, it also employed more than one interview technique. For this reason, a plan for the interview was constructed; it was intended to identify order within the interview and make most efficient use of the time available.

The interview process

Pre-interview

Telephone call; this was used to make initial contact with the prospective interviewee. During the discussion, brief information about the content of

the interview was given, an indication of the time that the interview would take and the reason for wishing to interview the individual. If the individual was agreeable, a date for the interview was set; all interviews were carried out at the interviewee's place of work. It was not considered necessary to send any pre-interview information to the interviewees, as all relevant information could readily be presented during the time of the interview.

During the interview

Introduction; the first few minutes of the interview were used for general discussion about the course. Though most of the interviewees had not met the interviewer in person, communication would have taken place using the computer conference system and they may have seen some of the satellite broadcasts, which were presented by the interviewer (researcher). This time was used to initiate discussion and was intended to relax the atmosphere in order that the interviewee would feel comfortable. Once initial informal discussion had taken place, an overview of what would happen during the interview was given. In addition to this, a brief description was given to explain why they were being interviewed, this was presented in such a way as to attempt to make the interviewee feel as comfortable as possible and at the same time indicate how important their information was to this evaluation.

Reminder; as the course had concluded approximately three weeks before the interviews after running for three months, it was considered productive to remind them of what had taken place. This involved allowing the

interviewee to browse through relevant sections of the course booklet and schedule, as well as showing them printouts of their discussions in the computer conference.

Rating scales; the same rating scales as those used to examine the computer conference discussion were used for a second time during the interview. Each of the rating scales was shown to the interviewee and explained to them; they were asked to identify where they would rate themselves, having taken the course. They were also asked to indicate the rating they would have given themselves before their involvement in the course. Discussion with the interviewee then took place to try to ensure that the ratings were as accurate as possible. The rating scale evaluation is discussed later within this chapter.

Open questions; the last part of the interview involved open questions designed to identify the interviewee's perceptions of the course. The questions were designed to promote open discussion about their perceptions of the course, with minimal guidance. This part of the interview was used within the final part of the EA course evaluation and is discussed in the next chapter.

Interviewee selection criteria

The interviewees were chosen using a few simple criteria: they were to come from as many different organisations as possible and they were to form three groups of equal size. These three groups were characterised by

the amount of use the members had made of the conference system. The three groups consisted of people making high usage, medium usage and low usage of the conference system. The reason for these groupings was to compare the extent to which greater involvement in the conference discussion affected the learning outcomes. Respondents classed as having high usage were those with greater than thirty discussion elements logged in the conference as part of their study group discussion. Those with medium conference usage had between ten and twenty items logged. Finally, those classed with low usage were those with between three and five discussion items. These groupings are referred to as the h, m and l groups throughout the remainder of this document.

There were only three learners out of the fifty who had high usage, as judged by the above criterion; they all consented to take part in the interview. There were fourteen people identified as learners with medium usage, seven of these were from countries other than England. Though it would have been useful to interview people from other countries, it was not possible due to the cost of travel to meet them and the interview was not considered feasible using the telephone. Four of the remaining seven indicated that they would not be able to participate in an interview due to time commitments at work. There were only five prospective interviewees with low interaction. For these reasons, three groups of three learners were interviewed.

Methods for generating rating values through interview

Negotiated ratings

The second part of the interview was used to gain information about the level of understanding each of the interviewees appeared to have before and after the course, according to the rating scales designed for the conference discussion. To accomplish this, the rating scales were initially explained in terms of what they were intended to measure. The levels for the ratings were then explained. The learners were asked to try to rate their knowledge before and after completing the course. Once their initial ratings had been identified, the criteria which would validate their ratings were explained. The interviewees were informed that the difference between the two marks was to represent the change in understanding that they had gained from the course. This was explained to them and, if considered necessary, the ratings were changed. The criteria explained were the same as those used for the analysis of the conference discussion. The result of this process was that each of the interviewees now had two sets of rating scales; the first used the conference discussion to identify the rating and the second was obtained by negotiative discussion. The second rating scales had two check marks on them, one representing the level of understanding before the course and the second representing the level of understanding after involvement in the course. In addition to the four rating scales used for the analysis of the conference discussion, a further seven rating scales were constructed in the same manner as the previous set, to provide greater detail.

Findings

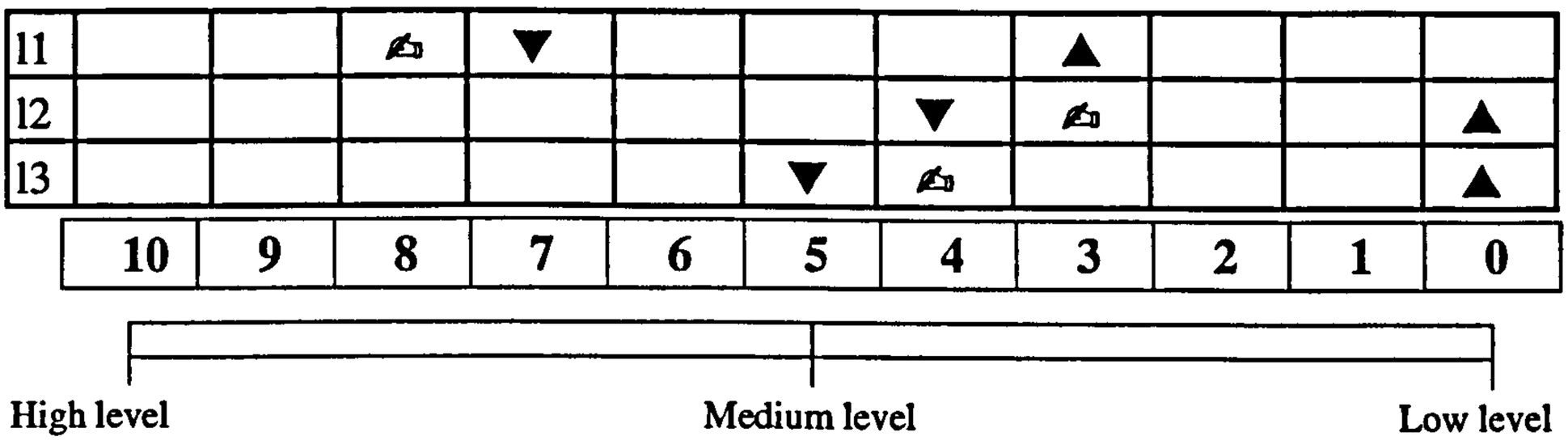
The format of the results tables

There were eleven rating scales used for this part of the EA course evaluation, they are numbered for ease of reference. In the tables of the ratings shown below, the ratings which were previously created for examination of the conference discussion are prefixed by the symbol ❐, while the ratings which were created for the more detailed analysis possible through interview use the symbol ○. As in the previous set of tables, the rating criterion is indicated first. Three tables are shown below the rating scale; in the left hand column of these tables a code representing the interviewees is shown. The codes; h1, h2, h3 represent the three learners interviewed who made high usage of the conference system, m1-2-3 are those with medium conference usage and l1-2-3 are those interviewed who showed low usage of the conference system. The analysis of the learner participation (part 3 of the evaluation) was used to identify h, m and l learners within these tables. To the right of this column, the table indicates the negotiated rating representing the learner's understanding prior to the course; this is represented by the ▲ symbol. The learner's rating after the course is indicated as a ▼. Where the rating criterion was the same as the one used for the conference discussion, this rating is also included in the table, represented as a ✍. The distance between the ▲ and ▼ symbols was used to identify change in understanding due to the course material. Below the rating scale tables is a table which indicates the mean rating before and

after the course for each of the three groups; the last column indicates the calculated difference between these two values. Where the rating scale is also used for the conference discussion, a further table indicates the mean rating observed in the conference and the mean rating from the interview; a final column indicates the difference between these two values.

Example

1. ❐ Rating scale criterion.



From the example above, the rating scale was numbered 1, the ❐ symbol shows that this rating scale was also used for the computer conference discussions. The diagram below the main body of the table indicates the rating scale and criterion ruler. From the main body of the table it is possible to identify that, for this rating, learner number 2 from the low computer conference usage group obtained a rating of 3 from the conference analysis (part 4 of the evaluation). They obtained a value of 4 from the interview rating after the course and a rating value of 0 before the course.

Findings of the interview ratings

This rating scale was used to gain some measure of the learner's affective development through participation in the EA course by considering their skills in using the computer conference system.

1. ❒ Competence in use of conference system.

h1	▼✍										▲
h2	▼✍		▲								
h3	▼✍										▲

m1		▼	✍					▲			
m2	✍	▼					▲				
m3			▼			✍					▲

l1			✍	▼				▲			
l2							▼	✍			▲
l3						▼	✍				▲

10	9	8	7	6	5	4	3	2	1	0

Shows ability to use all facilities offered by conference system. (e-mail, show and add to an item, start a new item, move around conference structure to take part in many conference discussions).

Shows ability to show an item and add to it to take part in conference discussion.

Shows no ability to use conference system.

Key to table :
▲ = Pre-course rating; ▼ = Post-course rating (obtained through interview).
✍ = Conference rating obtained through evaluation of the conference discussions within part 4 of the evaluation.

From this table it is possible to identify that for the h group the conference discussion ratings coincide with the post-course ratings, with a value of 10

on the rating scale. The pre-course ratings are 0 for two of the three learners interviewed within the h group.

For the m group, the rating values are more varied. The conference rating values differ from the negotiated post-course values in each case. Overall, the post-course and conference ratings are lower than those for the h group.

For the l group, the difference between the post-course and the conference ratings is 1 for all of those interviewed. Overall, the post- and conference rating values for the l group are lower than those for the h and m learner groups.

Average ratings for each group (obtained by interview)

Group	Pre-Course (x)	Post-Course (y)	Difference (y-x)
h	2.66	10.0	7.33
m	3.00	8.66	5.66
l	1.00	5.33	4.33

Figure 43: Average rating values obtained through interview for interview rating 1, Competence in use of conference system.

The ranked order for the average difference within between the pre- and post- course ratings is h group, m group and l group.

Average difference between interview rating and conference observed rating

Group	Post-course (y)	Conference (z)	Difference (y-z)
h	10.0	10.0	0.00
m	8.66	7.66	1.00
l	5.33	5.00	0.33

Figure 44: Average rating values comparing derived through interview and conference discussion analysis for rating 1, Competence in use of conference system.

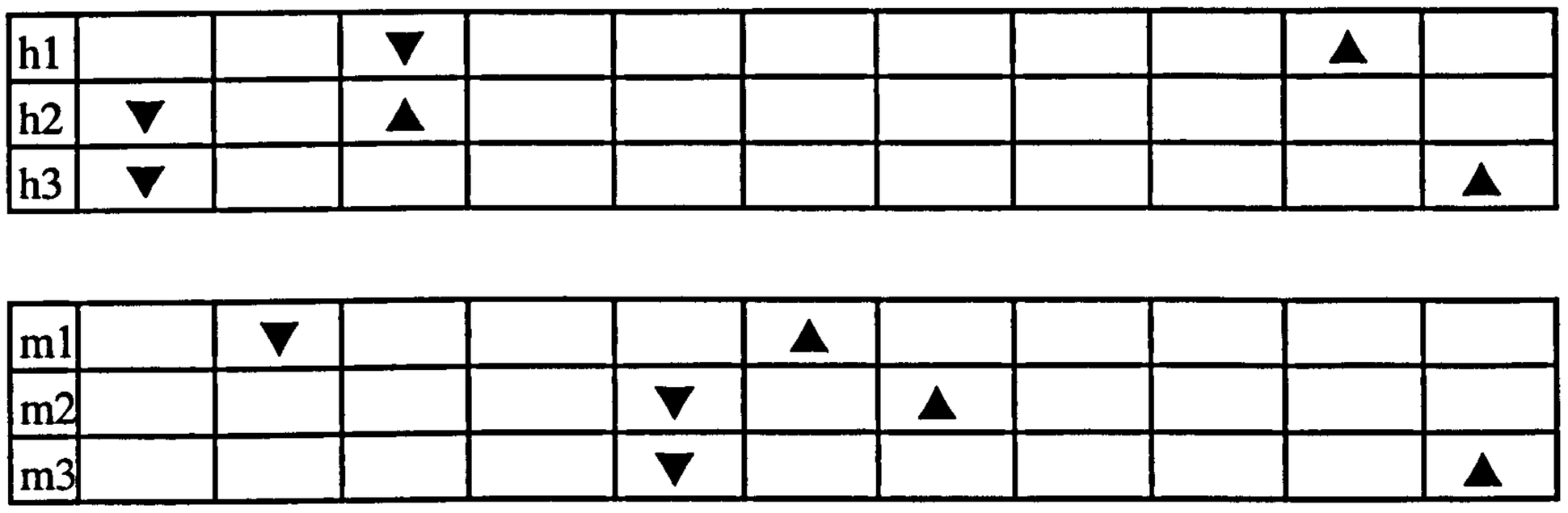
From this table, the ranked order for the average conference ratings for each group is h group, m group, l group. The difference between these ratings provides an indication of the extent to which the conference discussion identified the learner's actual level (post-course). For the h group, there is no difference between the conference rating and the post-course rating. The m group have the largest difference between what was identifiable within the conference discussions and the interview. Although the l group do not have the lowest difference, their post course rating value is the lowest.

From the pre- and post-course ratings, the h group appeared to 'gain' most, as their average pre- and post-course ratings have the greatest difference. The l group appeared to gain the least, according to these rating values.

From the conference and post-course ratings, the h group conference discussions appeared to be closest in reflecting the learner's actual knowledge level.

The rating below aimed to consider the learner's cognitive development in terms of understanding the concept of computer conferencing and its application. This rating scale was not used within part 4 of the evaluation, so there are no comparisons between the conference discussions and the interview ratings.

2. ○ Concept of computer conference system.



Key to table :
▲ = Pre-course rating; ▼ = Post-course rating (obtained through interview).
✍ = Conference rating obtained through evaluation of the conference discussions within part 4 of the evaluation.

From the rating scale table above, the h group obtained the highest ratings for this scale, with two of the learners interviewed gaining post-course

ratings of 10. The gap between the pre- and post-course values is also the largest, when compared to the m and l groups. The m group rating values are lower than those for the h group, with one learner gaining a rating value of 9 and the remaining two learners gaining a rating value of 6. For the l group, the rating values were relatively low, with one learner gaining a rating value of 6 and the remaining two learners gaining a rating value of 3 and 2. Overall, the pre-course ratings for all groups was relatively low, which triangulates with the learner's questionnaire (part 1 of the evaluation), which suggested that the learners were relatively unfamiliar with the concept of computer conferencing.

Average ratings for each group

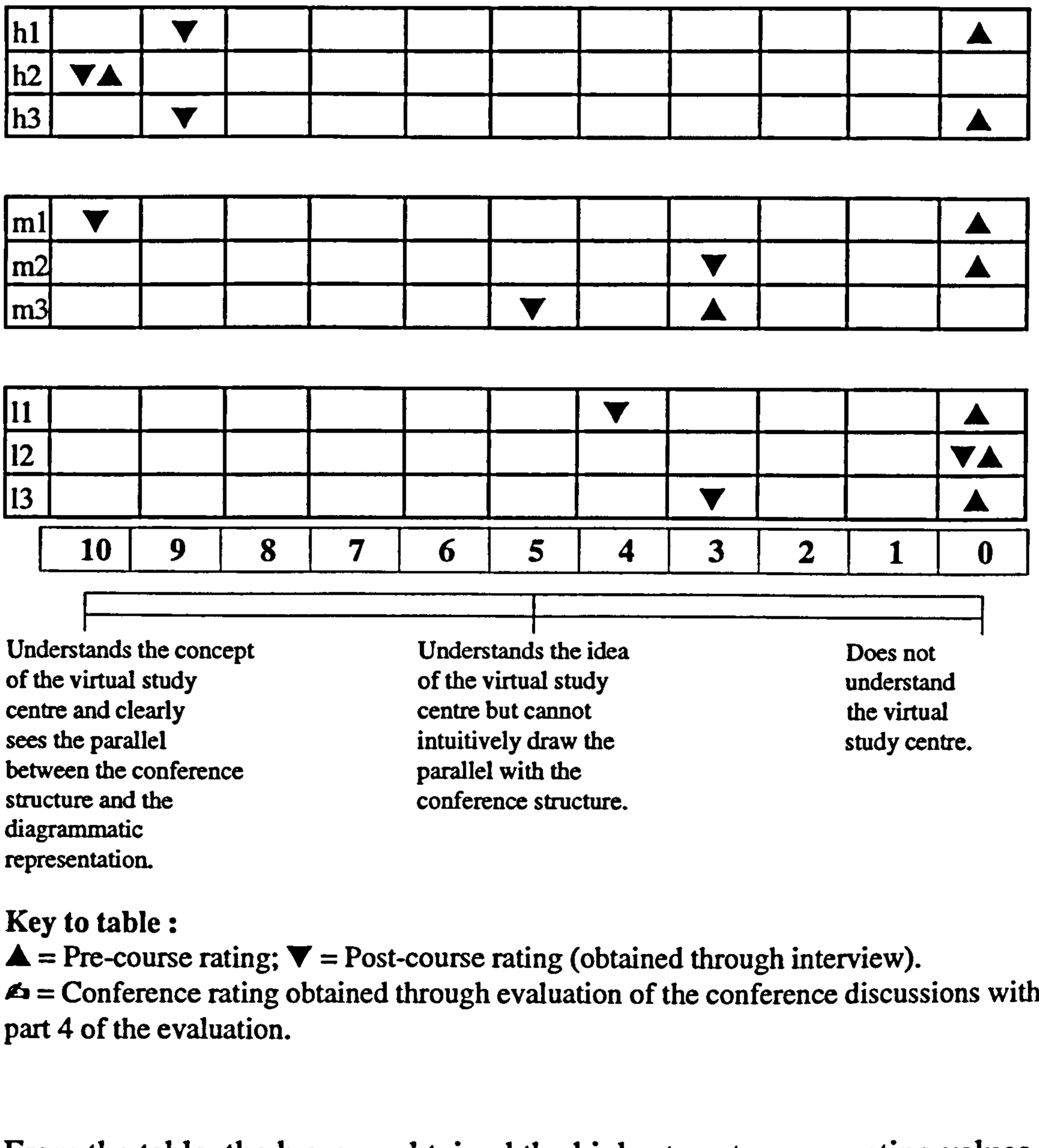
Group	Pre-Course (x)	Post-Course (y)	Difference (y-x)
h	3.00	9.33	6.33
m	3.00	7.00	4.00
l	0.66	3.66	3.00

Figure 45: Average rating values obtained through interview for interview rating 2, Concept of computer conference system.

From this table it is possible to identify that the h group appeared to gain most in terms of their pre- and post-course rating, having a difference in rating values of 6.33. The difference between the pre- and post-course ratings for the m group was 4.00, and for the l group it is 3.00.

In order to provide the learners with support and a familiar working structure, the concept of the virtual study centre was used, as described within Chapter 7. This rating aimed to explore the extent to which the learners on the EA course gained understanding of the concept and its implementation within the EA course.

3. ○ Understanding the concept of the virtual study centre.



Key to table :
▲ = Pre-course rating; ▼ = Post-course rating (obtained through interview).
✍ = Conference rating obtained through evaluation of the conference discussions within part 4 of the evaluation.

From the table, the h group obtained the highest post-course rating values,

with two learners gaining ratings of 9, and one learner gaining a rating value of 10. For the m group, one of the learners gained a rating value of 10, with the other learners gaining ratings of 5 and 3 respectively. The l group of learners interviewed gained the lowest post-course rating values of 4, 3 and 0.

Average ratings for each group

Group	Pre-Course (x)	Post-Course (y)	Difference (y-x)
h	3.33	9.33	6.00
m	1.00	5.66	4.66
l	0.00	2.33	2.33

Figure 46: Average rating values obtained through interview for interview rating 3, Understanding the concept of the virtual study centre.

From the average ratings for each group shown above, the h group have the largest difference between the pre- and post-course ratings, with the m and l groups having the second and third largest respectively.

This rating scale was used to consider Unit 2 of the EA course. It aimed to evaluate the extent to which the learners interviewed gained understanding of environmental issues, by considering the specific example of an environmentally sensitive hotel development. This rating scale was also used within part 4 of the evaluation, which considered the computer conference discussions.

4. ❒ Understanding of the issues and factors relating to an environmentally sensitive hotel development.

h1	▼	▲	✍								
h2	▼	▲				✍					
h3		▼✍						▲			

m1		▼		▲			✍				
m2			▼✍						▲		
m3				▼		✍			▲		

l1					▼▲				✍		
l2							▼▲			✍	
l3						▼	▲		✍		
	10	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**0**

Shows understanding of a diversity of issues and indicates the inter-relationship between them. Demonstrates understanding of the concept of sustainable tourism as outlined in the course.

Demonstrates understanding that there are many issues to consider in environmental decision making.

Shows no understanding.

Key to table :
▲ = Pre-course rating; ▼ = Post-course rating (obtained through interview).
✍ = Conference rating obtained through evaluation of the conference discussions within part 4 of the evaluation.

From the table, the highest ratings were obtained by the h group for both the post-course and the conference ratings. For the h group, two learners gained post-course ratings of 10, while the third learner gained a post-course rating of 9. The post-course ratings for the m group were lower than for the h group, with learners gaining post-course rating values of 9, 8 and 7 respectively. The l group obtained the lowest post-course ratings with learners gaining 6, 5 and 4 respectively. For the l and m learner groups the pre-course ratings were close to the post-course ratings and for two of the learners within the h group, the pre-course ratings were 9. This indicates that they already had a relatively high level of pre-course knowledge relating to this issue.

Average ratings for each group *(obtained by interview)*

Group	Pre-Course (x)	Post-Course (y)	Difference (y-x)
h	7.00	9.66	2.66
m	3.66	8.00	4.33
l	3.33	3.66	0.33

Figure 47: Average rating values obtained through interview for interview rating 4, Understanding of the issues and factors relating to an environmentally sensitive hotel development.

From the table above, the m group had the largest average difference between pre- and post-course ratings, with the h group second and the l group third. For this rating scale the average pre-course rating value for the h group was relatively high at 7.00, when compared to the other values within the rating table.

Average difference between interview rating and conference observed rating

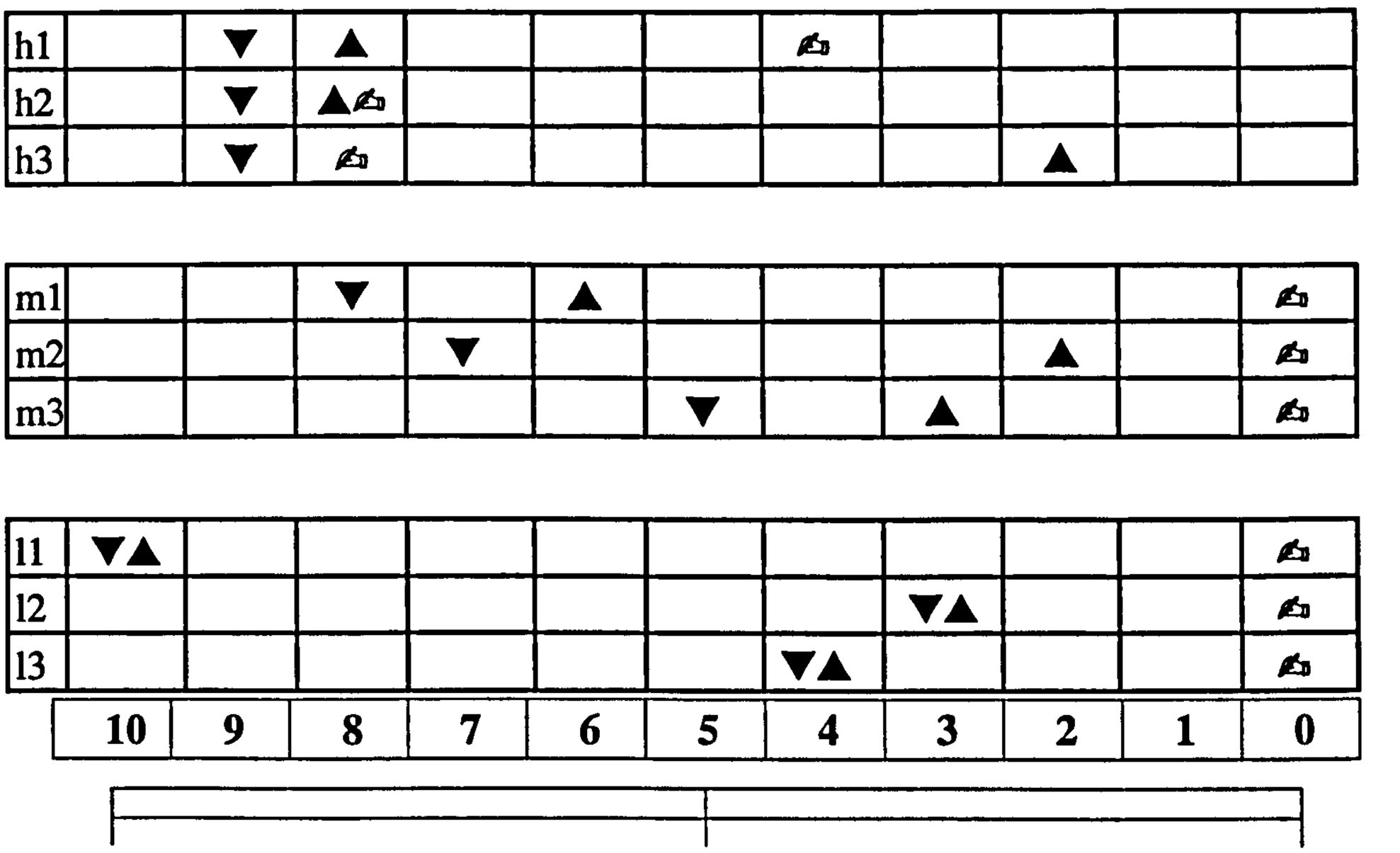
Group	Post-Course (y)	Conference (z)	Difference (y-z)
h	9.66	7.33	2.33
m	8.00	5.66	2.33
l	3.66	1.66	2.00

Figure 48: Average rating values comparing derived through interview and conference discussion analysis for rating 4, Understanding of the issues and factors relating to an environmentally sensitive hotel development.

From this table, the difference between the conference discussion ratings and the post-course interview ratings is similar for all groups at either 2.00 or 2.33. Though the differences between the groups is relatively low, this is due to the fact that, for this rating, the pre-course ratings for the h and m groups are relatively high when compared to other ratings. This suggests that the learners already had an understanding of the subject considered by this rating scale and therefore did not have much to gain through involvement in the course.

This rating aimed to explore the learner's understanding of the EC environmental legislation, which was the focal area of Unit 3 of the EA course. This rating scale was used within part 4 of the evaluation and therefore it includes the conference discussion ratings.

5. ❒ Understanding of the nature and role of EC environmental legislation.



Key to table :

▲ = Pre-course rating; ▼ = Post-course rating (obtained through interview).

✍ = Conference rating obtained through evaluation of the conference discussions within part 4 of the evaluation.

From the tables above, all of the learners interviewed within the h group obtained post-course ratings of 9. The m group had post-course ratings of 8, 7 and 5. The l group had lower post-course ratings, with learners gaining rating values of 10, 4 and 3. The h group obtained ratings of 8, 8 and 5 from the computer conference analysis. All of the learners in the m and l groups obtained ratings of 0 from the analysis of the computer conference discussions.

The pre-course ratings for the h group were 8, 8 and 2 with the m group gaining 6, 3 and 2. For the l group the pre-course ratings were 10, 4 and 3, which exactly correspond to their post-course rating values.

Average ratings for each group *(obtained by interview)*

Group	Pre-Course (x)	Post-Course (y)	Difference (y-x)
h	6.00	9.00	3.00
m	3.66	6.66	3.00
l	5.66	5.66	0.00

Figure 49: Average rating values obtained through interview for interview rating 5, Understanding of the nature and role of EC environmental legislation.

From the table above, the h and m groups both obtained the same difference in rating values before and after the course. For the l group the difference was 0 for pre- and post-course ratings.

Average difference between interview rating and conference observed rating:

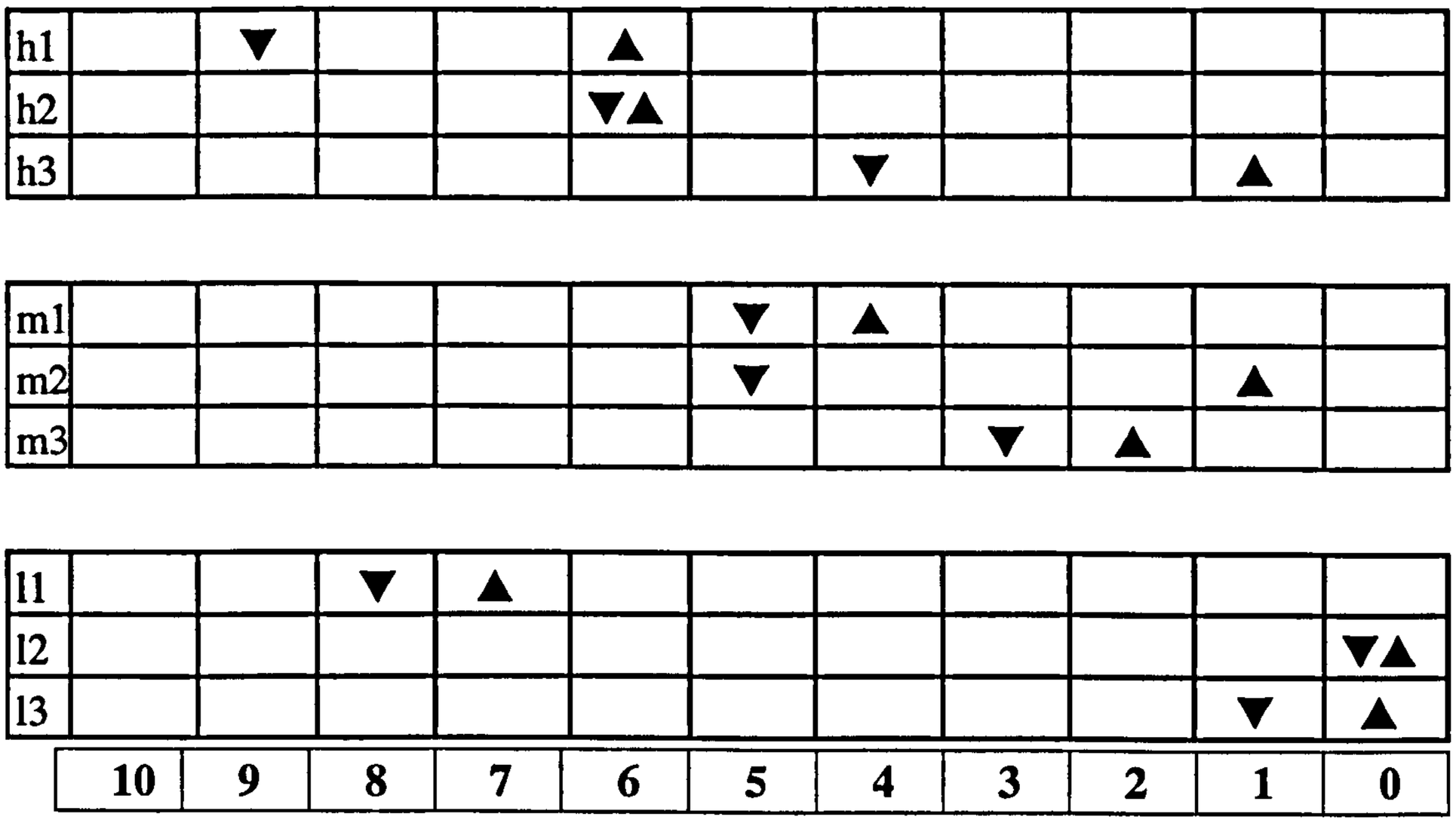
Group	Post-Course (y)	Conference (z)	Difference (y-z)
h	9.00	6.66	2.33
m	6.66	0.00	6.66
l	5.66	0.00	5.66

Figure 50: Average rating values comparing derived through interview and conference discussion analysis for rating 5, Understanding of the nature and role of EC environmental legislation.

From the table, the difference between the post-course rating and that derived from the computer conference evaluation was least within the h group of learners, at 2.33. The m group had the largest difference at 6.66 with the l group having a difference of 5.66.

This rating scale aimed to consider the learner's understanding of the issues relating to EC policy and legislation.

6. ○ Limitations of EC policy, Fifth Action Programme, Maastricht Treaty.



Key to table :

▲ = Pre-course rating; ▼ = Post-course rating (obtained through interview).

✍ = Conference rating obtained through evaluation of the conference discussions within part 4 of the evaluation.

From the table, the post-course ratings for the h group were 9, 6 and 4 which were the highest, on average, for all three groups. The post-course ratings for the m groups were 5, 5, and 3; for the l group they were 8, 1 and

0. The pre-course ratings for the h group were 6, 6 and 1. The pre-course ratings for the m group were 4, 2 and 1 while the l group had pre-course ratings of 7, 0 and 0 respectively.

Average ratings for each group

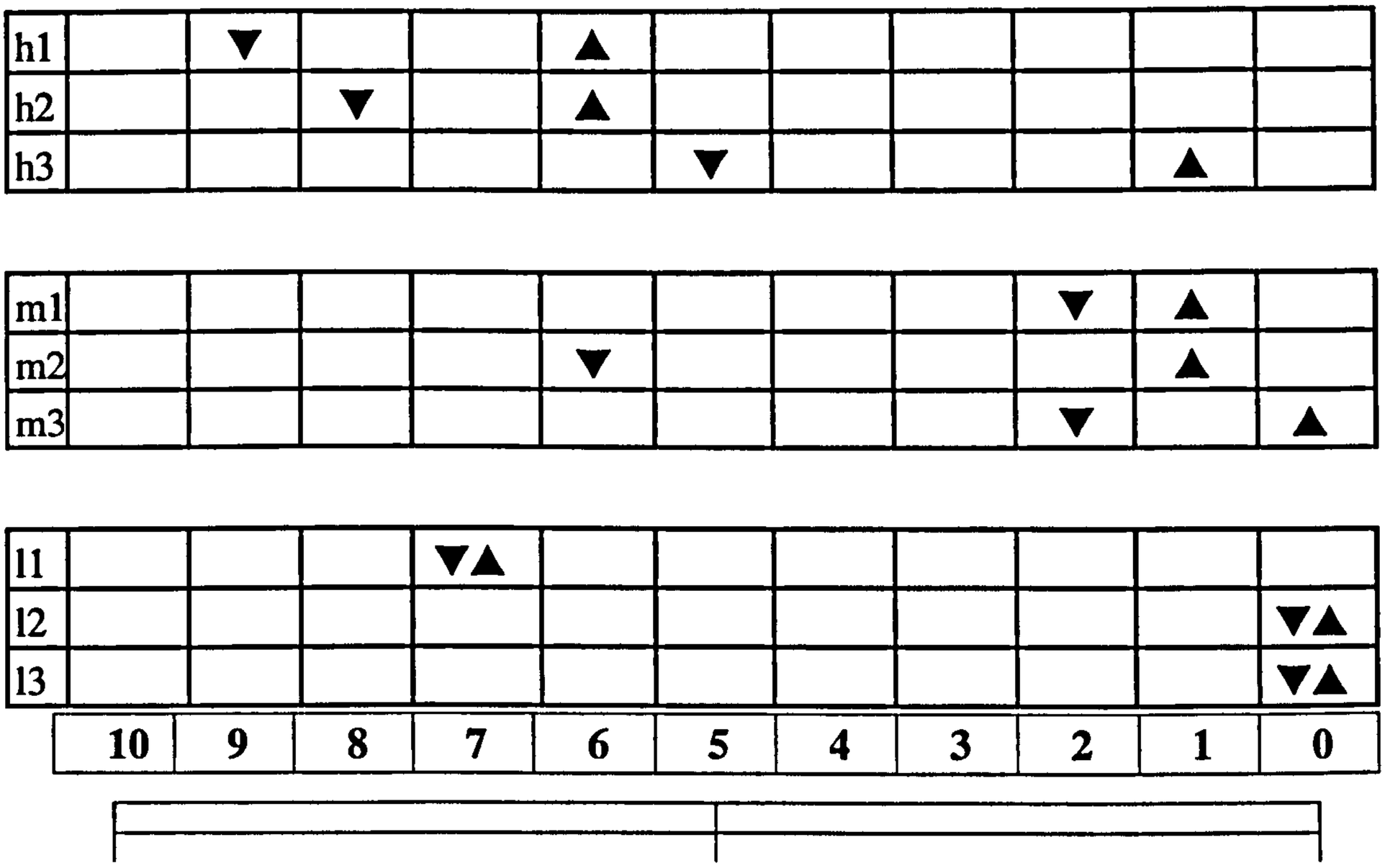
Group	Pre-Course (x)	Post-Course (y)	Difference (y-x)
h	4.33	6.33	2.00
m	2.33	4.33	2.00
l	2.33	3.00	0.66

Figure 51: Average rating values obtained through interview for interview rating 6, Limitations of EC policy, Fifth Action Programme, Maastricht Treaty.

From the table, the difference between the pre- and post-course ratings were highest for the h and m groups, at 2.00 in both cases. The difference between the pre- and post-course ratings for the l group was 0.66.

This rating scale aimed to explore the learner's understanding of the issues relating to the different approaches to pollution control.

7. ○ Approaches to pollution control.



Key to table :

▲ = Pre-course rating; ▼ = Post-course rating (obtained through interview).

✍ = Conference rating obtained through evaluation of the conference discussions within part 4 of the evaluation.

From the table, the learners within h group obtained post-course ratings of 9, 8 and 5. The m group post-course ratings were lower on average than the h group, with learners gaining rating values of 7, 2, and 2. The lowest post-course rating values for the learners interviewed were within the l group, who gained 7, 0 and 0 rating values.

The pre-course ratings for the h group are 6, 6 and 1, which represents a relatively large gap between the pre- and post-course ratings. For the m group, the pre-course ratings were 1, 1 and 0, which suggests that this was a subject area in which they had little previous experience. The l group obtained pre-course ratings of 7, 0 and 0. These rating values coincide with the suggestion given by their post-course ratings, that they did not gain anything through participation in the EA course.

Average ratings for each group

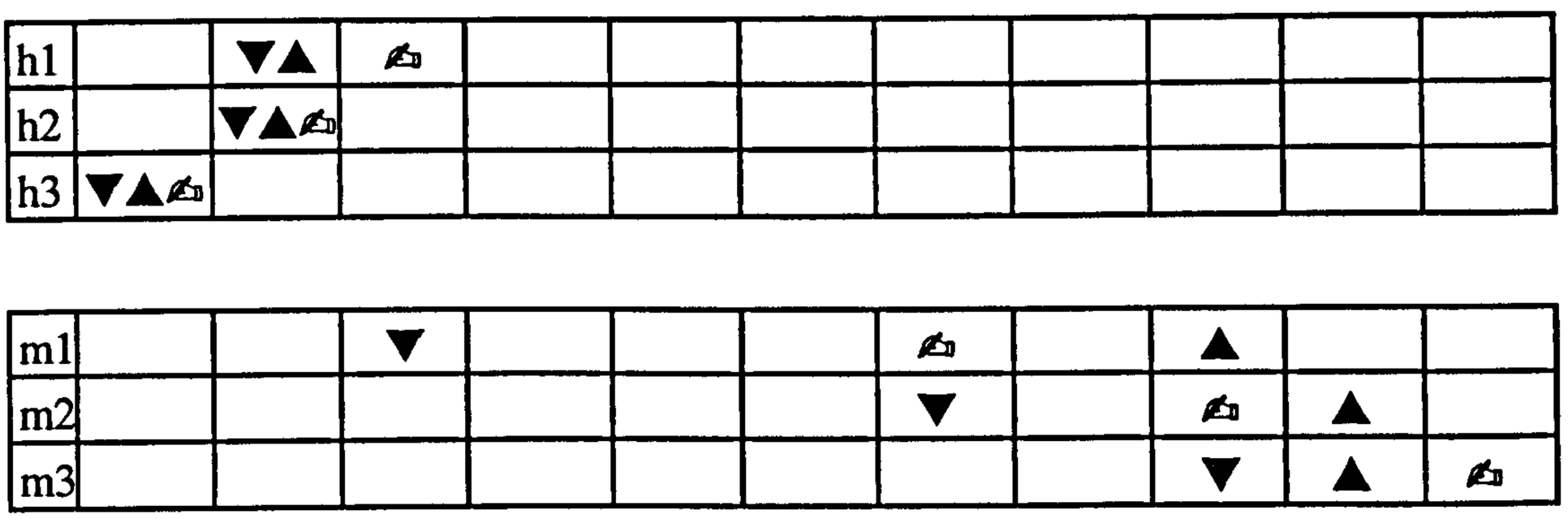
Group	Pre-Course (x)	Post-Course (y)	Difference (y-x)
h	4.33	7.33	3.00
m	0.66	3.33	2.66
l	2.33	2.33	0.00

Figure 52: Average rating values obtained through interview for interview rating 7, Approaches to pollution control.

From the table, the difference between pre- and post-course ratings for the h group were the largest at 3.00. The m group obtained a difference for the pre-course and post-course rating of 2.66. For the l group there was no difference between the pre- and post-course rating values for any of the learners.

This rating scale aimed to explore the learner's understanding of environmental procedures. This was the subject area of Unit 4 of the course. The rating scale was also used within part 4 of the evaluation, which focused upon the computer conference discussions.

8. ❒ Understanding of environmental procedures.



Key to table :
▲ = Pre-course rating; ▼ = Post-course rating (obtained through interview).
✍ = Conference rating obtained through evaluation of the conference discussions within part 4 of the evaluation.

For the h group the pre- and post-course ratings shown within the table

above had the same value for each of the learners. For all but learner number 1 within the h group, the conference rating is also the same as the pre- and post-course ratings. The fact that the pre- and post-course ratings are equal and that they are all above 9 suggests that the learners already had a good understanding of the subject material under evaluation. As the conference ratings closely reflect the post-course ratings, it may be assumed that the learners' understanding was reflected within the conference for others to share.

For the m group, the post-course rating values were lower on average than the h group at 8, 4 and 2. The learners' pre-course ratings were 2, 1 and 1. This suggests that the learners within the m group were relatively unfamiliar with the subject material of Unit 4. The fact that there is a relatively large difference between the learner's pre- and post-course ratings suggests that the conference discussion provided by the m group learners did not reflect their actual understanding and therefore could not be shared with others.

For the l group, the pre- and post-course ratings are equal at 8, 5 and 3; this suggests that they did not gain anything through participation in the EA course in relation to this subject area. The l group's ratings for the conference discussions was 0 for all of those learners interviewed. This suggests that where the individual had a certain level of knowledge relating to environmental procedures, this was not shared within the conference discussions.

Average ratings for each group (*obtained by interview)*

Group	Pre-Course (x)	Post-Course (y)	Difference (y-x)
h	9.33	9.33	0.00
m	1.33	4.66	3.33
l	5.33	5.33	0.00

Figure 53: Average rating values obtained through interview for interview rating 8, Understanding of environmental procedures.

From the table above, the h group had no difference in any of the learners' pre- and post-course rating values. This suggests that they did not gain through participation in the course. However, the rating values suggests that they already had a good understanding of the subject material, which could not be built upon within the framework of the EA course. The m group have a difference of 3.33 between their average pre- and post-course rating values. The l group have no difference between their pre- and post-course ratings. The average pre-course rating value for the l group is 5.33 which suggests that they may have gained further information through participation in the course.

Average difference between interview rating (post-course rating) and conference observed rating

Group	Post-Course (y)	Conference (z)	Difference (y-z)
h	9.33	9.00	0.33
m	4.66	2.00	2.66
l	5.33	0.00	5.33

Figure 54: Average rating values comparing derived through interview and conference discussion analysis for rating 8, Understanding of environmental procedures.

From the table, the conference discussions reflected the h group's post-course rating the closest of all of the groups. There was a difference of 2.66 for the post-course rating and the conference discussion. For the l group the conference discussion ratings were 0.

This rating scale aims to focus upon the learner's understanding of the environmental procedure of carrying out a life cycle analysis, as discussed in chapter 4 of the learner handbook (Appendix Ai).

9. ○ Understanding the concept of a life cycle analysis.

h1		▼▲									
h2		▼▲									
h3	▼▲										
m1			▼								▲
m2								▼		▲	
m3								▼		▲	
l1			▼▲								
l2						▼▲					
l3											▼▲

10	9	8	7	6	5	4	3	2	1	0

Shows understanding of why this process is necessary, the aims of the process, when it is appropriate to use and its limitations. Shows understanding of the intended outcomes of the process, the core elements, how the process may be adapted.

Shows Understanding of the aims of the process and when it appropriate to use. Shows understanding of the core elements of the process.

Shows no understanding

Key to table :
▲ = Pre-course rating; ▼ = Post-course rating (obtained through interview).
✍ = Conference rating obtained through evaluation of the conference discussions within part 4 of the evaluation.

From the table above, the learners within the h group obtained pre- and post-course ratings which coincided, with values of 10, 9 and 9. This

suggests that they did not gain anything in relation to this subject area through participation in the EA course. However, as in the previous rating, their pre-course ratings suggest that they already had a high level of understanding of this issue before the course began.

The m group had lower pre-course ratings than the h group, with rating values of 1, 1 and 0. Their post-course ratings were 8, 3, 3 which suggests that they gained information relating to the process of a life cycle analysis due to participation in the EA course.

For the l group, the pre- and post-course ratings are equal for each learner with rating values of 8, 5 and 0 for pre- and post-course. This suggests that the learners within the l group did not benefit by participating in the EA course, in relation to understanding of life cycle analysis.

Average ratings for each group

Group	Pre-Course (x)	Post-Course (y)	Difference (y-x)
h	9.33	9.33	0.00
m	0.66	4.66	4.00
l	4.33	4.33	0.00

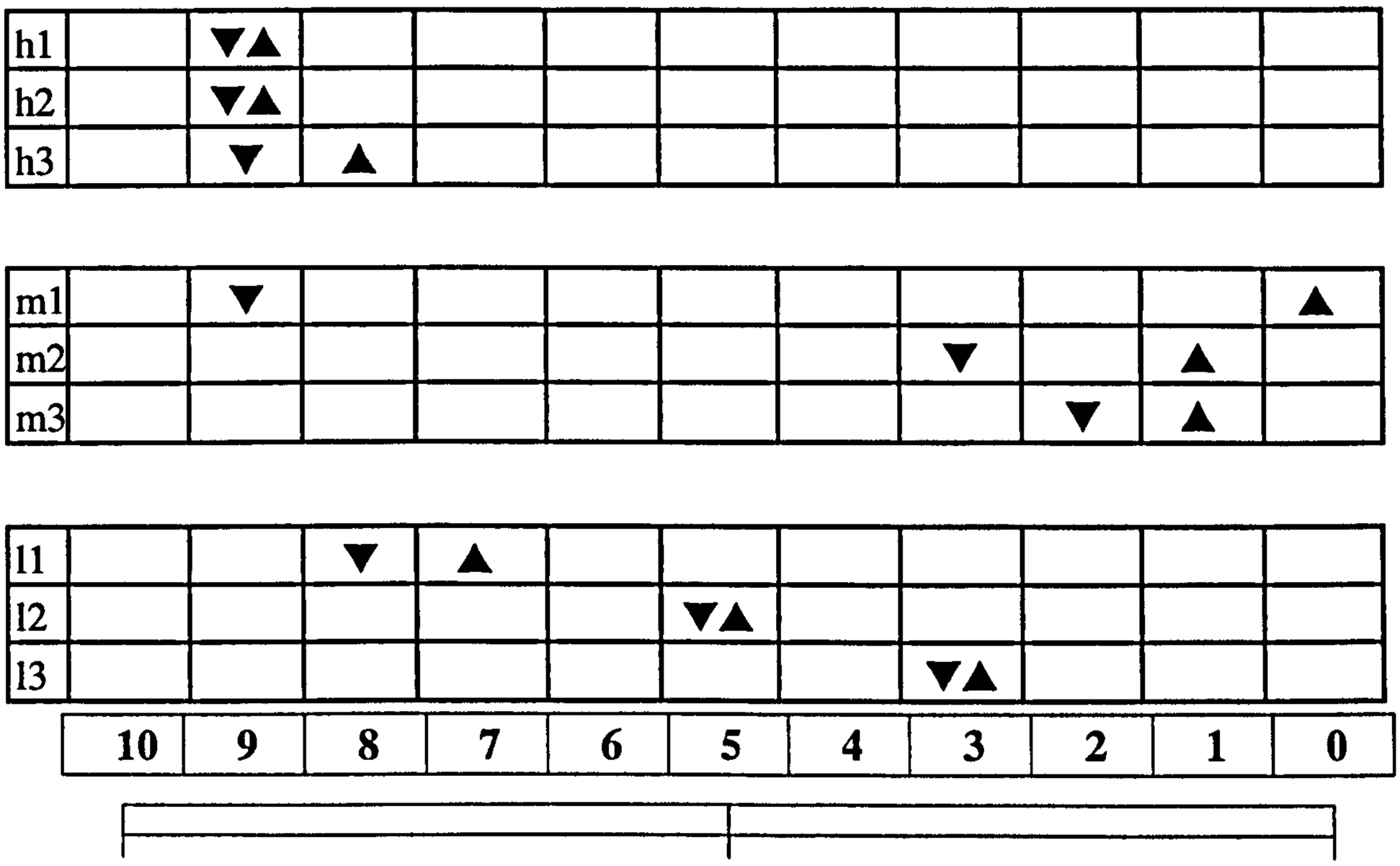
Figure 55: Average rating values obtained through interview for interview rating 9, Understanding the concept of a life cycle analysis.

The h group had the highest pre- and post-course rating values and there was no difference between them. For the m group, the learner's average pre-course rating value is 0.66, their average post-course rating value is 4.66, which constitutes a difference of 4.00. For the learners within the l group,

their average pre- and post-course ratings are 4.33. The low average ratings (4.66) for the l group suggest that there was the expectation to gain further understanding.

This rating scale was used to explore the learner's understanding of the process of undertaking an environmental audit. This was part of Unit 4 of the course, as detailed within the learner handbook, chapter 4 (Appendix Ai).

10. ○ Understanding the concept of an environmental audit.



Key to table :
▲ = Pre-course rating; ▼ = Post-course rating (obtained through interview).
✍ = Conference rating obtained through evaluation of the conference discussions within part 4 of the evaluation.

From the table above, in the h group each of the learners interviewed

obtained post-course ratings of 9; two of the learners were awarded pre-course ratings of 9 and the third learner was awarded a pre-course rating of 8. As in the previous two ratings this suggests that they did not gain very much in terms of their understanding of these issue, however their pre-course ratings suggested that they already had a relatively high level of understanding before the course began.

From the m group, the learners were awarded relatively low pre-course ratings of 1, 1 and 0. Their post-course ratings were 9, 3 and 2. The l groups pre- and post-course ratings are the lowest on average and, as in the previous two rating scales, they did not appear to gain much in terms of understanding the process of an environmental audit.

Average ratings for each group

Group	Pre-Course (x)	Post-Course (y)	Difference (y-x)
h	8.66	9.00	0.33
m	0.66	4.66	3.33
l	5.00	5.33	0.33

Figure 56: Average rating values obtained through interview for interview rating 10, Understanding the concept of an environmental audit.

From the table, the h and l groups have the same difference in average pre- and post-course rating values at 0.33 although the h group's ratings are higher than the l group's. The difference between the average pre- and post-course ratings for the m group is the largest of all of the groups, at 3.33.

This rating scale was used to evaluate the learner's understanding of the procedure of an environmental impact assessment.

11. ○ Understanding the concept of an environmental impact assessment.

h1		▼▲									
h2	▼▲										
h3		▼▲									
m1				▼		▲					
m2								▼		▲	
m3							▼		▲		
l1			▼▲								
l2						▼	▲				
l3										▼▲	

10	9	8	7	6	5	4	3	2	1	0

Shows understanding of why this process is necessary, the aims of the process, when it is appropriate to use and its limitations. Shows understanding of the intended outcomes of the process, the core elements, how the process may be adapted.

Shows Understanding of the aims of the process and when it appropriate to use. Shows understanding of the core elements of the process.

Shows no understanding

Key to table :

▲ = Pre-course rating; ▼ = Post-course rating (obtained through interview).

✍ = Conference rating obtained through evaluation of the conference discussions within part 4 of the evaluation.

The h group's pre- and post-course ratings are equal for each of the learners, with rating values of 10, 9 and 9. For the m group, each of the learners has the same difference between the pre- and post-course rating values. The pre-

course rating values for the m group are 5, 1, 2 and the post-course rating values are 7, 3 and 4. For the l group, two of the learners have no difference between their pre- and post-course ratings, the third learner has a pre/post-course difference of 1.

Average ratings for each group

Group	Pre-Course (x)	Post-Course (y)	Difference (y-x)
h	9.33	9.33	0.00
m	2.66	4.66	2.00
l	4.33	4.66	0.33

Figure 57: Average rating values obtained through interview for interview rating 11, Understanding the concept of an environmental impact assessment.

The h group of learners have no difference between their pre- and post-course ratings. The m group have a difference of 2.00 between the average pre- and post-course ratings. The l group have a difference of 0.33 between the average pre- and post-course ratings.

Summary of findings

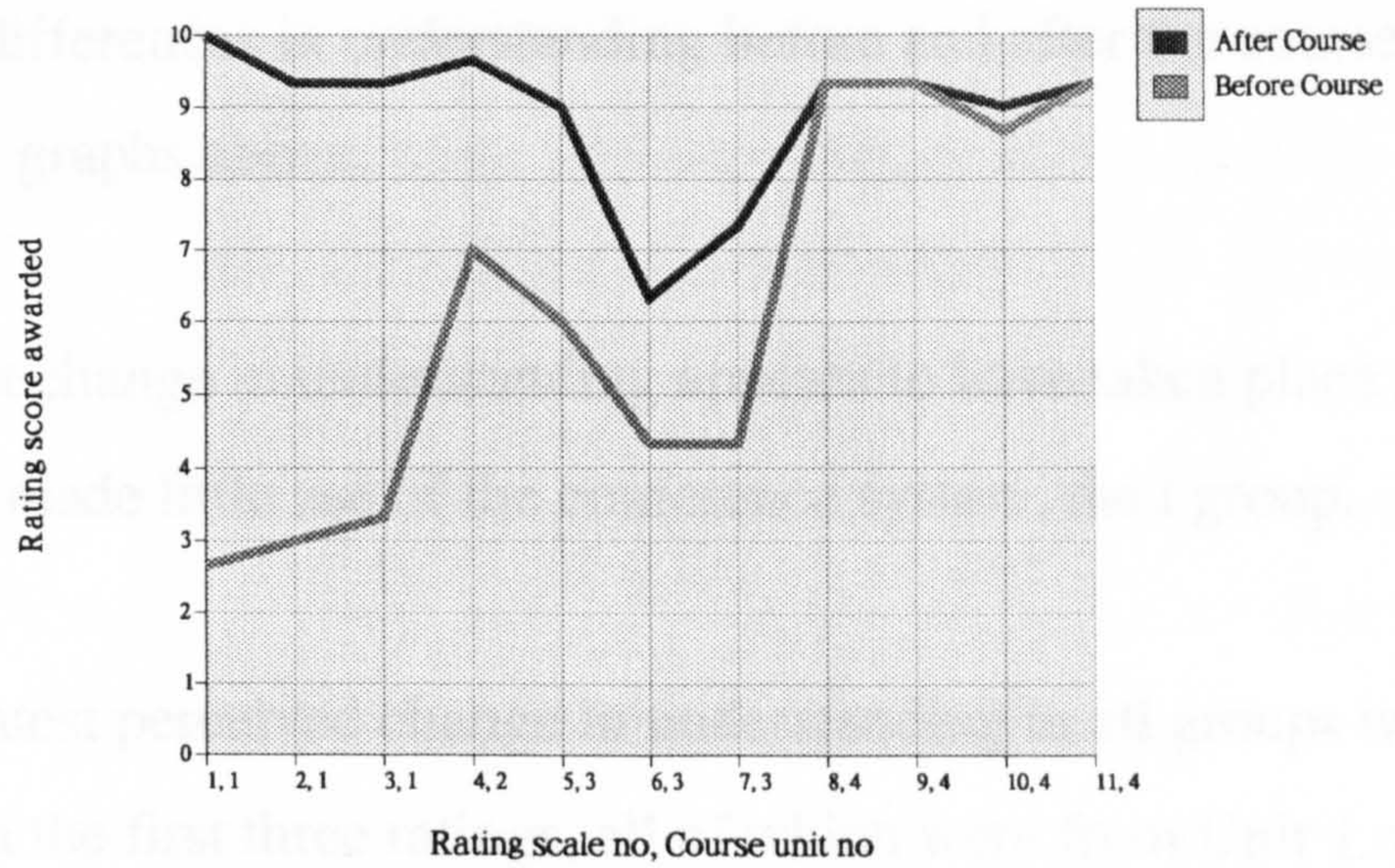
To help in the discussion which follows, two sets of graphs are presented below.

The first set of summary graphs

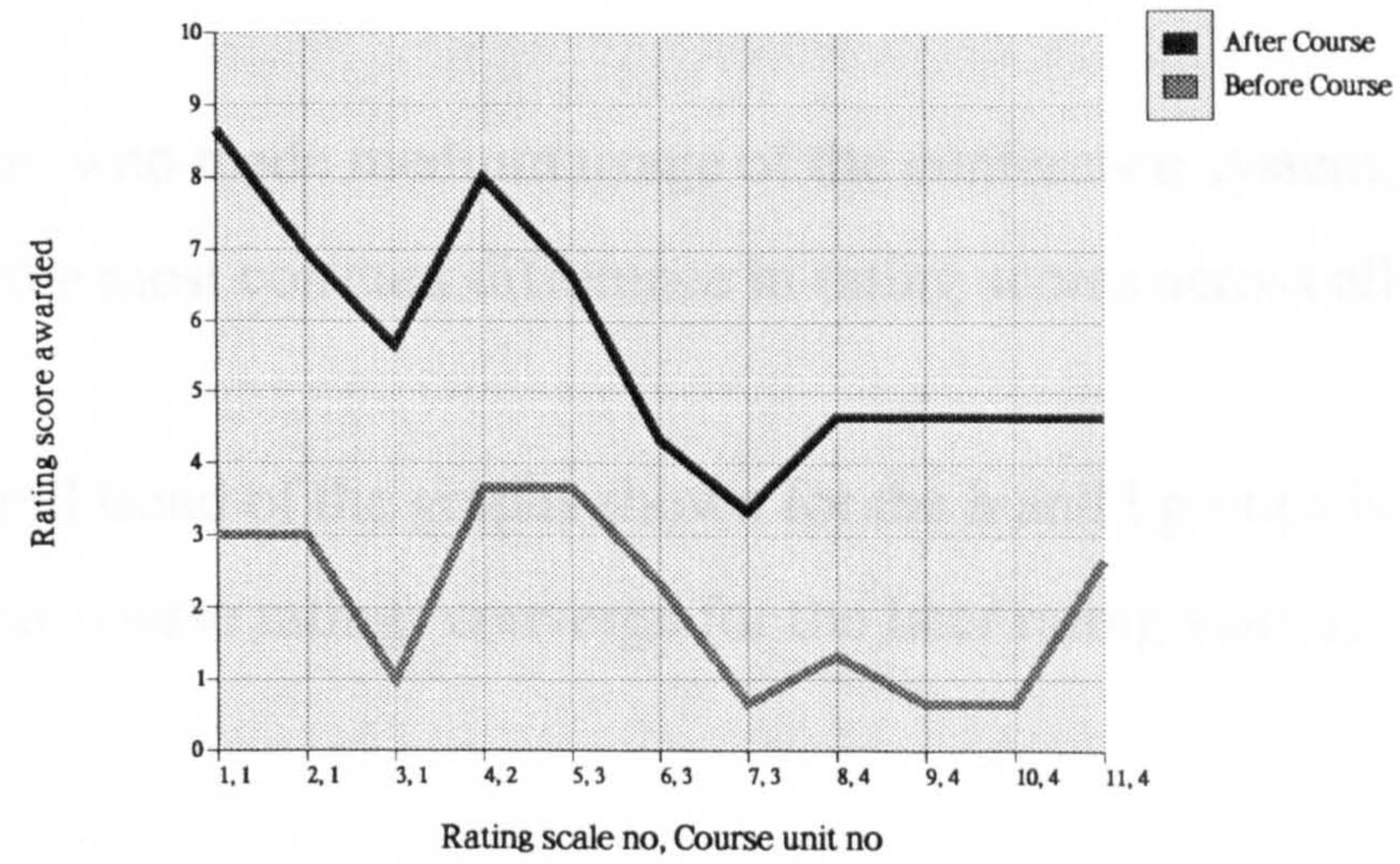
The first set of three graphs indicates the average ratings before and after the course, obtained through interview. The first set of graphs uses the data in the tables below each of the eleven rating scales presented earlier in this chapter; the darker line (upper) indicates the average rating score after the course. The lighter line (lower) indicates the average rating before the course. The *y* value indicates the average rating value gained for each of the rating scales used. The rating scales were numbered sequentially, there were eleven rating scales constructed, the *x* value reflects the rating scale, numbered 1 to 11. In addition to this, a second number indicates from which of the course units the rating scales was drawn; eg 3, 2 indicates that it was the third rating scale while the 2 indicates that this rating scale was used to examine the learning outcomes of Unit 2 of the course. The numbering system is provided for reference purposes, whereas the main aim of the graphs is to highlight trends within the collected data. The gap between the two lines shown in the graphs was used to give an indication of perceived change in understanding.

Figure 58 (below): Summary graphs of pre- and post-course ratings obtained through interview for h, m and l learner groups.

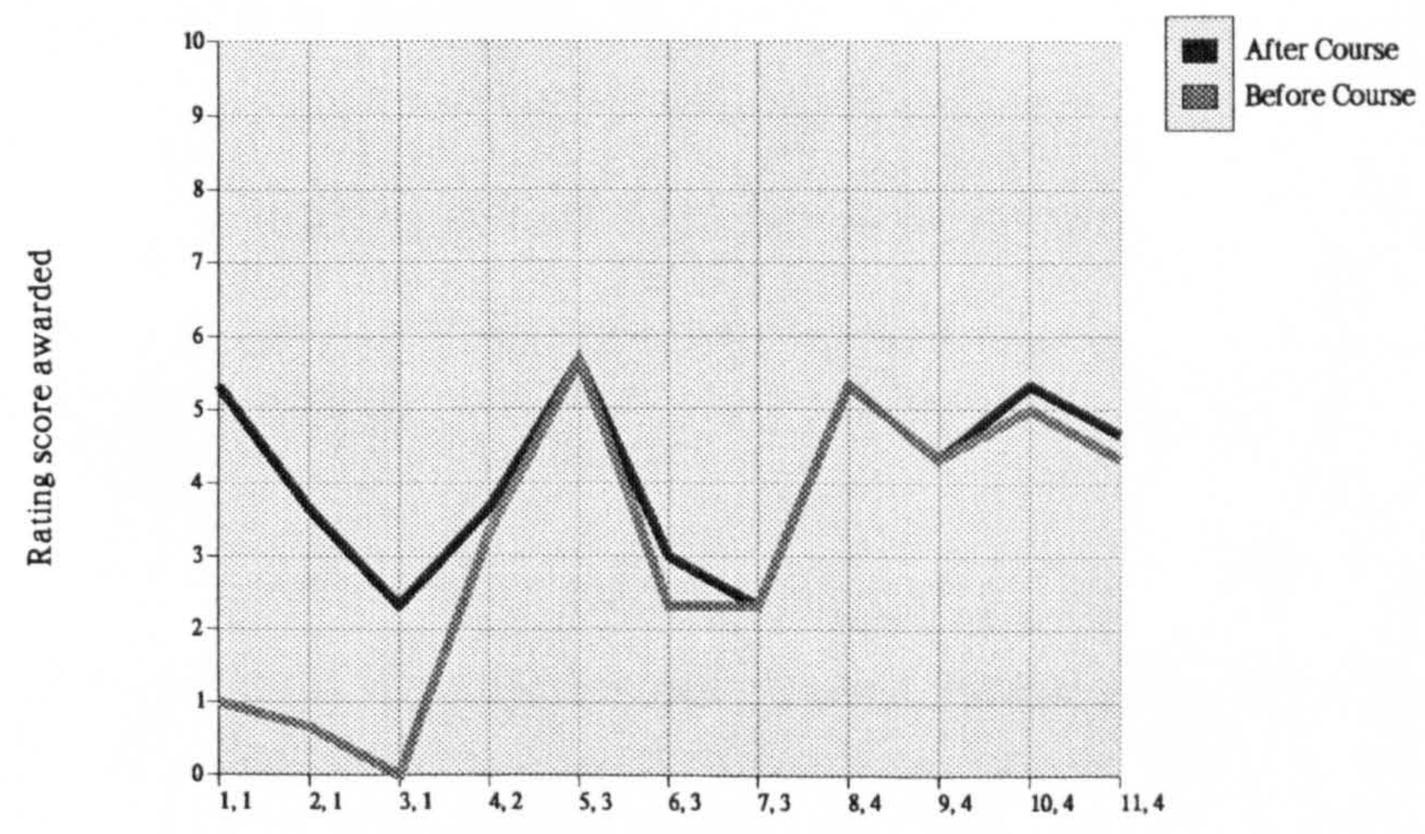
Graph of average pre/post course ratings for (h) group



Graph of average pre/post course ratings for (m) group



Graph of average pre/post course ratings for (l) group



The following summary points were derived from the data indicating the perceived differences in understanding before and after the course, as shown in the three graphs above:

O The least change in understanding appears to have taken place in the group who made little use of the conference system, the l group.

O The greatest perceived change in understanding in all groups was indicated in the first three ratings, all of which were from Unit 1 of the course (understanding computer conferencing).

O The group who made medium usage of the conference system, the m group, had the most constant difference in rating scores across all groups.

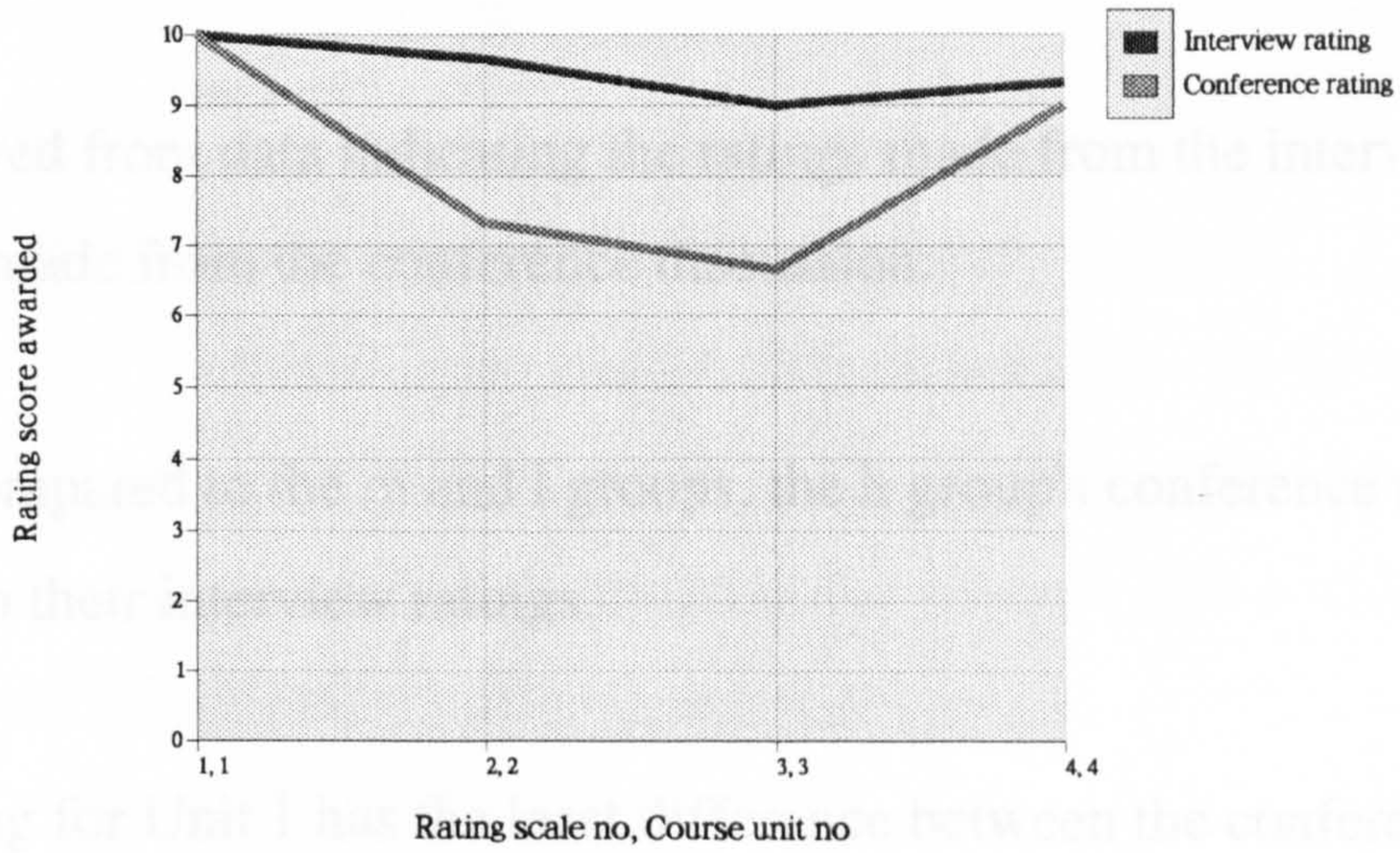
O The overall trend of the graphs shown for the h and l groups is that the pre- and post-course ratings converge for the later rating values.

Second set of summary graphs

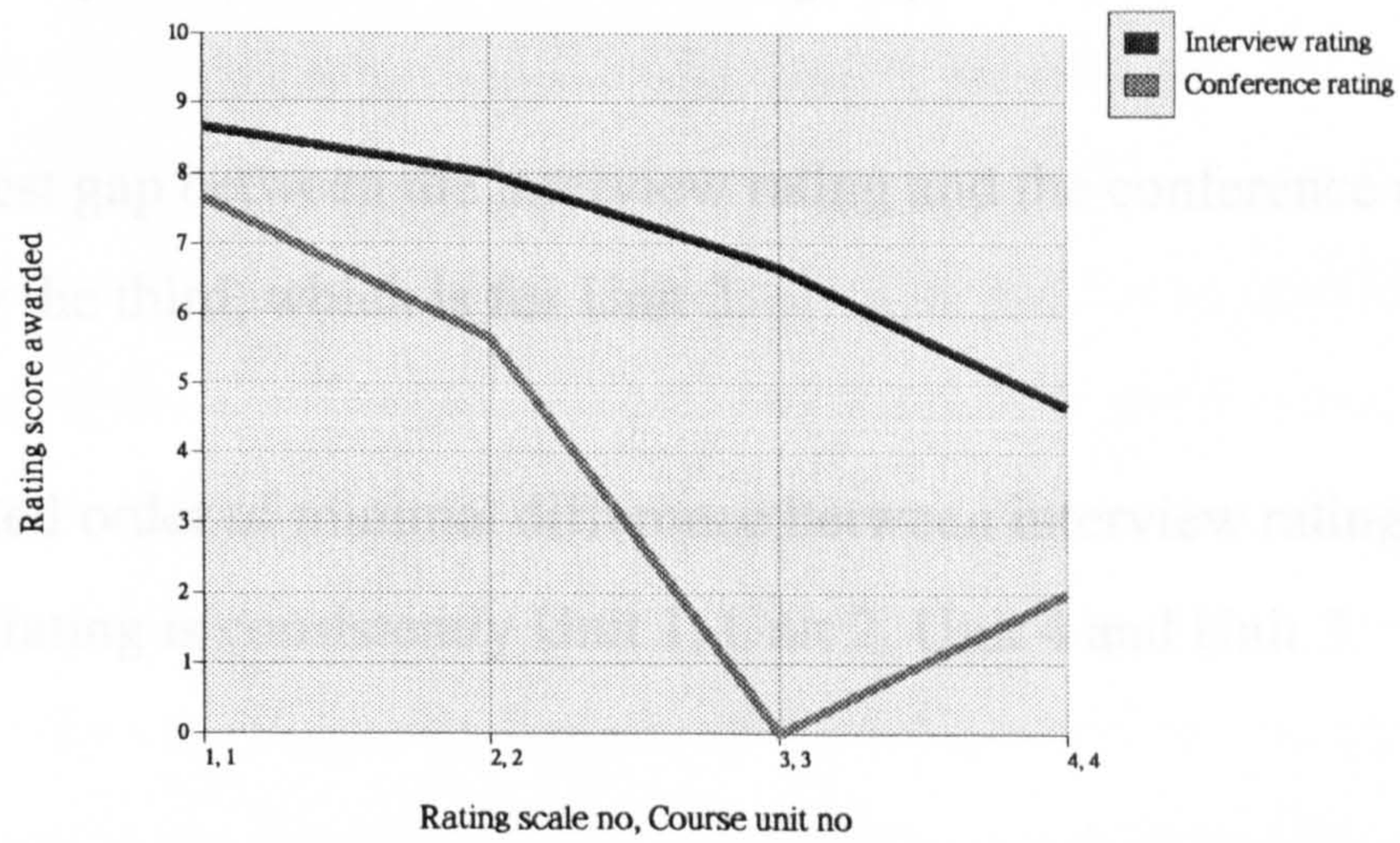
The second set of graphs indicates the average ratings made from the conference discussion analysis and those obtained through interview. The darker (upper) of the two lines indicates the average rating values awarded, based upon interview discussion. These rating values aimed to reflect the learner's actual understanding of the component issues identified within the EA course. The lower (lighter) line indicates the average rating values obtained through examination of the computer conference discussions. These rating values aimed to reflect the level of understanding demonstrated by the learners within the computer conference discussions. The gap between these two lines was used to given an indication of the extent to which the conference discussions reflected the learner's actual knowledge.

Figure 59: Summary graphs for interview and conference ratings obtained through for h, m and l groups

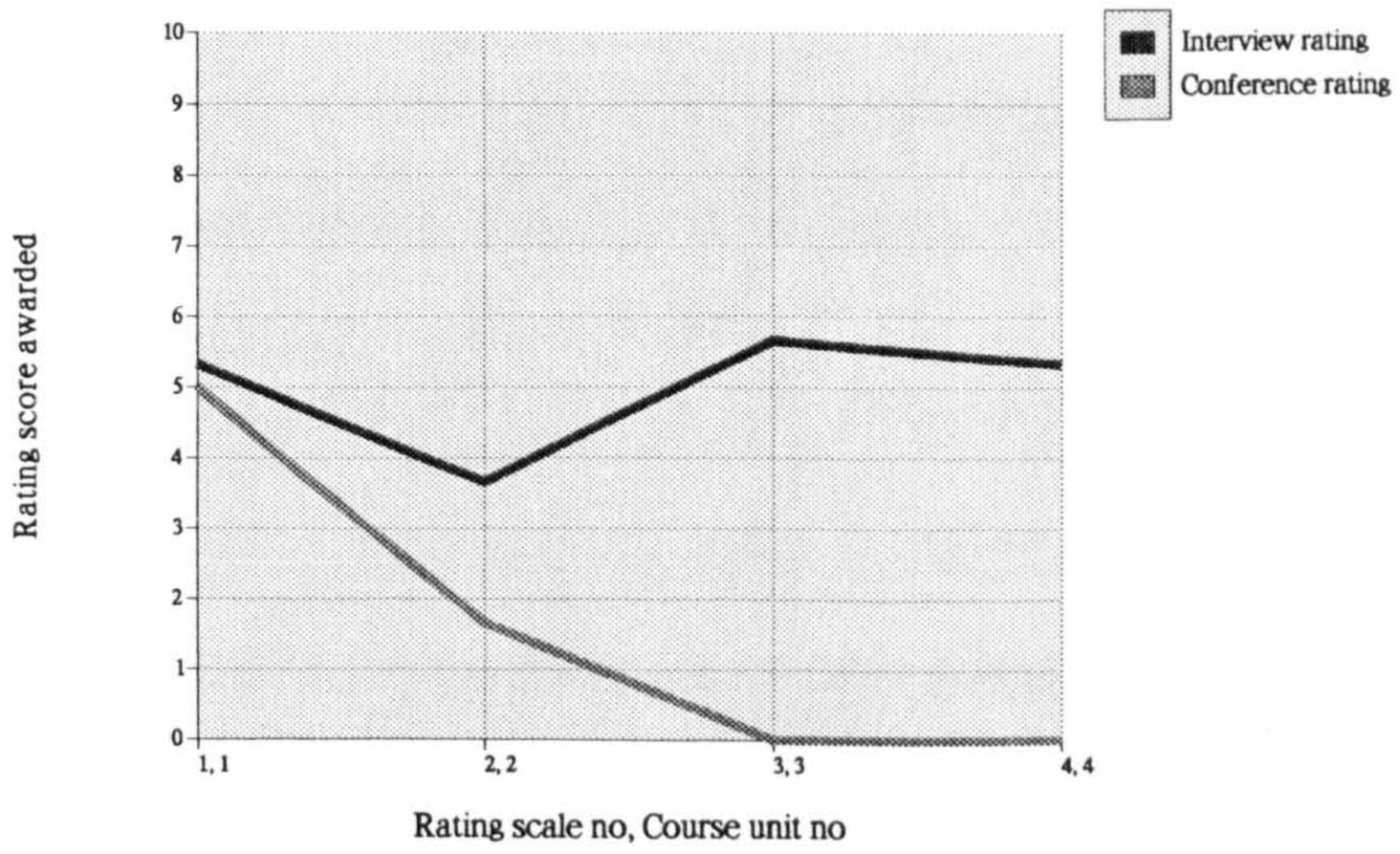
Graph of average interview/conference ratings for (h) group



Graph of average interview/conference ratings for (m) group



Graph of average interview/conference ratings for (l) group



Summary points of results 2 graphs

Points derived from data indicating the ratings made from the interview and the ratings made from the conference discussion:

- When compared to the m and l groups, the h group's conference ratings are closer to their interview ratings.

- The rating for Unit 1 has the least difference between the conference and interview ratings for each of the h, m and l groups.

- The largest gap between the interview rating and the conference rating is consistently the third, which is for Unit 3.

- The ranked order of minimal difference between interview rating and conference rating is consistently Unit 1, Unit 2, Unit 4 and Unit 3.

Discussion of the Results

To recapitulate, this part of the evaluation aimed to consider the extent to which the conference discussions reflected the learner's actual understanding of a specific issue or procedure. It also aimed to gain some insight into how effective the EA course was in bringing about change in understanding of these issues by comparing the learner's rating scale level before and after the course.

From the findings of the evaluation, it appears that on average the m group 'gained' most through participation in the course, as their pre- and post-course ratings differed more than the other two groups. However, if we discount the rating values for Unit 4 of the course, the above conclusion would not be valid. The first set of summary graphs for the h group indicate that the learners within the h group have relatively high pre-course ratings. This suggests that they already knew much of the course content material for Unit 4 of the course before the course began. It could be considered that the learners from the h group would not gain very much from Unit 4 of the course, as it was not providing them with 'new' information. This could lead to the conclusion that, had the h group learners been unfamiliar with the content of Unit 4, the h group may have shown the largest difference between pre- and post-course ratings.

The pre- and post-course ratings differed by the largest amount for the first rating, which related to Unit 1 of the course, an introduction to computer conferencing. From this it is inferred that the learner's understanding of

computer conferencing in particular benefited the most, of all the subject areas addressed within the EA course. Following a similar argument, one might assume that Unit 2 of the course benefited the learners more than Units 3 & 4, as the pre- and post-course ratings for Unit 2 differed, on average, more than those for Units 3 & 4 for all of the learner groups.

The fact that the graphs of pre- and post-course ratings converge for the h and l groups needs further consideration. For the h group, the pre-course ratings are relatively high for the later rating scales which refer to Unit 4 of the course. During personal communication with the learners from the h group it was indicated by them that the content of Unit 4 was familiar. For the l group the pre-course ratings were lower; this leads to the suggestion that these learners could have gained some information through participation in the course. This information may have come from the learner handbook or possibly from other learners within the conference discussions. From part 3 of the evaluation, which considered the levels of learner participation in the conference discussions, it was possible to identify that for the learners in question, participation in the conference discussions for the later units of the course was non-existent.

The above discussion indicates that the intended learning outcomes of the EA course were affected by the low average levels of learner participation throughout the course, as identified within part 3 of the evaluation. This has implications in terms of learner motivation and commitment to the course and the fact that some learners did not benefit form participation in the course possibly due to low participation.

The results tables, which indicate the extent to which the conference discussion ratings reflect the learner's post-course ratings, suggest that if the conference discussions are to reflect the learner's actual understanding of an issue, then the learners must contribute actively to the conference discussions. If the computer conference system is to provide a shared learning environment, then the discussion taking place in the conference must reflect the knowledge to be shared. This part of the evaluation suggests that some of the opportunity for sharing ideas and information was missed due to low participation in the course.

The findings of this part of the evaluation also suggest that Units 3 & 4 of the course were less successful in terms of bringing about effective learning and providing a shared learning environment. This conclusion is derived from the fact that the learners' pre- and post-course ratings did not differ as much as for the first two units of the course. From part 4 of the evaluation, the conference ratings for the later two units of the course gained the lowest rating values on average. It is hypothesised that reasons for this may be that enthusiasm waned throughout the duration of the course and that the teaching strategies used within Units 3 and 4 were less appropriate than those for Units 1 & 2.

The next part of the evaluation will focus upon the learners' opinions of the EA course, to gain insight into some of the reasons for the findings of this and the previous parts of the evaluation.

Chapter 14

Evaluation of learners' opinions of the EA course (part 6 of the evaluation)

Aims

The parts of the evaluation described so far have provided an observational perspective on the EA course. In general, they have focused upon specific aspects or outcomes of the EA course and they have attempted to lay values against criteria in order to make judgements about them. The focal areas for the evaluations have been partly decided upon by the researcher's own agenda as creator and coordinator of the course. The researcher's role as course coordinator and tutor provides an 'insider perspective' which is often considered a valuable asset to an evaluation (Patton, 1987). This part of the evaluation, part 6, aims to gain information relating to the learner perception of the EA course, having taken part in it. The outcome of this part of the evaluation was to attempt to identify the learners' opinions relating to all aspects of the EA course, in order to make judgements about the course, which are based upon the different perspectives of those involved.

In order to achieve this, a number of questions were asked of the learners during the interview with them. These questions were asked during the second part of the interview, which is described in the previous part of the

evaluation. As this part of the evaluation aimed to explore the learners' opinions on all aspects of the course, it covers all areas within the diagram of the theory of distance education created within Chapter 3 of this thesis. This notion is represented within the diagram shown below, where all of the issues relating to the construction and implementation of the EA course are indicated with a white rectangular background.

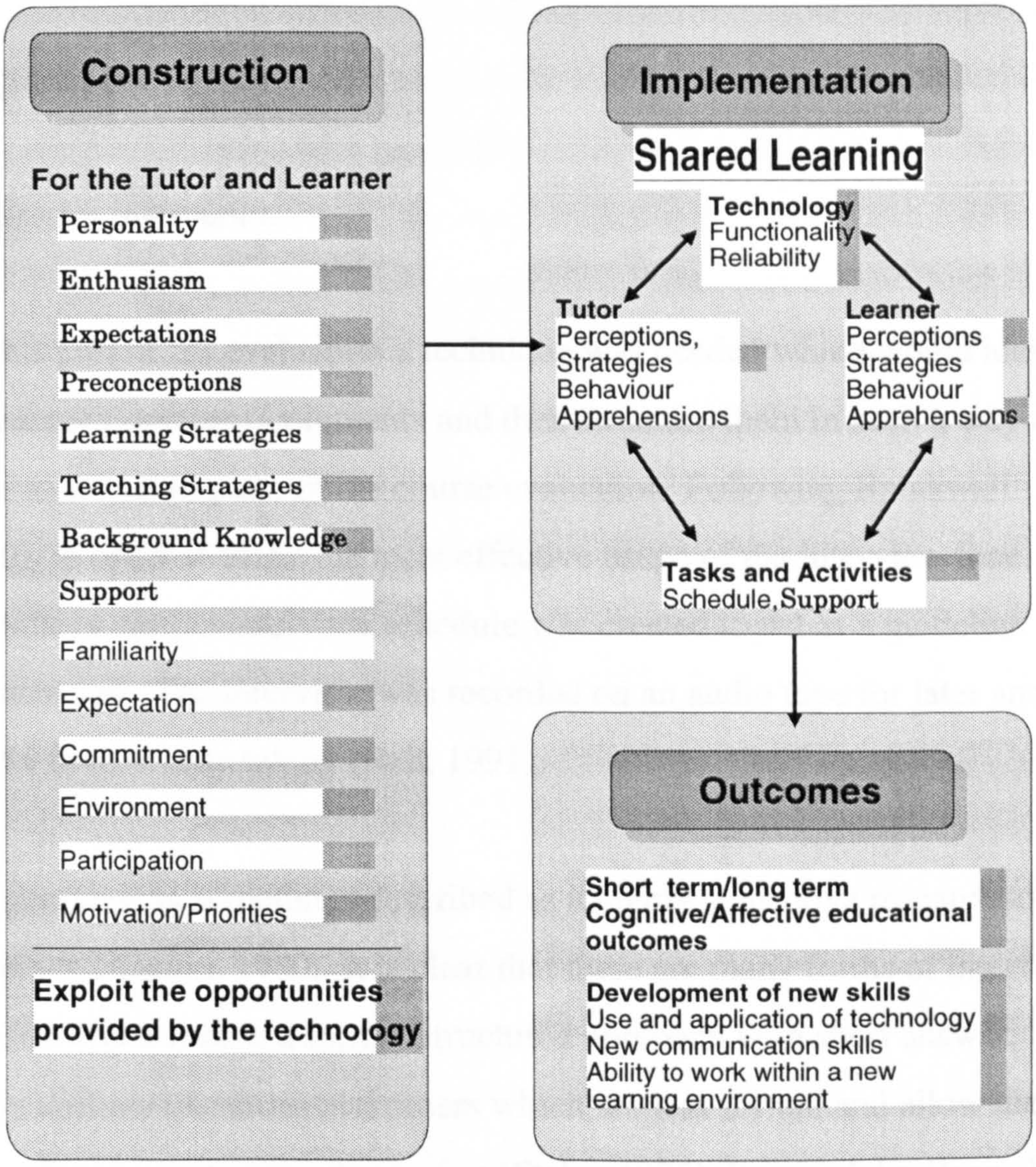


Figure 60: Focal areas of part 6 of the EA course evaluation

Source of the information

The source of the information used within this part of the evaluation was the learner interviews, as described within the previous chapter. The process of preparing for and conducting the interview has already been discussed in the previous chapter, under the section heading 'The interview process'.

Methods

Qualitative interviews

For this part of the evaluation a technique was needed which would identify the learner's opinions/comments and then structure them in such a way as to relate to the other parts of the course evaluation. Following Breakwell (1990), in order to make the most effective usage of the interview time available, a simple interview schedule was created to act as a guideline for the interview. The interview was recorded on an audio tape for later analysis to save time in note taking (Bell, 1991).

The interview is sometimes described as a highly subjective research tool (Cohen & Manion, 1980). It is clear that there are many forms of interview, some of which follow a formal structured approach with short answer, highly defined questions and others which are less formal and allow the respondent to control the discussion (Stake, 1975). Research by Borg (1981) indicates that highly structured interviews can sometimes restrict the interviewee's replies and hide the real meaning that the interviewee is trying

to convey. Borg (1981) terms this 'the response effect'. It was considered highly desirable by the researcher that the learner's responses were affected as little as possible by the interview questions. Kerlinger (1970) states that, 'a questionnaire does not allow for the follow up of ideas; probing of responses and investigation of feeling and motives'. For this part of the evaluation, the intention was to identify the learner's opinions relating to all aspects of the EA course. The evaluation was based upon the expectation that each individual may have a different view of the situation derived from a different experience of the EA course (Cicourel, 1986). This may have been particularly true considering the selection criteria, i.e. three learners from each of the h, m and l groups were those interviewed, as described in the previous chapter.

The following description of the interview provided by Tuckman (1972) outlines the essence of what was needed for this part of the evaluation:

> 'By providing access to what is 'inside a person's head', [it] makes it possible to measure what a person knows (knowledge and information), what a person likes or dislikes (values and preferences), and what a person thinks (attitudes and beliefs).'

Having outlined what was needed from the interviews, one must consider how this information was to be gained in practice. It should be clear that the researcher did not wish to restrict or control the learner's replies to the extent that they would not be able to convey their message. With this in mind, one must consider the needs of this part of the evaluation. In order to provide the more useful information, this part of the evaluation should aim to complement the other parts of the evaluation. This suggests that the

interview should focus upon similar areas to the other parts in order to allow comparisons to be drawn.

If the interview was to follow what Moser and Kalton (1983; p. 23) describe as, 'a conversation between the interviewer and respondent with the purpose of eliciting certain information from the respondent', it must have some form of structure to ensure a certain level of consistency between interviews (Bell, 1991).

The method of structuring the interview was to use the same set of pre-defined questions with each of the learners interviewed. The questions used were intended to focus the interview discussion without restricting the learner's responses (Cannel & Kahn, 1968). To achieve this, the questions generated were 'open ended' to allow the interviewees the freedom of response needed to gain insight into their opinions of the EA course (Jones, 1987). The form and design of the questions used during the interview is described below. The approach taken to posing these questions followed a 'semi-structured' approach, as described by Cohen and Manion (1980), which is based on the belief that, in order to provide the respondent with an accurate understanding of the question posed, it may be necessary to repeat and re-phrase it (Cannel & Kahn, 1968). It was also valuable to allow a certain amount of flexibility during the interview to further discuss some of the comments made by the learners. This was considered valuable on two counts: firstly it would help to ensure that the understanding of the comments was as accurate as possible; secondly it would also help to identify issues which were not previously considered or anticipated by the

researcher (Turner, 1990).

Question design

An important part of any ethnographic study involves questioning appropriate informants to gain insight into the situation under study (Weiss, 1972). For this reason, much attention has been given to the design of questions used to extract this valuable information (Gibbs, 1989; Bingham, 1941; Habeshaw, 1989; et al). Questions are often categorised according to type or usage (Alkin, 1985). Question type refers to the structure of the question, or the language used to pose the question to the interviewee. Usage refers to the purpose for which the question is posed, ie to get an overview of a situation, to validate a statement/theory or to identify similarities and contrasts with known facts. For the purpose of this evaluation, more than one form of question was used. The form for each question was chosen according to how appropriate it was for gaining the required information from the interviewee (Cronbach, 1982).

Forms of questions used

Three basic forms of question were used in the construction of the interview questionnaire.

Descriptive questions involved asking the learners to describe events they experienced during the course to gain further information about them (Hedges, 1985). The descriptive questions used were of two types. The first

type were *Typical Grand Tour Questions;* this type of question involved asking the interviewee how their studies progressed during the course. The second type were *Task-Related Grand Tour Questions*; here the learner was asked to provide a description of an event by completing a task , eg. "Please tell me the process that you went through when you logged onto the computer conference system".

Structural Questions are used as a means to validate or help formulate ethnographic hypotheses (Payne, 1951).

Contrast Questions; this form involves asking questions to identify variations between different viewpoints. For the purpose of this evaluation, contrast questions were used to establish how the learners' preconceptions of the EA course differed. They were also used to contrast statements made by the learner during the interview with those made earlier in the same interview (Richardson, Dohrenwend & Klein, 1965).

During the construction of the interview schedule, many of the questions could be classified as belonging to more than one of the above forms. For example, "please describe how your method of sending an e-mail message differed from that described in the course booklet" (whilst showing the method in the booklet); this is a task-related grand tour question designed to identify contrasts. The questionnaire designed for use during the interview is discussed in detail below.

The Questions used during the interview

During the learner interviews there were basically five questions used to elicit opinions relating to the EA course. These questions aimed to initiate discussions relating to different aspects of the EA course. If necessary, the questions were reiterated using a different phrasing, to ensure the respondent's understanding or to gain further information from them. During the interview, trigger information in the form of a copy of the learner pack, (Appendix Ai&ii), and a printout of the conference discussions was used as a reminder. Below, each of the questions used for the interview is explained, in the order that they were originally asked.

1. Did you find the learner pack a useful resource during the course? (The respondent was presented with the learner pack for review.)

This question aimed to identify the respondents' opinions of the learner pack as a learning resource within the EA course. Chapter 7 of this thesis details how the resource materials used for the EA course were constructed. It was the intention of the course design that the information within the learner pack would provide useful background information which the learners would need to undertake their learning activities.

This question was followed by discussion, aiming to further explore the learner's opinions by gaining information as to the positive and negative aspects of the resource material.

2. What are your feelings about the computer conference system used during the EA course?

This question aimed to explore the respondent's opinions about the computer conference system. It was intended that the learner themselves would discuss any related issues which they wished to. If the respondent indicated that they needed further guidance for issues to comment on, further specific questions were asked. These questions asked the learner's opinions relating to the ease of use of the computer conference system, whether they found it reliable, enjoyable to use, etc. In practice, the learners interviewed did not need much prompting as they were forthcoming with their responses to the initial question.

3. Did you feel that the course was well-structured?

4. What did you think of the course tasks and activities?

5. What did you think of the virtual study centre? (trigger: chapter in learner handbook explaining the V.S.C.)

6. Did you think that the time schedule for the course was appropriate?

The initial question within this section aimed to gain insight into any opinions that the respondents had relating to the general 'structure' of the course. The somewhat loose term 'structure' was used to allow the learners to discuss their interpretation of the question in order that their replies would not be restricted. The three questions which follow Question 3 were used to ask the respondents about specific areas of the course structure. Questions 4 to 6 were asked only if the respondent had not already commented upon the specific areas within their reply to Question 3.

7. Overall, what did you think about the course?

This question was asked to provide the respondents with an open invitation to comment on any aspect of the course that they wished. Any comments made by the respondents following this question were further explored through discussion.

8. What would you say were the most positive aspects of the course?

This question followed on from Question 7, to identify the respondents opinion on the most positive aspects of the course.

9. What would you say were the most negative aspects of the course?

This question aimed to consider the respondent's opinions of the negative aspects of the EA course.

10. What, if any, changes would you make to the EA course?

Having discussed the respondent's general opinions of the course, this final question aimed to identify any recommendations from the learner's viewpoint as to how the course might be improved.

The questions described above were only used to structure the interview discussion. If a respondent obviously wished to discuss other issues or discuss any issues in greater depth, then they were encouraged to do so.

Methods used to analyse the learner's comments

The aim of this evaluation was the identification of learners' opinions about various aspects of the EA course. Spending the large amounts of time required to perform structural analysis on the discourse may have provided further insight into the opinions the learners were trying to convey. However, greater benefit was gained by analysing the discussion using simplified ethnographic methodologies. Malinowski is quoted as describing the process as, "to grasp the native's point of view, his relation to life, to realise *his* vision of *his* world" (Spradley, 1979; p.3). From the interviews with members of the learner group, an understanding of their perceptions of the EA course was desirable in order to help make informed judgements about it and to generate the secondary knowledge base.

Before describing the processes involved, it must be made clear that the evaluation of the EA course interview discussions alone could not be considered as comprising a complete ethnography. The process of constructing a complete ethnography involves integrating with the culture under evaluation and carrying out a number of interviews over a period of time (Fetterman, 1984). Unfortunately there was no opportunity for repeated interviews as part of the evaluation of the EA course. However, some of the methodologies of an ethnographic analysis of interviews may usefully be applied to the single interview event with the EA learners. It is more realistic to consider this thesis, in its entirety, as an attempt at constructing an ethnography of the EA course.

Stages in the analysis of the EA learner comments

There are four stages involved in the analysis of the learner comments. These lead to the generation of what Spradley (1979) describes as a 'meaning system' to provide understanding. Generation of a meaning system results in the discovery of relationships and contrasts between the constituent parts (Filstead, 1970). Shown in the diagram below are the four stages of analysis used, which are described in detail below:

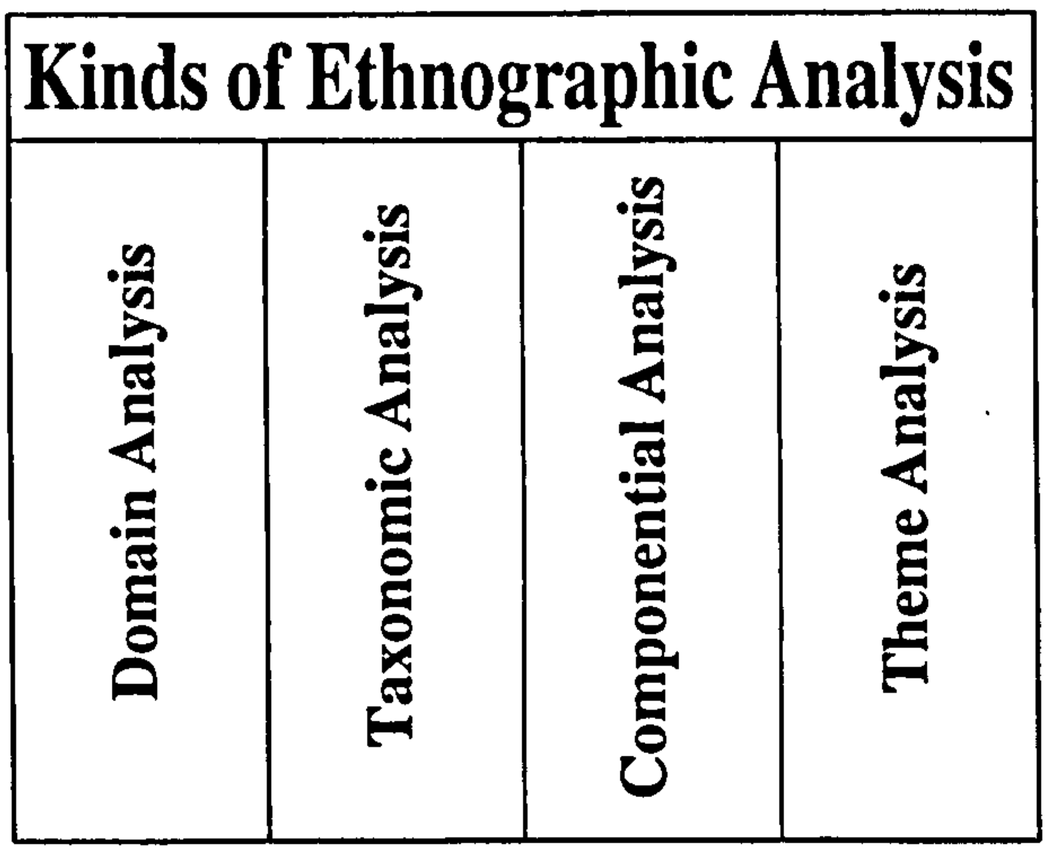


Figure 61: Kinds of ethnographic analysis used for learner interviews within part 6 of the EA course evaluation

The above diagram is adapted from Spradley (1979; p. 140).

Domain Analysis

Domain Analysis involves identifying 'symbols', which are defined as 'any object or event that refers to something', (Spradley, 1979; p. 95). For the EA course evaluation a symbol represents a comment made during the interview. Each symbol may have more than one meaning, depending on the

context. An example of this from everyday life might be that the symbol "the man was cold" might refer to the man's temperature or to his personality. Considering a symbol in relation to its context is required in order to identify its meaning; this process is part of the creation of a 'meaning system'. A symbolic category which includes other categories is known as a domain.

Taxonomic Analysis

This involves selecting a domain, or collection of symbols, for analysis. It is then analysed in a very systematic way to discover the inter-relationships between the symbols within that domain. The process of conducting a taxonomic analysis was used to structure the 'meaning systems' to directly relate to the other parts of the EA course evaluation (Bogdan & Taylor, 1975).

Componential Analysis

The Domain Analysis of the comments made by the learners during the interview classified their comments into sub-groups, or domains. This provided an indication of the different topic areas commented upon. Following this, the taxonomic analysis structured these comments in order for them to relate to the other parts of the EA evaluation. This process of grouping the comments facilitates exploration of their inter-relationships.

The componential analysis identifies the differences between the comments

made by the high, medium & low conference usage groups. Examining the differences between the comments made about certain issues provides a greater understanding (Rutman, 1980).

Theme Analysis

The notion of the 'cultural theme' was first introduced by Morris Opler who used it to describe the general features of Apache culture. He proposed that a better understanding of a culture may be gained by identifying recurrent themes. He defined a theme as 'a postulate or position, declared or implied, and usually controlling behaviour or stimulating activity, which is tacitly approved or openly promoted in a society" (Spradley, 1979; p. 185).

The word theme is used in the context of this evaluation to relate specifically to opinions declared or implied by members of a specific learner group. For the purpose of identifying themes within the comments made by the learners interviewed, a summary overview was produced. Spradley describes this approach as useful to 'help pull together the major outlines of the scene you are studying'. This provided exactly the information required to consider the learners' comments in the context of the methods adopted for delivery of the EA course.

Performing Domain and Taxonomic Analyses on the learner's comments.

The processes of carrying out a domain and taxonomic analysis of the comments made by the learners interviewed led to the structuring of these comments, in order to relate them to the other parts of EA evaluation.

A Domain Analysis of the comments made by the learners interviewed

Domains have a certain hierarchical structure, the first element of the domain structure is known as the cover term. Below the cover term is a list of symbols which belong to the cover term.

For this evaluation, the components or symbols within the domains were comments made explicitly or implied by the learners interviewed. Inferences made from comments were only included if they were subsequently verified at a later stage of the interview. For each domain a different cover term was identified. The relationship between the cover term and the components of the domain was "<symbol>.. a comment relating to..<cover term>". This relationship was applied to all domains. This method of constructing the domains results in the identification of those comments which relate to a specific aspect of the course.

The process of identifying the elements within the domains involved initially selecting a learner comment and then constructing a cover term for it. Each subsequent learner comment was then included in one of the

predefined domains. If it was not possible to include the comment in one of the predefined domains, a new one was created. Eventualities such as repeated difficulties deciding in which of two similar domains a comment should be included led to the possibility of merging two domains. This developmental approach for constructing the domains was used to ensure that the classifications were made on the basis of the actual comments made, rather than any predefined structure.

Having performed the domain analysis, it was possible to identify eight separate domains each using the relationship '<symbol>.. a comment relating to <cover term>'. A list of the cover terms used to define the domains is shown in italics below:

A comparison with face-to-face teaching; these were comments made by the learner in which comparisons with face-to-face teaching were drawn.

Interaction and shared learning; comments made which related to interaction between learners, involving sharing of ideas.

Content; comments made which related to the content of the course, including content of the course booklet (Appendix A(i)) and the tasks set.

Schedule; comments made which related to the time schedule for the course (Appendix Aii) or the amount of time given for tasks to be completed.

Course Resources; comments made about the course resources and/or the

contents of the learner resource pack (Appendix Ai & Aii).

General Positive; general comments made about any aspect of the course which were positive.

General Negative; general comments about the course which were negative.

Adaptations to the course; comments made which recommended changes to be implemented, should the course be repeated.

Most valuable aspect; this domain was constructed to group comments made by interviewees in response to a specific question asking them what, in their opinion, was the most valuable aspect of the course.

Grouping the similar comments made by the learners as part of the interview can therefore allow useful comparisons to be drawn. As the rating scale analysis examined each of the units of the course in isolation, identifying comments made about each of the units was also considered valuable.

The domain analysis described above identifies the various aspects of the EA course commented upon by the learners interviewed. Following this, a taxonomic analysis was used to structure these comments so that they relate to the same framework as other areas of the evaluation.

A Taxonomic analysis of the learners' comments

The first step in this process was to select a domain for analysis. As each of the domains were to be analysed in turn, it did not matter which was selected first. An appropriate substitution frame was then generated. Spradley (1979) defines a substitution frame as a relationship between two objects. In order to relate the comments made by the learners during the interviews to other parts of the evaluation, appropriate substitution frames were used. As the other parts of the evaluation examined each of the units of the course in turn, it was appropriate to construct substitution frames which would group comments made about each unit of the course. The following substitution frames were chosen in order to group comments made about each of the units of the course; 'comments relating to Unit 1', 'comments relating to Unit 2', 'comments relating to Unit 3', 'comments relating to Unit 4' and 'general comments about the course'. The first four substitution frames were selected to construct taxonomies of comments made about each of the four units of the course. The final substitution frame was used to create a taxonomy of comments which related to the course in general.

The interview schedule used as a guideline for the interview contained questions designed intentionally to obtain opinions about each of the units of the course, as well as more general opinions of the course as a whole. This made the task of categorising the comments into taxonomies a simple one. The diagram below clarifies the taxonomic structure used to classify the comments made by the learners interviewed.

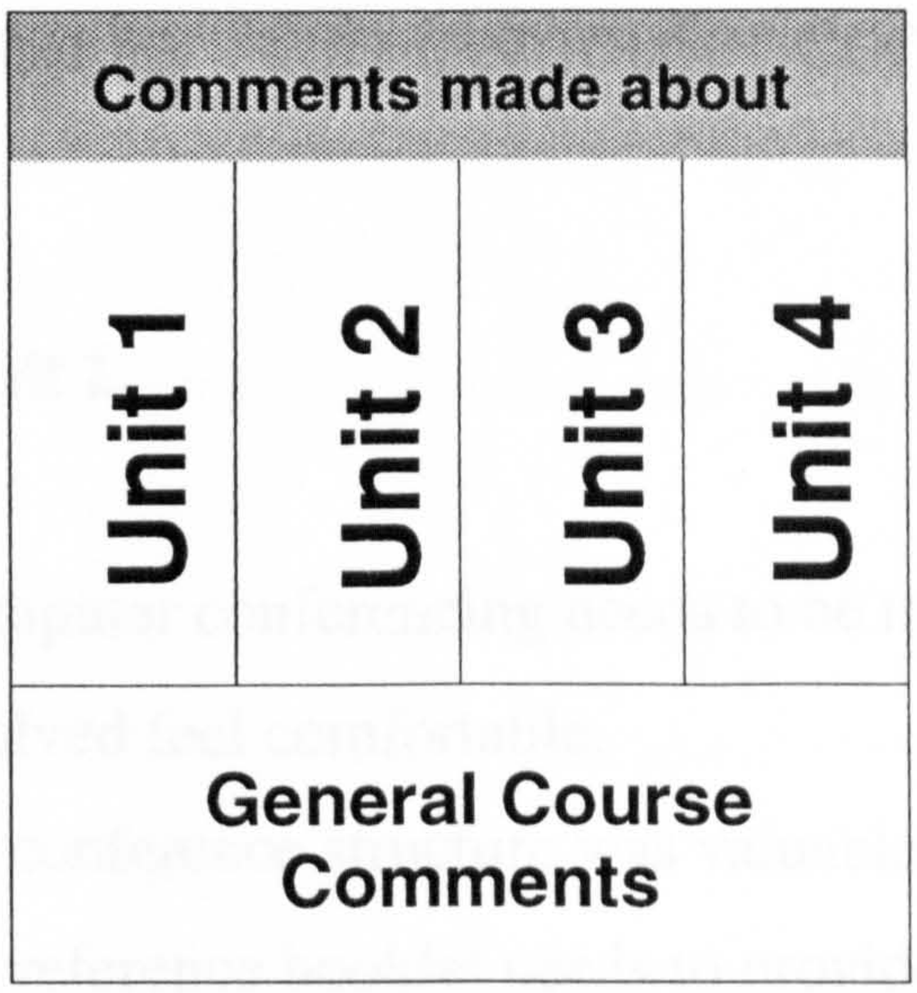


Figure 62: Structure of analysis of comments relating to the EA course made by those interviewed

By performing a domain and taxonomical analysis of the comments made by the learners interviewed, sets of comments about the different parts of the course are identified.

Results of conducting domain and taxonomic analyses of the learners' comments

The table below shows the results of conducting a domain and a taxonomic analysis on the data. The next stage of the evaluation involves conducting a componential analysis. To present the information in a form which will be most useful for this part of the analysis, comments made by the high, medium and low computer conference system usage groups are separated. The reason for this is explained in the next section describing the componential analysis.

Comments made by high computer conference usage group.

Comments about Unit 1.

Domain : Content

O Introduction to computer conferencing needs to be more comprehensive, to ensure that all involved feel comfortable.

O Description of the conference structure was valuable and clear, the user guide included in the reference booklet needs to provide more detail and explain what to do when things go wrong.

Domain : Adaptation

O Fixed exercises recommended as part of this unit. These should take the form of structured over-simplified exercises which guide the individual through the process of using the system.

Comments about Unit 2.

Domain : Comparison with face-to-face teaching

O Low level of interaction meant that it did not compare with face-to-face role-play.

Domain : Interaction and Shared Learning

O The structure of this unit was useful for promoting sharing personal opinions using the role-play.

O Interaction did not get going because the gaps between the interactions

were too long.

O This unit was good for bringing out people's personal opinions, by promoting discussion using role-play.

O The fact that the unit required interaction was a good way to get the conference discussion started.

Domain : Content

O The content was good because it covered an emotive subject which was likely to lead to an interesting role-play.

O Content promoted thinking about issues which otherwise would not be considered.

O The content of this unit made it clear what the use of computer conferencing was for and how it should be used.

Domain : Schedule

O The fact that the unit took place over the Easter holidays caused problems.

Domain : General Positive

O This unit was a good introduction to getting people using the system.

O It was an interesting exercise.

O It was a good way to start using the system.

O It was the most participative unit of the course.

O It clearly made the point that there were different perspectives and so acted as a good introduction to the course.

Domain : General Negative

○ The discussion did not have the chance to really get going.

○ There was potential for enlightening discussion which was not realised due to low participation.

Domain : Adaptation

○ The role-play should have run throughout the course, to allow people to make use of new knowledge obtained as the course progressed.

Comments about Unit 3.

Domain : Interaction and shared learning

○ A positive aspect of this unit was the opportunity to find out how legislation was affecting other organisations, though this never really got going.

Domain : Content

○ Putting environmental legislation into a historical context was interesting (ref : resource 1, course booklet, (Appendix Ai)).

○ There was too much (content) in this unit. The tasks set for the three week period of this unit were too demanding in terms of time.

○ There were too many tasks.

○ This unit required the most research, but there was not time to carry out this research.

○ The quality of the resource material was very good, but there was too much work.

O The first part, involving reflection on what had made the learners interested in the environment, was potentially a very good aspect of the course and quite challenging. Sharing ideas on this was not included and would have been valuable.

O The reference material was good quality and informative.

O It was not clear where the conferencing came in.

Domain : Schedule

O The time schedule for this unit was abysmal, it did not provide enough time to get the tasks done.

Domain : General negative

O Due to the workload for this unit being unmanageable, many people may have just decided to give up.

O This may have been the breaking point for the course.

Comments about Unit 4.

Domain : Content

O The content of this unit was too diverse, should have focused on a limited area.

O There were not enough details given for full understanding.

O Putting environmental issues together was possibly confusing, but also interesting.

Domain : Adaptation

O Need for more active participation in the conference discussion from the course tutor for this unit.

O Should have been constructed so that, rather than the learners taking responsibility for the decisions required by the tasks, they should have been guided by the tutor.

General course comments.

Domain : Interaction and shared learning

O Learner tried to read comments made by others and respond to them.

O During the conference discussion learner tried to give relevant personal knowledge to conference discussion.

O Learner felt that new information had been learnt from others as a result of the course (though mainly from only one other person).

O Very few people really got stuck into the course discussions on the computer conference.

O Whenever possible, learner read comments made by others, before adding comments to the conference discussion.

O Felt that quite a lot had been learnt about the environmental subject material, mostly from other learners rather than the course reference material.

O Potentially the opportunity to have expert input was very good, but not enough people took advantage of this ('expert' refers to the course tutor).

Domain : Content

O There was too much content in the course for the time available, this was especially true for the latter two units.

O People were not given enough background information to allow them to contribute effectively.

O The content needed to be less general and more tailored to the individual's organisation.

O The content of the course was very good in terms of providing an effective overview of the subject and still providing a level of detail which led to a more complete understanding.

Domain : Schedule

O People need longer to get into discussion than they would in a face-to-face situation; this extended time period was not provided sufficiently.

Domain : Course resources

O Did not make use of the course booklet or other resources except for the schedule.

Domain : General Positive

O The course was enjoyable overall.

O Generally the course was very interesting and very ambitious.

O A good way of raising environmental awareness.

O Enjoyable way of educating.

Domain : General Negative

O Biggest problem with the course was getting the technology set up and getting access for people.

O People not able to give up enough time for the course as it took a low precedence in their working day.

O There were problems with the conferencing system throwing them off-line without warning, this could be very frustrating.

O Conference system was not user friendly.

O Overall opinion of the course was that it was very good, the whole idea was very good; what spoiled it was that not enough people got involved.

Domain : Adaptation

O There should be more formal monitoring and feedback included in the course (formal monitoring - explained as written essays completed by the learners and marked by the tutors for feedback).

O Formal teaching needs to be included to promote conference discussion.

O Whenever possible include regular in-house presentations where course participants meet to discuss the course as it progresses (This was a comment from a representative of BAA; BAA was one of the participating organisations which conducted such meetings and reported that they were a valuable addition to the course).

O Measures need to be taken to ensure more participation (no recommendations made as to what these might be.)

O Part of the course resources needed to give an indication of how to get the most out of the course, indicating that regular input was necessary (after this comment was made, course resource sheet titled 'how to get the most out of the course' was shown (Appendix Ai); learner had received it as part

of the course pack but hadn't noticed it.)

O Early on in the course, a restructuring should take place to group those learners who have a high level of involvement, so that those that are interested will not be held back by low participation from others.

O The library conference should contain more than just references and contact addresses, further information not provided in the course booklet should be here.

O A banner at the top of the screen should constantly inform the learner of where they are in the conference structure.

O There should be more participation by the tutors.

O More support faxes should be sent to ensure that learners are not having any problems which get in the way of sustained involvement.

O Unit 2, the role-play, should run in parallel with all of the other units of the course so that, as people gain new knowledge, they can include it in their discussions.

Domain : Most valuable aspect

O That there were no set times for study.

O Potential for exchange of ideas and experiences.

Comments made by medium computer conference usage group.

Comments about Unit 1.

Domain : Content

○ This unit was very valuable for introducing the conference system.

○ Without this component of the course, people would have been lost right from the start.

Domain : Adaptation

○ There needed to be more instructed tasks, as can be found in many computer reference manuals, where the task is explained in detail to lead you through it step by step.

Comments about Unit 2.

Domain : Interaction and shared learning

○ The role-play was a good way to start the course because it promoted interaction, which was a good way to 'break the ice'.

Domain : Content

○ This unit was a good way of getting people to think about environmental issues by providing enough background information but still allowing the freedom to express one's own opinions.

O The course booklet helped to identify issues which in the first instance would not readily come to mind.

Domain : General Positive

O The role-play was a good way to start the course because it got people using the conference system.

Comments about Unit 3.

Domain : Interaction and shared learning

O There was trouble getting feedback from other learners.

O Learner gained information from course book on environmental legislation, but not through conference discussion.

Domain : Content

O There was a lot to get through and it got a bit complicated.

O This unit of the course was overwhelming because of the assigned tasks, and lack of feedback from other learners.

Domain : Schedule

O There was not enough time given to complete the complicated tasks which were set.

O The difficulty was that there was not enough time, as well as lack of participation by other learners.

Domain : Course Resources

O Found it difficult to answer questions based on the resources given.

O The resource material was useful for the course, providing a lot of information.

Comments about Unit 4

Domain : General Negative

O Did not gain very much from Unit 4.

General course comments

Domain : Interaction and shared learning

O As much as possible, learner tried to take other people's comments into account when making own comments.

O Would log on, read comments, log off, prepare replies, then log on and send these replies.

O On a few occasions learner had given details of personal knowledge to conference discussion.

O Learned new things from other learners.

O Had learned from other people.

Domain : Course Resources

O Used the course resource materials to help in the completion of the course tasks.

Domain : General Positive

O Thought that the overall course structure was good, well planned and could not think of a better way of doing it themselves.

O The conference structure was necessary to organise discussions and provide a framework in which to work.

O Felt that the course made good use of the technology.

O The computer conference was easy to understand.

Domain : General Negative

O Gaining access to the computer for computer conferencing was difficult.

O Biggest problem was low participation from other learners.

O Conference system was very user unfriendly, this was annoying and sometimes led to lack of desire to use it even though there was something they wanted to say.

O The library conference was a disappointment, expected further information in the form of excerpts from books, journals and reports.

O Felt that more tutor support was needed, felt that they were 'floundering' at times, had expected a more instructive approach.

O Short time scale.

O Low learner participation.

Domain : Adaptation

O Discussion should be open forum, learners should be encouraged to take part in discussions with learners from other groups.

O Award of some qualification needed to promote participation.

O Employer's support should include provision of extra time for study.

O Somebody needed in each study group to act as "devil's advocate", to promote interaction and discussion.

O More tutor involvement needed.

Domain : Most valuable aspect

O Opportunity to communicate with other people with a similar interest.

O A good experience, nice to communicate with people from other countries.

Comments made by low computer conference usage group.

Comments about Unit 1.

Domain : Content

O This was a necessary part of the course.

O There was sufficient content to grasp the basics of what was needed.

Domain : General Positive

O More detail might have been useful here.

Comments about Unit 2.

Domain : General Positive

O The role-play was a good way to introduce the conference and get people used to it.

O I would imagine that this would be a good way of getting the discussion started but I was unable to take part.

Comments about Unit 3.

Domain : Content

O This unit was more factual, listing events.

O This unit did not provide further understanding because content was not biased towards people communicating using the conference system.

Domain : Schedule

O This part of the course did not seem to flow very well, the tasks were isolated - they did not follow on from each other and there was not enough time to complete them properly.

Comments about Unit 4.

Domain : Content

O The content of this part of the course tried to cover too many aspects and as a result did not provide further understanding.

General comments about the course.

Domain : Interaction and Shared learning

O Did not read other people's statements on the conference.

O Did not really learn anything from other learners.

Domain : Course Resources

O Made very little use of the course resources, had a brief look at them at

the start of the course but did not go back to them throughout the course.

Domain : General Positive

- It was a good way of getting used to computer conferencing.
- The structure of the computer conference was necessary and the best way of doing it (virtual study centre, Appendix A(ii)).
- The course made good use of the technology, although the technology was limited.

Domain : General Negative

- Disliked having to go through stuff which was not found interesting, either because it was already known or because could not be bothered.
- Biggest problem with the course was the lack of participation (probably a motivational aspect).

Domain : Adaptation

- Need for more tutor involvement.
- The course relied too much on interactive learning, this was fine except for the fact that there was not enough interaction.
- Tutors should initiate all of the discussions.

Domain : Most valuable aspect

- The fact that work could be carried out from place of work and did not require unpleasant travel.

Performing a componential analysis

The domain and taxonomic analyses were used to structure the learners' comments to allow exploration of the inter-relationships between them. In order to compare the comments made by the high, medium and low learner groups, a componential analysis was undertaken. This process was also used to facilitate the final theme analysis of the data. The componential analysis led to systematic comparison of the comments made by the different groups interviewed. The diagram below clarifies the comparison structure; comments in each taxonomy are compared between the interview groups.

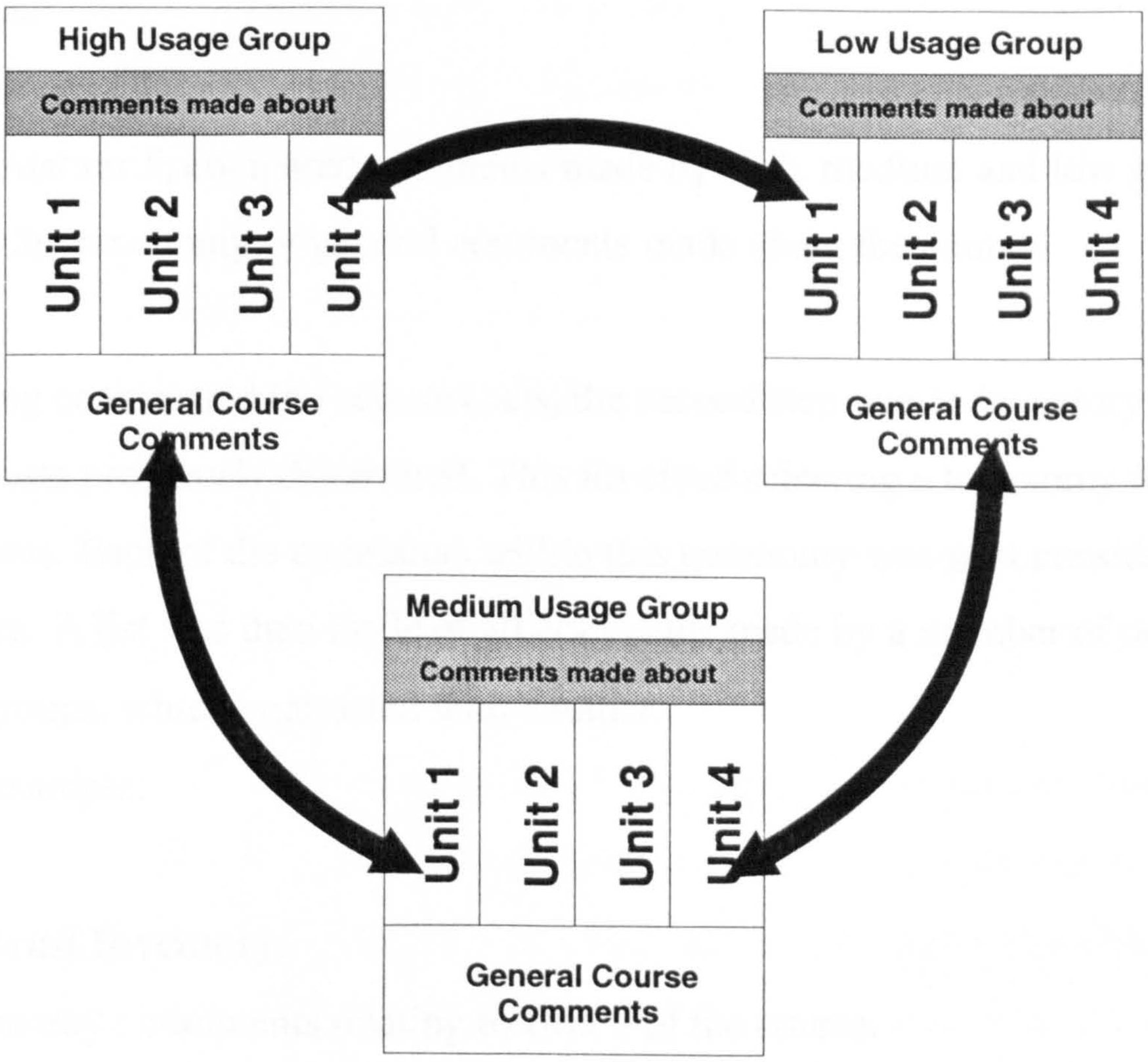


Figure 63: Schematic of componential analysis of learner comments made during interview

The steps for carrying out a componential analysis, as described by Spradley (1979), follow: The first step was to select a contrast set for analysis. The contrast sets selected were chosen as comments made by learners from the high, medium and low groups. The elements within the contrast sets consisted of all of the comments included within one of the previously identified taxonomies. This led to the construction of five contrast sets:

Contrast sets 1 to 4; comparing comments made by high, medium and low groups from the taxonomy of comments made about Units 1 to 4 of the course.

Contrast set 5; compared comments made by high, medium and low groups from the taxonomy of general comments made about the course.

Having constructed the contrast sets, the second step was to inventory all contrasts previously discovered. This involved selecting a taxonomy for analysis. Each of the comments within this taxonomy was next considered in turn. A list was then made of all comments made by a member of one of the groups, which contrasted with another.
For example:

Contrast Inventory.

Taxonomy : comments relating to Unit 1 of the course.

Contrast set : comments made by the high, medium and low groups.

Comments from l group

O More detailed content might have been useful here.

O There was sufficient content to grasp the basics of what was needed.

Comment from h group.

O The introduction to computer conferencing needs to be more comprehensive, to ensure that all involved feel comfortable.

In the example above, it is important to note that there are two comments recorded for the low group, which disagree. As there were three individuals within each group it was quite possible that within the group there was disagreement. In practice this did not occur very frequently. For the instances when it did occur both YES and NO were recorded in the binary paradigm worksheet as shown in the example below.

The next stage of the analysis involved constructing a paradigm worksheet for each of the contrast sets. The paradigm worksheets all had the same set of rows: high, medium and low. Adopting these row headings would identify dimensions of contrast between the comments made by members of these groups.

The next stage in the analysis involved identifying dimensions of contrast which had binary values. The inventories of contrasts were examined. From them, statements were designed such that each of the comments collated would either agree or disagree. This would ensure that binary values were always obtained. From this it was possible to construct paradigm work sheets which had binary values. These were of the form :

Contrast Set	Dimensions of Contrast			
	Statement 1	Statement 2	Statement 3	
High	Yes, No		No	
Medium	No	Yes	Yes	
Low		No	Yes	

Figure 64: An example of a binary paradigm worksheet for constructing a contrast set

The indication of agreement and disagreement with Statement 1 shown for the high group simply means that one of those interviewed agreed with the statement and one did not.

Following the construction of the binary paradigm worksheets, the next step was to group similar dimensions of contrast to create multi-dimensional domains of contrast. This involved identifying subject areas where those interviewed had a number of differing opinions. An attempt to perform this final step in the analysis did not prove fruitful. The main reason for this was that it was attempting to distil the information further. This caused problems, primarily because it was not possible to re-interview the learners to complete the binary paradigm worksheets. Having gaps in these tables made it difficult to identify similar domains of contrast which were complete. The only method for generating the new multi-dimensional domains of contrast would have been to select the previously identified cover terms from the domain analysis. If all the comments made by all of the groups were then considered together, it would have been possible to

construct a completed paradigm worksheet. However, this new paradigm would merely be a tabulated form of the domain analysis.

Spradley (1979) does not suggest that one has to end up with a multi-dimensional paradigm worksheet in order to to move on to the final stage of the developmental research sequence. In this case, trying to generalise the information further would, at the least, make it become trivial due to its simplicity. At worst, it would take a step backward by simply presenting the same information but in a different form. The binary paradigm worksheets created present all the information needed to perform a theme analysis without the need to further simplify them. For this reason, it was considered appropriate to conclude the componential analysis by presenting the binary paradigm worksheets.

Binary Paradigm Worksheets

Completed binary paradigm worksheets for contrast sets 1 to 4 (comments relating to Units 1 to 4 of the EA course).

UNIT 1:

Group	Content needs to be more detailed	Practice exercise recommended	Valuable part of the course	Content needs to be more comprehensive
h	YES	YES	YES	YES
m	NO	YES	YES	YES
l	YES, NO		YES	NO

UNIT 2:

Group	Low level of interaction	Structure promoted sharing personal opinions	Gaps between interactions too long	good way to get discussion going
h	YES	YES	YES	YES
m	YES, NO	YES	YES	YES
l			YES	YES

Group	Content good (emotive subject)	Different perspectives clearly defined	Promoted thinking about issues otherwise not considered	Made clear what computer conference was for and how it should be used
h	YES	YES	YES	YES
m	YES	NO	YES	YES
l	YES			NO

Group	Schedule caused problems (over Easter)	Good introduction to getting people using system	Interesting exercise	Most participative unit of course
h	YES	YES	YES	YES
m	NO	YES	YES	YES,NO
l		YES		YES

Group	Content likely to lead to interesting role - play	Discussion did not have the chance to really get going	Potential for enlightening discussion not realised due to low participation	Should have run through - out course
h	YES	NO	YES	YES
m	YES	YES	NO	NO
l	YES	YES		

UNIT 3:

Group	Content promoted finding out how legislation affects other organisations	Not enough participation, lack of feedback	Interesting to see environmental legislation in historical context	Too much content
h	NO	YES	YES	YES
m	YES	YES	YES	YES
l		YES	YES	YES

Group	Not enough time allotted to complete tasks	Too many tasks	People may have given up due to workload	May have been breaking point for course
h	YES	YES	YES	YES
m	YES	YES	NO	NO
l	YES	YES		

Group	Required a lot of research	Quality of resource material was good	Reflecting on personal reasons for environmental concern was good	Conference did not play a clear role
h	YES	YES	YES	YES
m	NO	YES, NO	YES	YES
l	NO			YES

Group	Time schedule poorly organised	Information obtained from course book, not from computer conference	Got a bit complicated	More of a factual unit, listing events
h	YES	YES	YES	
m	YES	YES	YES	YES
l	YES		NO	YES

Group	Tasks unrelated to each other	Did not provide further understanding		
h				
m	NO	NO		
l	YES	YES		

UNIT 4:

Group	Content too diverse, not focused enough	Not enough detail	Putting environmental issues together possibly confusing	More participation from tutor needed
h	YES	YES	YES, NO	YES
m	NO	NO	NO	YES
l	YES		YES	

Group	Did not gain very much from this unit			
h	NO			
m	YES			
l	YES			

Completed binary paradigm worksheets for General Course Comments:

Group	Read other learners' comments and responded to them	Tried to give relevant personal knowledge	Learnt new information from other learners	Not enough participation
h	YES	YES	YES	YES
m	YES	YES	YES	YES
l	NO		NO	YES

Group	Learnt about environmental subject from other learners, not reference material	Not enough people used tutor's expert input	Too much content for time available	Not enough background information given
h	YES	YES	YES	YES
m	NO	YES	YES	NO
l	YES	NO		

Group	Content should be less general, more tailored to individ-ual organisations	Content provided an effective overview of subject	Enough detail provided to ensure more complete understanding	Made good use of course resources
h	YES,NO	YES	NO	NO
m	NO	YES	YES	YES
l		YES		NO

Group	Course was enjoyable	Very interesting and ambitious course	Good way to raise environ - mental awareness	Biggest problem was getting the technology set up
h	YES	YES	YES	YES
m	YES	YES	YES	NO
l	YES			NO

Group	People couldn't give enough time to course, as it took low priority	Frustrating problems with system throwing them off line	Conference system was not user friendly	Should have more formal monitoring and tutor feedback
h	YES	YES	YES	YES
m	YES	NO	YES	YES
l	YES	NO		

Group	Formal teaching should be included to promote conf - erence discussion	Include regular in house present - ations to discuss course as it progresses	Measures to ensure more participation should be taken	High interaction learners should be grouped together early in course
h	YES	YES	YES	YES
m	NO	YES	YES	YES
l		YES	YES,NO	

Group	Library should have more background information	Banner at top of screen should inform learners of current location in conference	Not enough tutor participation	More support faxes needed
h	YES	YES	YES	YES
m	YES	NO	YES	NO
l			YES	

Group	Good potential for exchange of ideas, experiences	Most valuable aspect was having no set study times	Overall course was good, well - planned	Conference structure was necessary
h	YES	YES	YES	YES
m	YES	NO	YES	YES
l		NO		YES

Group	Computer conferencing was easy to understand	Gaining access to computer was often difficult	Course made good use of technology	Discussion should also take place between learners from different groups
h	YES	YES	NO	NO
m	YES	YES	YES	YES
l	NO		YES	

Group	Course a good way to get used to computer conferencing	Most valuable aspect was that it could be done at place of work	Disliked having to go through uninteresting material	Tutors should initiate discussion
h	YES	NO		YES,NO
m	YES	NO	NO	NO
l	YES	YES	YES	YES

Performing a theme analysis

Having performed domain, taxonomic and componential analyses on the information gained from the learner interviews the last stage was to perform a theme analysis. The intention of this final stage is to summarise the findings in such a way as to ensure that they are useful in the evaluation of the EA course. To achieve this goal, the results of the componential analysis were considered in relation to the comments recorded at the end of the domain and taxonomic analyses. From this summary, statements were created outlining the opinions of those interviewed, identified through the developmental research sequence. Each of the dimensions of contrast within the paradigm work sheets were considered in turn. Summary statements were then created by relating the dimensions of contrast to the interview comments.

Findings

Results of theme analysis of learner interviews

The following themes were identified from the analysis of the comments:

For Unit 1:

Of those interviewed, opinion was divided as to whether greater detail was needed in the content of this unit. One of the recommendations made was that exercises which led the learner through each step of procedures were

vital to familiarise them with the computer conference system. All of those interviewed considered that this initial introduction was a vital element of the course as a whole. (It should be noted that some of the other training courses delivered as part of the Multimedia Tele-School project did not include this element in their course programme. Many complaints were made by learners involved in those courses.) Members of the high and medium usage groups interviewed felt that this part of the course needed to be more comprehensive. Some indicated that there was just enough information to start working with the computer conference system but that greater detail, for instance how the system worked, would have been useful.

For Unit 2:

All of those interviewed suggested that the idea of a role-play using the computer conference system was a good way to get people using it; many suggested that the way the role-play was structured promoted shared learning by requiring input from all involved. The content of the role-play was emotive and promoted thinking about aspects of the environment which would not normally be considered. This potential was not realised due to low participation, both in terms of numbers of people getting involved and the frequency of their involvement. It was pointed out that the Easter holiday occurred right in the middle of this unit. The fact that the role-play took place at the beginning of the course when many involved had little knowledge of environmental matters may have contributed to the lack of participation. One of those interviewed suggested that the role-play should have continued throughout the course, acting as a forum to test the new

knowledge gained as the course progressed.

For Unit 3:

Most of the comments about this part of the course related to either its content or schedule. There were many positive comments made about the content of this unit of the course. Some of those interviewed remarked that the way in which it required reflection on one's personal reasons for environmental concern was good. All of those interviewed felt that it was interesting to see environmental legislation in a historical context.

It was commented that the content of this unit seemed to be based around providing factual information and listing events. There were also a number of negative comments about this unit of the course. All of those interviewed indicated that there was not enough learner participation during this unit, leading some to say that it may have been the breaking point for the course. Suggested reasons as to why the participation in this unit was so low were that there were too many unrelated tasks and it was not made explicitly clear within the tasks how the computer conference was to be used. The resource material in the course booklet for this unit was too lengthy and so often did not get read. It was suggested that because of this, people found the tasks to be difficult.

For Unit 4:

Comments about Unit 4 of the course indicated that the content of this unit was too diverse. This unit tried to provide an overview of the different procedures employed by organisations to satisfy environmental legislation. Some of those interviewed suggested that putting environmental issues together was confusing and that it would have been better to provide greater detail by concentrating only on the procedures directly relevant to their company. It was also mentioned that, due to the complexity of the subject matter of this unit, there was a need for more participation from the tutor.

For general course comments:

All of those interviewed commented that the course provided an effective overview of the subject. They also said that they found the course enjoyable, this was reportedly reiterated in discussions one of the interviewees had with other people on the course from their organisation. Some of those interviewed said that they felt that the idea of such a course was interesting and ambitious. They went on to say that in their opinion it was a good way to raise environmental awareness within Europe's workforce. They went on to express the opinion that they felt there was good potential for exchanging ideas and experiences during a course of this nature. Some of those interviewed said that the way the course was constructed made good use of the technology and that it was a good way of introducing people to computer conferencing.

Most of those interviewed said that they would read other people's comments before making their own. They went on to say that they tried to give relevant knowledge from their own personal perspective. Many of those interviewed indicated that they learnt new information from others and that this was a valuable aspect of the course. Sharing ideas would have been more effective if the level of participation throughout the course was higher.

General problems with the course were also identified by those interviewed. Some suggested that there was too much content in the course for the time available. Others suggested that there was not enough information to ensure that people could 'speak' with authority and thus would not comment in the computer conference discussions. All of those interviewed suggested that there was not enough participation from the course tutors. It was identified that there was often difficulty for the learners in gaining access to a computer which would allow them to log on to the host. All of those people interviewed complained about the computer conference system. In some instances there was a problem with learners' computers being automatically disconnected from the host, allegedly due to bad phone lines. All of those interviewed said that they felt that the conferencing system was very user unfriendly. A reason for low participation identified by all of those interviewed was that, as participation was voluntary and led to no formal qualification, it took a low priority in their working day.

Suggestions were also made by those interviewed as to how the course might be improved. Such suggestions included incorporating seminars

within each of the organisations involved as part of the course structure. It was suggested that this would reinforce what was being discussed on the computer conference system, it would also provide an opportunity to focus relevant aspects of the course to a specific working situation. It was also suggested that the study groups used throughout the course exaggerated the low participation problems. Those who were active participants in the course were spread throughout all of the study groups. This meant that, rather than having a few groups which were working well, there were many groups with only a few active participants in each. Two suggestions were made to remedy this: the first involved re-grouping those actively involved at an early stage of the course, the second involved promoting inter - discussion between groups. To facilitate early discussion within the groups, it was suggested by some of those interviewed that the course tutors should initiate the computer conference discussions.

From the interviewer's point of view, the most commonly recurring comment was that if the course were to be repeated then the priority must be to ensure high levels of sustained participation.

Discussion

It has already been mentioned in the introduction to this chapter that this part of the EA course evaluation aimed to identify some of the learners retrospective opinions relating to all aspects of the course. In order to make value judgements relating to the EA course, it is necessary to discuss all parts of the EA course evaluation together. For this reason the next and final

chapter discusses the comments identified within this part of the evaluation in relation to all of the other parts of the evaluation before drawing final conclusions which were used to construct the secondary knowledge base of recommendations for course implementation. To avoid unnecessary repetition, the above findings are only discussed briefly here, with further more detailed discussion in the next chapter.

From the comments made, it was inferred that greater attention was needed during construction of the course content, to ensure that it was applicable to the learner's personal situation, comprehensive but at the same time concise and stimulating to motivate and ensure participation. It was also considered that sustained learner participation was needed to ensure that the computer conference discussions were lively and promoted the sharing of ideas between those enrolled on the course. The comments made during the interviews suggested that further consideration to learner motivation and commitment was needed during the EA course to facilitate sustained learner participation. Possible methods to achieve this were suggested as; supplementing the distance elements of the course with regular face-to-face meetings to promote learner cohesion and minimise the possibility of learners feeling isolated or alone. It was also mentioned that providing some form of qualification at the end of the course may help to stimulate the learners to be active participants, as they would have some reward for their efforts.

The positive responses relating to the learners' enjoyment of the course and their opinion that this form of education offers good opportunities for trans-

European education was taken to indicate the value of such courses. Some of the learners interviewed indicated that, in their opinion, the full potential of this form of education was not realised by the EA course even though it was, overall, a valuable learning experience. For the researcher, these comments suggest that developmental research of this nature should help to ensure that in the future, the 'potential' of such training is better realised.

The next chapter of this thesis will discuss the learners' comments in relation to the course construction and other parts of the course evaluation in order to suggest how one might aim to realise the potential of this form of education.

Discussion

a

Chapter 15

Discussion of the Evaluation and the Secondary Knowledge Base

This chapter begins with a brief reminder of the primary knowledge base and the EA course construction methodologies which were outlined in Chapter 7 and discussed in detail within Appendix A(i). Following this, a discussion of its evaluation is presented. Conclusions are then drawn by considering the issues of the EA course and relating them to the findings of the evaluation. Finally, this information is used to construct generic recommendations of issues and methods for future implementation of distance education courses. These recommendations are referred to as the "secondary knowledge base" for distance education using multimedia technology.

The secondary knowledge base intends to provide a framework for further research identifying a number of issues for future consideration. Throughout this chapter, issues to facilitate further study which have been identified as a result of this research are also presented.

A reminder of the course construction and primary knowledge base

The process of constructing the EA course involved an initial stage of reviewing case studies of other distance education courses. This information is referred to as the 'primary knowledge base'. The primary knowledge base focuses upon issues for consideration when creating distance education courses of this nature. This tentative set of criteria helped in the construction of the EA course. Following this, the evaluation of the EA course assessed the approaches taken. In order to consider what has been learnt through the evaluation of the EA course, it is useful to summarise the points drawn from the case study evaluations (Chapter 6), which form the primary knowledge base for construction of the EA course.

The areas identified by consideration of case study evaluations were categorised into four groups, those relating to: the learners, the tutors, the technology used for course delivery and the course materials or resources.

With respect to the learners, an important factor identified was that of 'support for their activities'. This support should come from the tutors - who should be accessible to the learners - and from the course coordinators and technology coordinators. In addition to this, a cohesive working atmosphere between the learners needs to be actively promoted in order to allow the learners to provide reciprocal support for their peers. Further to learner support, it was identified that the course must be stimulating in order to encourage communication and sustain interest. It should include specific

activities which require participation.

With regard to the tutors, it was identified that problems had been encountered in the past with tutors being overloaded with work. The tutors were acting as distance tutors in addition to their normal teaching duties. It was inferred from the case study reports that the part-time commitment of the tutors, compounded with the use of inappropriate strategies to avoid work overload, led to the tutors not giving the learners enough attention. This in turn resulted in learner dissatisfaction. Taking this factor into consideration, it was established that strategies which would allow the learner to work with greater autonomy were valuable. It was also considered necessary to ensure that the tutors were aware of the scope of possibilities that the technology offered, in order that they could exploit them.

As far as the technology used for course delivery was concerned, any problems encountered with the technology needed to be dealt with as rapidly as possible to ensure that they did not impede the learning process. However, it was anticipated that the technology often does not function as intended and therefore contingency plans had to be constructed before the course began, in order to minimise effects on the learning process. Where possible, the technology should be used to cater for the needs of the teaching-learning situation, and not the other way round.

Finally, it was identified that the course material should provide all of the relevant information which the learner was likely tò need. This information was to be self-explanatory where possible and, above all, interesting to the

learner. The arrival of the course material had to be punctual in order to avoid delaying progress of the course.

The issues summarised above formed the basis of knowledge for construction of the EA course. Chapter 7 describes how the EA course was constructed taking these identified issues into account. Providing the support, interaction and cohesive working atmosphere which may have been lacking in the past was a necessity, in order to be responsive to the learners' needs. The course design should be responsive to the tutors, allowing them to work effectively as educators in the new and perhaps unfamiliar environment. It should also be responsive to the restrictions and opportunities presented when using multimedia technology for this form of education (see Chapter 3).

During the construction phase of the course, three working areas were identified: preparation, working structure and generation of course materials and learner tasks. Preparation of the EA course included an initial period of training for the course tutors (including the researcher) in use and application of the technology to be used for the course. In order to satisfy the perceived need for providing a familiar working structure for the learners, the notion of the virtual study centre was generated. The virtual study centre made use of a feature of the computer conference system which allowed separate areas of the host computer's memory to be used for conferences (Appendices A(i) and A(ii)). The separate areas were constructed to reflect a similar structure in a traditional study centre. Finally, a special coding system for the learners' login ID's was

implemented to facilitate interaction and cohesion between all learners and tutors involved in the EA course.

The generation of the resource material and the learner tasks was the final working area identified in course construction. The resource material, "the learner study pack", consisted of hard copy material in the form of printed sheets and a course booklet (Appendices A(i) and A(ii)). This booklet was intended to provide all of the 'background' information which the learner would need to work effectively on the course tasks. It was intended that the booklet would include this resource material and that the computer conference system would then facilitate shared learning between the learners, by allowing them to communicate and thereby work collectively on the tasks. The learner tasks were designed specifically to promote active participation in shared learning, drawing on the information in the course booklet but stimulating contributions from each of the individuals involved (Appendix A(i)).

The content material of the EA course was split into four units, each interlinked with the others but considering a different subject area. The teaching strategies adopted within each of the units of the course differed, ranging from the use of role-play to the use of models, as well as more didactic approaches (see Chapter 7). A support structure for the learners was implemented for both the course provision and the technology used. During the delivery and after the completion of the EA course, a number of evaluation methods were used to gain insight into the effectiveness of the implementation of the course.

The outcomes and problems from the EA course evaluation

This part of the discussion aims to examine the findings of the evaluation of the EA course. It begins by exploring the outcomes and limitations, then goes on to relate the findings to the initial aims of this work.

Outcomes of the evaluation

Through the implementation of a multi-method approach to the evaluation of the EA course, four 'forms' of information were derived: *context descriptive*, *quantitative descriptive, quantitative analytic* and *qualitative analytic*. These different forms of information build upon each other to generate the information used to make judgements about the EA course and its attempt to promote effective distance education.

Context descriptive information is used to describe the information derived from the profile of the organisations involved in the EA course, as well as the results of the questionnaires sent to the individuals enrolled on the course. The information provided by these two sources gives a limited summary for the demography, distribution, past experience and preconceptions of the learner group. It allows the evaluative findings of the EA course to be considered in the 'context' of those involved in the course.

Quantitative descriptive information was derived from analysis of the computer conference activity and the rating scale evaluations applied to the

computer conference printout and obtained during the learner interviews. The results of these analyses were in the form of numerical data. This numerical data was presented in tabular or graphical form to 'describe' the outcomes of the EA course, ie. the amount of conference usage or the extent to which intended learning outcomes were reflected in the conference discussion. This descriptive statistical analysis was used to form hypotheses relating to the EA course.

Quantitative analytic; wherever possible, hypotheses derived from the quantitative descriptive data were tested for statistical significance. This analysis was used to substantiate the conclusions drawn from the descriptive data. In addition to this, it included analysis of the relationships between sets of descriptive data to gain further information. The information derived through analysis of the quantitative descriptive data forms the latter part of the previous chapter.

Qualitative analytic information was derived though the ethnographic evaluation of the comments made by the learners during the interview sessions. The findings of the final stage of the evaluation involved a theme analysis of the learners' comments. The results of this theme analysis were used to triangulate the findings of the quantitative evaluation. They were also used to provide greater insight into the learners' opinions of the course.

Problems with the evaluation of the EA course

To recapitulate, the EA course, delivered as part of DELTA's MTS project, involved around thirty project partners with an overall budget of six million ecu. This research constitutes a relatively small component of the project as a whole and this has certain implications in terms of its priority within it (see Chapter 1). As this research had to operate within the much wider context of the MTS project, it was not possible to re-orientate course activities to suit the evaluation. The research had to take place within the time schedule and structure of the MTS project. In addition to this, the learners involved in the EA course were busy people working in industries spread throughout Europe. The spatial distribution of the learner group throughout Europe, coupled with their full time work commitments, generated a number of restrictions on the opportunities for evaluation. However, it is the opinion of the researcher that these restrictions are outweighed by the opportunity to research the real life situation of a course of this nature (see Chapter 9).

Discussion of the findings of the EA course evaluation

This section of the discussion considers the findings of the EA course evaluation. The findings are discussed by relating them to the issues considered and strategies employed in the construction and implementation of the course.

Discussion of findings relating to Unit 1

For Unit 1 of the course, the course booklet includes a chapter relating to computer conferencing. This chapter contains information describing the concept of a computer conference system, the notion of the virtual study centre and a user guide for the CAUCUS computer conference system. The learners were asked to study this information and then complete three tasks. Completion of the tasks would involve carrying out the basic procedures required to communicate using the conference system. Those involved in the course were given two weeks to carry out these tasks; this was considered to be more time than required to resolve any problems which might arise. Preceding this two week period was a satellite broadcast which discussed all of the issues contained within the associated chapter of the learner booklet, although this was only watched by 10% of the learners on the course.

The initial questionnaire, sent to all of those involved in the course as part of the study pack, indicated that 49% of the respondents had no prior

knowledge of computer conferencing systems. Further investigation during telephone conversations on the course's technical support line suggested that assumed previous knowledge was often quite limited. In addition to this, 88% of the respondents to the questionnaire indicated that they enjoyed learning how to use new technology, 70% also indicating that they found it relatively easy to learn about the use of new technology. These factors indicate that those involved in the course not only had a significant amount to learn about the subject material of Unit 1, but also that they were likely to enjoy learning it. This hypothesis is further substantiated by the fact that they would need to learn about the subject matter of Unit 1 if they were to communicate effectively using the system. It must also be pointed out that 88% of the respondents to the questionnaire gave an indication that they were initially enthusiastic about taking part in the EA course.

Taking all of these factors into account, it is perhaps not surprising that Unit 1 consistently gained the highest rating values of any of the four units within the course. But it is clear that it is not possible to isolate the causal effects of teaching and learning strategies alone without wider consideration.

During the interviews with the learners it was indicated by many that this unit of the course was, in their opinion, a vital element. Considering that a substantial proportion of them had limited knowledge of computer conferencing and that such knowledge was vital for the EA course to work effectively, this was perhaps not surprising. However, it was also indicated that the first unit of the course needed to be more comprehensive to ensure a

complete understanding for all those concerned. Further attention was needed to provide greater detail on how the technology underlying the computer conference system worked in practice. During the course construction, this was not considered relevant, as those involved did not necessarily need to understand how the technology functioned but how to use it in the context of the EA course. The learners involved in the EA course were not asked whether the inclusion of such information would have been useful. At the time of creating the course, it was considered important to keep the technical subject material as simple as possible. As the course was constructed and delivered within the MTS project's time schedule, there were certain time constraints which precluded the opportunity to research thoroughly the content of the course material to ensure that it was as appropriate as possible. It is possibly true to say that, in this case, the endeavour to keep the technical subject matter as simple as possible left some questions unanswered which should have been dealt with. The conclusion that, where possible, course content should be pre-tested as extensively as possible and subsequently adapted to suit the target audience's needs can be derived from this.

Discussion of findings relating to Unit 2

The teaching strategy used for Unit 2 was to use a role-play, where the medium of communication was the computer conference system. The scenario for the role-play was that of an environmentally sensitive hotel development. Each of the learners, within each of the study groups, was assigned a different role at the beginning of the unit. The learner handbook

(Appendix A(i)) gave details on the different areas within an environmentally sensitive region. A map showing the region (named 'Puedam') was also provided within the learner study pack (Appendix A(ii)). Using the map and background reference material given, the learners were asked to discuss, in their respective roles, the most suitable location for a hotel development within the region. By discussing this hypothetical situation, it was intended that the learners would identify some of the relevant environmental issues (see Appendix A(i) for further detail).

In terms of the extent to which the intended learning outcomes for Unit 2 were realised in the computer conference discussions, this unit was awarded on average the second highest rating value for all learner groups. With 43% of the total interaction elements logged by the host computer during Unit 2, which constituted 30% of the course's duration, this unit had the highest amount of interaction, by at least 50%, than any of the other units.

The figures quoted above may indicate that adopting a role-play teaching strategy leads to greater levels of interaction between the learners than in the other course unts. Considering the summary of results 2 in the previous chapter, there was a statistically significant increase in the extent to which the conference discussions reflected the learners' own levels of understanding in the *h* group (*the group which logged most discussion elements*). This reinforces work by Nethal (1986) which concluded that, in order for effective knowledge transfer to take place in open discussion, the conversation should reflect as closely as possible the understanding to be transferred. This leads to the hypothesis that adopting a teaching strategy

which promotes learner participation and communication, such as role-play, contributes to ensuring that there is the maximal possibility for information transfer and shared learning.

Consideration of the findings for all three of the learner groups interviewed indicates that there may be some form of relationship between the amount of interaction and the extent to which the learner's knowledge level is reflected within the discussions. Further research should consider whether this is a linear or exponential relationship, and perhaps ascertain threshold levels required for effective information transfer to facilitate shared learning.

Those learners interviewed expressed the opinion that they felt that the use of role-play helped ensure high levels of interaction using the computer conference system. It was also indicated that, in the opinion of those interviewed, the full potential of the role-play was not realised due to inadequate participation. This apparent contradiction may be explained by considering the fact that although relatively short, Unit 2 had the greatest amount of participation. Overall participation in the course was low, with an average of less than one interaction element relating to the course tasks per learner every two weeks . It would appear that, although certain teaching strategies seem to be helpful in stimulating greater learner interaction, they alone will not ensure high levels of learner participation. A further point made by one of those interviewed was that greater potential may have been achieved by allowing the unit to run throughout the duration of the course. This would allow the learners to 'test' out their new knowledge as they

gained it and offer a greater period of time to explore the subject material of the role play. This suggests three things, namely that: appropriate teaching strategies may increase learner participation; there was a need to ensure greater participation from the learner group as a whole; and that the sequential, modular approach to course delivery was perhaps not the most suitable.

Discussion of findings relating to Unit 3

For Unit 3, the course booklet included resource materials in the form of texts and diagrams relating to the subject of European environmental legislation. The learners were requested to study this material and then complete tasks relating to it. The structure of these tasks was somewhat different than that used in the other units of the course. Rather than using the learner groups established in Unit 2, it required learners to pair up in order to work collaboratively on the tasks for Unit 3. This process required the learners to contact each other in order to establish a working partnership before beginning their work.

From the analysis of the computer conference discussions, Unit 3 of the course consistently gained the lowest average rating value for all of the learner groups. At 11%, Unit 3 also had the lowest proportion of activity of all of the course units. The average number of interaction elements logged by the conference system per learner during Unit 3 was 0.33 per week. This constitutes less than one third of the average for each of the other units. The fact that Unit 3 scored the lowest rating values coupled with the lowest

learner activity may have been influenced by a number of factors.

The learners interviewed indicated that changing the working structure in the way described above, from the pre-assigned groups of Unit 2 to the self-assigned pairs of Unit 3, caused certain problems. In addition to the time taken to complete the course tasks, they had to spend time organising themselves into pairs. During the initial course construction, this was not considered likely to cause any problems. However, the greater proportion of the learners interviewed expressed the opinion that, due to the overall low participation in conference discussions, it was too difficult to identify a suitable working partner. This problem was compounded by the fact that many people were not logging onto the system on a day-to-day basis and therefore it often took as much as a week to establish a working partnership. As Unit 3 of the course was scheduled to run for three weeks (compared to the four weeks allocated for Units 2 and 4), losing a week meant that one third of the allotted time was taken up with organisational matters. During the course construction, this problem was not anticipated and subsequently no time was allotted for it.

Once the working partnerships were established, the learners were asked to complete four tasks, each of these tasks requiring communication. The expectation for these tasks was that at least three information exchanges would be necessary between the partners. The term 'information exchange' is used here to describe an initial text sent electronically from one partner to the other with a response returned. For Units 1 and 2, the approximate time for such an exchange proved to be at least three to four days. It is possible

therefore to estimate that, working at the same rate and allowing one week to organise a working partnership, it would take in excess of eight weeks to complete Unit 3 alone.

These statistics indicate that one possible explanation for the apparently low level of interaction and low rating values may have been due to incompatible tasks and/or time scheduling for Unit 3. During the interview discussions with learners from the course this theory was further substantiated.

Comments made during the interview indicated that Unit 3 of the course had two major areas for concern: the tasks associated with the unit were too complex for the time allotted and the change of working structure from groups to pairs caused problems. This, coupled with the fact that some of those interviewed indicated that the resource materials in the course booklet were too lengthy, leads to the conclusion that the unit required too much in terms of work commitment for the learner group. Members of the *h* group - who were interviewed indicated that they felt that the resource material associated with Unit 3 was in fact the most in-depth and valuable of the whole course. It was also confirmed by those interviewed that, given the low levels of commitment from the learners involved in the course, it was unrealistic to expect so much from them. During construction of the course there was little indication of how much commitment there would be from the learners.

It must be emphasised that this evaluation gives no indication of how

successful this unit would have been had there been greater participation from the learners. This unit was considered to be the least appropriate, in terms of learner workload. However, this may simply highlight the fact that there was a need for greater learner participation overall.

Discussion of findings relating to Unit 4

The teaching strategy used for this unit required learners to examine texts within the course booklet which gave outline descriptions of four environmental procedures. Learners were asked to consider the working practices of their own organisation and prepare a text describing the likely issues if their organisation were to undertake the processes described. Following this, they were asked to consider a fictitious company which was to have an environmental audit. Each of the members of the learner groups was asked to consider a different aspect of the process and to discuss it between themselves as if they were a working party carrying out the audit.

During the interviews, some learners indicated that the problems with Unit 3 of the course may have affected participation in Unit 4. An examination of the results of the evaluation of learner participation for Unit 4 indicates that there was an increase of 130% in the number of interaction elements during Unit 4 compared to Unit 3. This significant increase would perhaps contradict the preceding statement. However, Unit 4 also had 60% fewer interaction elements logged than Unit 2.

A similar pattern is shown by the fact that the average rating values for Unit

4 of the course were consistently higher than those for Unit 3, but consistently lower than Units 1 and 2. From the rating scale values obtained through interview, Unit 4 obtained the lowest difference between pre- and post-course ratings. This difference was used to give an indication of the change in perceived levels of understanding due to participation in the EA course. Considering that this unit had a greater level of computer conference activity, the expectation was that there would be greater increase between the pre- and post-course ratings than in Unit 3. However, telephone conversations with the learners suggested that many of those interviewed already had a substantial knowledge of environmental procedures, whereas they indicated that they knew relatively little about environmental legislation (the content of Unit 3). This suggests that those interviewed had relatively little to learn about environmental processes. This notion is further substantiated by the fact that, although the difference between pre- and post-course ratings for Unit 4 was lower than for Unit 3, both the pre- and post-course ratings were relatively high in Unit 4. The fact that this unit did not appear to provide much gain in understanding may therefore be considered as evidence that the unit was not constructed to suit the needs of its target audience.

The EA course was constructed to give those involved an overview of environmental issues and to introduce them to the concept of using computer conferencing for distance education. Comments made by those learners interviewed indicated that the content of Unit 4 was too general in nature, and not related to the individual's specific situation sufficiently to be of any substantial value. It was also indicated that trying to cover the

number of topics was confusing to some of the learners. The combination of these two points highlights the fact that the individuals taking the course were not expressly asked about their specific learning needs before the creation of the EA course. It was further indicated that, as a result of a certain level of confusion due to the diversity of subjects covered in Unit 4, the need for greater tutor participation was even more prevalent.

Discussion relating to the course as a whole

Learner participation

Considering the course as a whole, perhaps the most obvious problem with the course was with the levels of learner participation. The average number of recorded logins per learner was less than one per week. Examination of the summary of the analysis of the conference activity indicates that it is clear most of the conference discussion was provided by a minority of the learner group. This research did not make any comparisons between how the interaction using the computer conference system compared with a similar situation where the people met face-to-face. However, research undertaken by Stone & Elwin (1982) indicates that, in terms of a small number of people contributing the majority of discussion, there are similarities between a face-to-face discussion and the computer conference discussions of the EA course.

The overall trend for the amount of learner activity for the course was downward. Respondents to the initial learner questionnaire indicated that

they were more enthusiastic about taking the course because it was different to other training courses they had taken. The overall downward trend of conference activity may have been due to the fact that over the three months of the course the initial enthusiasm waned. During interviews some learners indicated that frustrations with the 'unfriendly' interface of the computer conference system may also have had an affect on the sustained levels of conference activity. Even though the overall trend of learner activity using the conference system was downward, there is a pronounced fluctuation, with a sharp drop during Unit 3.

The rating scale evaluation

Using the rating scales as a measure of the level to which the intended learning outcomes were reflected in the conference discussion, it was possible to calculate an overall average rating scale score as a percentage. This overall percentage was 40%, as indicated in the previous chapter. This overall rating score perhaps reflects the relatively low level of learner participation in the conference discussions. Only considering those learners who made high usage of the computer conference system, the *h* group, an average rating score of 82% was awarded. This further substantiates the notion that there was the necessity for increased learner participation in order to achieve greater 'success' in terms of achieving the intended learning outcomes.

The rating scales derived through interview combined three values, a pre-course rating value, a post-course rating value and a rating value derived

through analysis of the computer conference discussions. Comparing the ratings made from the conference discussions and those intended to reflect the learners' post-course knowledge, the *h* groups conference discussions consistently reflected their actual knowledge level more closely. If shared learning is to take place, the discussions in the conference would need to convey the messages to be shared. In this case, these messages would be the learner's knowledge about environmental issues.

From the case study evaluations of the *h, m* and *l* groups it would appear that greater participation leads to the conference discussion reflecting this knowledge more closely. Further research should attempt to identify any possible relationship with knowledge transfer and levels of interaction when using a computer conference system. This further research should build upon this and where possible compare with face-to-face interaction, to examine the effects of the asynchronous nature of communication using computer conferencing. It should try to quantify the observed relationships to provide guidelines for those wishing to stimulate a certain level of shared learning. It should identify a possible 'cut off' point above which discussion becomes banal or repetitive.

Interviewees' general opinions of the course

It was encouraging to the researcher that all of those whose opinion was known expressed that they enjoyed taking part in the EA course and found it in some way rewarding. The concept of trying to provide a shared learning situation for distribution of knowledge between industries within Europe

was also reportedly well thought of by all those involved. The opinion expressed by a number of those involved in the course during research and informal discussions was that there was great potential in the concept of using technology for distance education. It was also expressed that this potential was not fully realised, primarily due to the low participation of the learners. Although the statistics indicate the low learner participation, it was made clear by comments of some learners that in certain instances greater participation was needed from the course tutors. This highlights the need for further research into what is needed from a course tutor in terms of commitment, skills and involvement.

It was also clear that in some instances learners felt intimidated by their peers' obvious superior knowledge of certain subjects. It was hoped by the researcher that this would not play a major role, as the computer conference system would act as a 'buffer' which would allow freedom from this type of constraint, through anonymity. Further research should examine the effects of hierarchy on such communication. It was identified that the technology itself was intimidating for some of the learners which only served to compound the problems of low participation. Further research should also evaluate the extent to which familiarity can overcome the feeling of intimidation for the learner using the technology. It should also aim to quantify time scales needed or appropriate practices to ensure that learners become accustomed with using the technology as soon as possible.

Working structure of the course

A final consideration was that of the working structure initiated for the learners, the study groups were constructed to ensure a cohesive working atmosphere. The rigid groups of ten learners were intended to allow learners to develop some familiarity with their peers as the course proceeded. From Unit 3 of the course it became clear that the group structure only served to segregate the active participants from those making little use of the conference system. As the course tasks required learners to share ideas, relying on each other's input, the learner group structure became a restriction rather than an asset. Reorganising the learner groups at that late stage in the course was not attempted, as it was considered that this would cause too much disruption. Some of those interviewed indicated that greater flexibility was needed in the structure of the course to accommodate the diverse learner group. However, it was also indicated that a working structure was essential to provide the necessary learner support.

Conclusions drawn from the evaluation of the EA course

The conclusions presented here fall into two categories; those which represent a summary of the preceding discussion and those which were identified as a result of action research within the researcher's role as EA course coordinator.

Conclusions derived from EA course evaluation

O Strategies implemented to allow the learners to work with near complete autonomy were successful in ensuring that tutors were not overburdened with work. However, more time created through the implementation of these strategies should have been devoted to provision of learner support (Chapter 14).

O The notion of employing concepts such as the virtual study centre to provide a familiar working structure similar to a traditional study centre proved useful, although it may have created certain learner expectations, such as the greater tutor involvement associated with face-to-face learning (Chapter 14). One learner indicated during a telephone conversation that 'the operational staff within the virtual study centre were seldom at their place of work' (Ellis; personal communication).

O Although there were no major problems with the computer conferencing technology, it was clear that many people were not 'comfortable' with its use. In some instances, this caused a problem with levels of participation (Chapter 10).

O The strategy used for the course construction was flawed in one major aspect, it did not consider 'flexibility' as a major factor. It was clear that employing a rigid structure of learner groups and sequential course units caused problems where low participation levels were not anticipated. Flexible working strategies, not solely reliant upon preconceived

expectations, would have been more effective (Chapters 11, 12 and 14).

O Time scales for learners to carry out tasks which require substantial learner group interaction must be greatly extended compared to traditional face-to-face teaching (Chapters 12 and 14). This factor should have been better catered for within the EA course and must be an integral part of any course structure.

O The overall participation of the course was less than was considered desirable in order to achieve the intended learning outcomes (Chapters 11 and 14). This may have been partly due to the experimental nature of the EA course as part of the MTS project. The overall impression of the researcher was that the inclusion of formal evaluation and subsequent certification may have provided a great deal of the motivation need to ensure sustained learner participation.

O Greater learner participation led to an increased level of shared knowledge, by ensuring that the conference discussion conveyed the learners' knowledge more accurately (Chapters 11, 12 and 14).

O Understanding of the learners' educational needs before construction of the course and during its delivery is important to ensure that the material is of greater relevance to their specific needs. Separation in terms of time and space requires that strategies for gaining this knowledge are necessary (Chapters 10 and 14).

O Different teaching strategies, such as the use of role-play, appear to promote greater learner participation (Chapters 11, 12 and 13).

O There may be a gradual lowering of enthusiasm for participation in such a course, which may be compounded by the extended time scales required for interaction. This must be anticipated, and strategies to minimise its effects implemented as part of the course structure (Chapters 11, 12 and 13).

O Learners must be aware of their responsibility to their peers in order for group learning and sharing of ideas to take place (Chapter 14).

O Learners' host organisations need to provide support for their learning activities by providing time and space for learning to take place. It was clear that in the case of the EA course, the expectation of the host organisation was that there would be no need for time to be made available. This was partly due to the marketing approach used for the EA course. It was clear that, although there may be a much reduced disruption to the learner's normal working schedule when compared with a residential training course, some allowance was needed in order for the process to be of any real value to the individual learners (Chapter 14).

O It must be made clear that sustained participation in conference discussions on a regular basis from all learners must be a primary aim in order for a course such as the EA course to be of the greater value. If this cannot be relied upon, there must be contingency plans to minimise any detrimental effects (Chapters 11 and 14).

O Learner motivation must be a focal area of concern; this is evident from the analysis of the conference discussion, part 3 of the evaluation, and also from the interviews, part 6 of the evaluation (Chapters 11 and 14).

O Resource materials for the course must appear instantly relevant to the learner tasks, providing information in a concise form (Chapters 10, 11 and 14).

O One should not consider the use of multimedia technology for distance education in isolation. Complementing a course of this nature with local group gatherings of learners was reported by one organisation to be of great value as a supplement to the distance elements of the course (Chapter 14).

Recommendations for future distance education using multimedia technology (the secondary knowledge base)

The research activities described in this thesis began with the identification of issues for consideration when delivering distance education of this nature. This set of criterion were collectively termed the "primary knowledge base" for distance education. These issues for consideration were derived through analysis of case study reports made by three organisations who had undertaken similar projects. The EA course was constructed to address the issues raised by these case studies. The findings of the evaluation relating to the EA course allows content of the primary knowledge base to be expanded upon. The following discussion represents a

description of the "secondary knowledge base", the formation of which was identified as an initial aim of this research.

The ideas which follow should not be considered as an ultimate model structure for the provision of distance education using mulitmedia technology. It is an attempt to take a step further and provide an operational structure for future research to work within or expand upon. It builds upon the primary knowledge base discussed in Chapter 6, taking into account the action research of involvement in the creation of the EA course, the evaluation of the EA course and documentation produced by WIK, the MTS project evaluators (Zippel, 1993).

The following discussion of the secondary knowledge base makes use of terms which have a specific meaning in this context:

Course project, this term is used to describe all activities relating to the planning, construction, implementation and support of a distance education course which uses multimedia technology as a communication medium.

Course actor (shortened to *actor),* this term is used to describe any person or organisation with some involvement in the *course project.*

Dynamic action domains (shortened to *action domains*), is used to identify related issues for consideration within the course project.

The secondary knowledge base includes five 'action domains' relating to the 'course project' as a whole. The diagram below indicates the inter-relationship between the dynamic action domains. It also identifies three sequential phases or stages to the construction and delivery of a distance

education course.

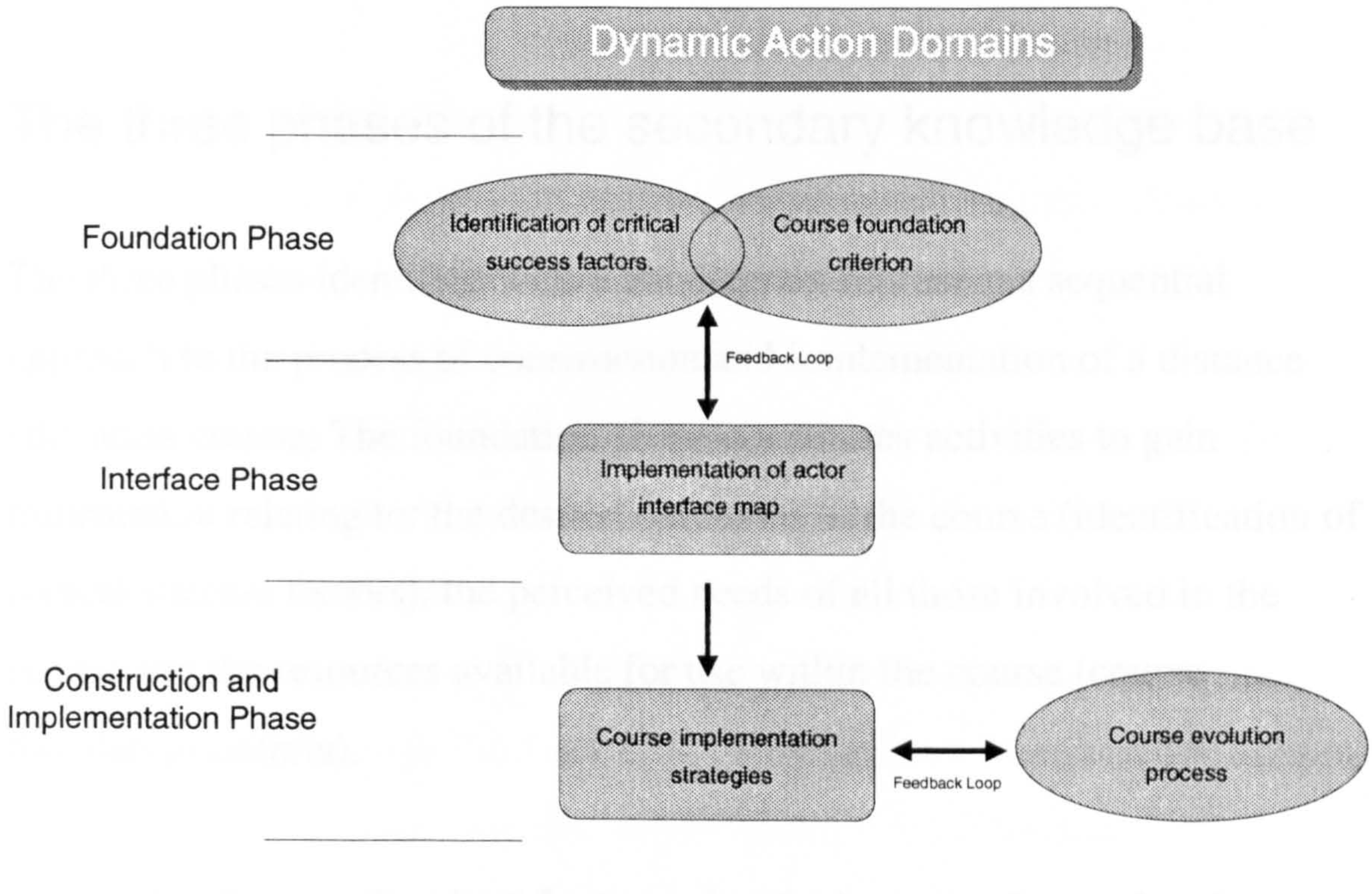


Figure 65: Diagram of dynamic action domains

The term dynamic action domain was created to indicate that there are identifiable areas for consideration which could be focused upon by those interested in distance education of this nature. Work undertaken within each of these areas, or 'action domains', should not be considered in complete isolation, but rather within the context of the whole course project.

This research has shown that there are many influencing factors within such a system and that many of these factors inter-relate. In order for each of the action domains to be successful, they must incorporate dynamic planning to ensure cooperation and integration between them. It is proposed that anyone wishing to undertake research in distance education of this nature should

consider the framework outlined above as a basis for evaluation, in order that they might build upon this work.

The three phases of the secondary knowledge base

The three phases identified within the diagram represent a sequential approach to the process of construction and implementation of a distance education course. The foundation phase constitutes activities to gain information relating to: the desired outcomes of the course (identification of critical success factors), the perceived needs of all those involved in the course and the resources available for use within the course (course foundation criteria).

Within the diagram the identification of critical success factors involves identifying, from all of the course actors, the desired outcomes but also establishing what potentially needs to be achieved in order to attain these outcomes. The cover term 'critical success factors' therefore relates to the operational and final aims of the course in addition to its operational objectives.

Linked to the critical success factors are the course foundation criteria. This area represents the information relating to the operational structure for the activities of the course. It should provide an audit of the resources which may be utilised within the framework of the course. The two areas indicated on the diagram are linked because identification of unexpected resources may provide further opportunities for inclusion within the critical success

factors and, conversely, the critical success factors may require further resources to be generated.

During this initial phase it should be possible to identify those people who will have an interest in the construction, implementation and outcomes of the course. These people are referred to here as the 'actors' in the course project. The second phase within the project plan outlined in the diagram involves construction of an interface map between these actors. As there are likely to be a number of actors, this phase will consider a communications network which should be mapped out diagrammatically between them. The main aim of this process is to establish appropriate communication links. An example of this from the EA course was that there was a communication link between the course provider, the technology provider and a representative in the learner's host organisation (Appendix C). In the diagram, a feedback loop is shown between the foundation and interface phases to indicate that the outcomes of each may affect the other.

Once all of the foundation information has been established and a communication network implemented, the next phase is the course construction and implementation phase. This phase relates to the activities of constructing and delivering the course, it also includes evaluation and adaptation, which should take place as an ongoing process.

The Dynamic Action Domains

Identification of critical success factors

The identification of critical success factors constitutes the formation of a list of descriptions of the main aims of the activities relating to the course. It will also include sub-lists, indicating 'sub-aims' required to achieve these main aims or 'critical success factors'. Following the identification of critical success factors it may be valuable to structure this list to give an indication of any sort of relationship or hierarchy which may exist between them. Wherever possible, any critical success factors should be presented to allow later evaluation of the extent to which they were achieved. There are likely to be a number of forms of critical success factors which are dependent on the focus of the course to be delivered. These may include:

- *Desired learning outcomes within the cognitive domain*

This relates to issues where actors within the project will gain knowledge due to participation within the course. This may concern understanding of specific issues which were to be taught by the course, or it may concern knowledge gained about the concept or process of provision of distance education.

- *Desired learning outcomes within the affective domain*

In some instances education aims to bring about changes in the learners' perceptions of an issue, which may lead to a change in their behaviour

relating to this issue. Research has indicated that this is often more difficult to quantify as an outcome (Fox, 1989). However, affective outcomes should be identified within a list of critical success factors and related to any other relevant success factors.

○ *Outcomes relating to motivation and commitment*

In some instances, the activities of the course may require certain levels of commitment from any or all of the actors in the course. Linked to this may be motivational support, for instance from the host organisation to the learners from that organisation. Expected levels of participation, commitment or motivation should be included as critical success factors. It is vital that critical success factors such as this are communicated to all actors within the course, in order to establish common goals.

○ *Outcomes relating to knowledge transfer*

A primary function of education relates to the transfer of knowledge, this may be between any of the actors within the course structre. If there are specific issues which are to be communicated, these should be included. It is unlikely that the specific details of the content of these issues are known prior to the course, as they will often relate to the transfer of knowledge about an individual's personal opinion or experience. For this reason, success factors included within this section are likely to be more generalised than in others. An example from the EA course is the transfer of knowledge relating the approach to environmental policy to each individual learner's own culture and/or organisation.

○ *Outcomes relating to ways of working*

It may be possible to establish that certain teaching or learning strategies are to be promoted as part of the overall strategy for the course. If there are strategies which are considered most appropriate, then they may be included as critical success factors and evaluated within the course project.

○ *Outcomes relating to evaluation or research activities*

As in the EA course, there may be identifiable research activities pertaining to the overall course project. Any intended research outcomes should be established during this foundation phase, with the understanding that there is a likelihood of additions or adaptations to them.

Course foundation criteria

Very much linked with all of the activities within the critical success factors' action domain is the identification of course foundation criteria. The course foundation criteria constitute a knowledge base which should identify all of the practical considerations relating to the course. They will include information comprising a profile of any organisations involved in the project, the expectations of all those with a vested interest and the issues relating to the technology.

○ *Profile of the organisations involved*

Each profile should include details relating to the operational activities and structure of the organisations, giving indication of their size, motivation and focal areas of activity. This overview of the organisation should be as brief

as possible but still ensure that all information considered relevant to the project is included. This information must be disseminated to all of the course actors to ensure that they all know who is involved in the project.

○ *Expectations of those involved*

Strategies to gain insight into the expectations of the course actors should be included within this action domain. These should aim to highlight prospective areas of cooperation between actors, or identify conflicts of interest which may cause problems later in the course project.

○ *A technology audit*

This should serve to provide two main areas of knowledge. It should identify the technology which is already in place, in order for it to be utilised for the course where appropriate. It should also identify skill levels within the actor group which may be utilised, or identify areas where assistance is required in order to establish the required skill level for all of those concerned.

Implementation of actor interface map

The activities of establishing the critical success factors and the foundation criterion will identify many of the actors in the course project. The next stage of the process should aim to identify any further actors who might be necessary to provide support, assistance or any other service which the course project may require. Having identified all of the actors in the course, the next action domain involves constructing and implementing an actor

interface map. The construction of an actor interface map involves identifying links between the actors. These links may represent cooperation in carrying out specific tasks, *cooperation links*. They may represent *communication links* which are needed to ensure that each member of the project team has all of the information they need to carry out their involvement.

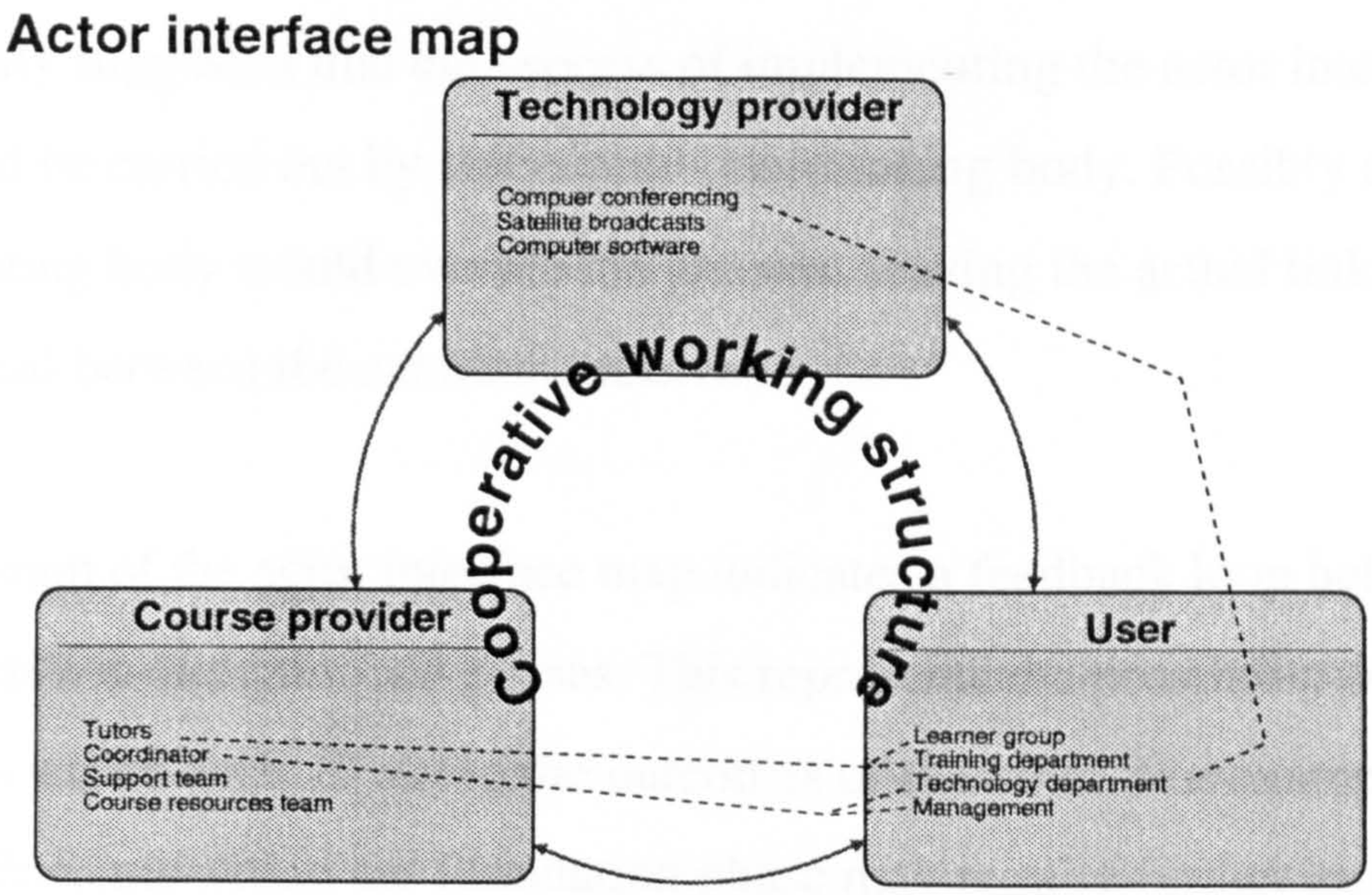


Figure 66: An example of an actor interface map

The diagram above represents a simplified actor interface map based upon a hypothetical distance education course similar to the EA course. It is not intended to be a complete representation of a full interface map but simply to give an idea of the form one might take. It identifies three organisations involved in the course project. The three organisations will be working collaboratively in the course project, the dashed lines indicate some of the

communication links to be established within the actor framework. The diagram includes a few sample links between actors, in a real map there would be many more links. In more complex systems it may be necessary to construct more than one interface map for clarity.

Having constructed the actor interface map, its implementation involves the organisation of the links represented in the map. This may involve setting up meetings between the actors, conferences to discuss issues relating to the course or simply providing contact addresses for those involved. It is not necessarily suggested that the process of implementing the actor interface map need be carried out by any central coordinating body. Possibly a coordinating body would oversee the process, leaving the actual links to be established between the actors themselves.

The diagram of the actor interface map indicates a feedback loop between the foundation and interface phases. This represents the possibility of activities within each affecting the outcomes of the other. For example, further elements within the foundation phase may require further input from external organisations; conversely, as new actors join the group new aims may also be identified. This developmental process of identifying the critical success factors, course foundation criteria and implementing an actor interface map are very much a planning stage for the construction and delivery of a distance education course.

Course construction and implementation

The construction and implementation action domain builds upon the initial planning phases by focusing on issues directly relating to the delivery of the course. These will include: the subject content of the course, teaching/ learning strategies to be used, support structure and time scheduling for the course. To be most effective, it is important to ensure that all actors have some involvement in this part of the course construction to ensure that no potential opportunities or problems are overlooked. There are a number of issues which need to be considered as part of this phase of the course project, each of these will have some actors whose input is most important. In order to clarify these areas for consideration and identify the primary actors each of them is discussed in turn:

- *Subject content of course*

The subject content should meet the needs of the learners in terms of being relevant to their professional or personal interests. It should strive to present the information in a concise format without loss of detail. It should aim to cater for learners with different pre-course knowledge levels. The course content should be decided upon through negotiation with as many of the learner group as possible and it should also include the host organisations in which the learners are based. Once established, the content should be publicised throughout the group of course actors for further comment and adaptation.

○ *Working structure for course*

This should be constructed to be as simple as possible, providing a flexible working atmosphere facilitating dynamic planning. If a structure is implemented which is analogous to a more familiar situation such as the virtual study centre used in the EA course, care must be taken to anticipate associated learner or tutor expectation which may not be met.

○ *Time schedule for course*

It must be taken into consideration that time scales within this form of education are likely to be much extended compared to those in face-to-face teaching. Opportunities for the learner to reflect on their work should be highlighted as part of the course structure. There may be the possibility that interest in the course activities will wane over time and strategies to counteract this must be identified.

○ *Support structure for course*

An efficient support structure must be put into operation which will deal with problems that learners or tutors might have. This support structure should provide support for the technology used during the course as well as general course work support. Identification of a prime contact for the learners must be made, possibly the tutor. Also a contact is needed for the host organisations, the course coordinator. The contact structure should be an integral part of the actor interface map.

○ *Motivation for participation.*

Course actors must understand the value of the course project in terms of its

outcomes. They must understand the importance and relevance of their participation. For the learners in particular, they must identify the reward they will gain from participation in the course in terms of their personal development.

○ *Time for learning*

An initial premise of this form of distance education is that it will have no impact on the tutors' or learners' working day. This is a fallacy, with no regular commitment for the learner or tutor there is little likelihood of shared learning or valuable discussion. Learners and tutors should be given time by their employers on a regular basis, to concentrate on the course. If they are working in their spare time, they must themselves identify this time.

○ *Place for learning*

Access to the required technology needs to be provided by the host organisation or identified by the independent tutor/learner. Preferably, the location of this technology should be somewhere suitable for study.

○ *Related educational activities within each learner site*

The inclusion of educational activities such as discussions, seminars and presentations by experts may enhance the learning experience. Organising local group meetings at appropriate times is likely to help learner cohesion and maintain motivation and participation in the course activities.

○ *Problem contingency plans*

As part of a dynamic planning strategy, possible problem situations such as technology failure within one of the learner sites or low learner participation should be anticipated. Strategies to minimise the effects of such problems should be identified before the start date of the course. In some instances it may be helpful to inform all those concerned of the possibility of such problems in order to avoid them occurring. It may also be useful to inform the learners of any contingency plans before the course begins in order to aid their effective implementation.

Having considered each of these areas in relation to each other, as well as in the context of the actor group and the course foundation criteria, it should be possible to create a course which exploits the resources available and which is appropriate to the needs of all those involved. It should be expected that with such a complex system, any final solution is likely to have some element of compromise.

Course evolution process

Thus far processes designed to ensure consideration of all aspects of course delivery have been discussed. The whole process is evolutionary in nature, with evaluation and adaptation at every stage. It may therefore appear somewhat confusing to identify a linked action domain titled 'course evolution process'. This action domain focuses on formative and summative strategies to evaluate the course, leading to adaptation either during its delivery or in subsequent deliveries. It may, as in the case of the evaluation

of the EA course, lead to the construction of recommendations based upon these evaluations. This thesis has discussed some of the problematic issues related to evaluation of such courses, as well as providing some strategies for the evaluation process. As the nature of the information required by any such evaluation is likely to differ from one course project to another it would not be possible to attempt to discuss all evaluation processes here. However, based upon the action research carried out within this thesis, recommendations for any future evaluation process would be:

- Evaluation should be an integral part of the course structure, it should be an ongoing process throughout the course delivery as well as following it.

- It should make use of both qualitative and qualitative processes, adopting a multimethod approach to allow triangulation between findings.

- At the time of writing, the cost in financial terms of such a project requires that it needs to be of a large scale in order to be cost effective (Zippel, 1993). As a result of this, it is likely to be complex in nature and therefore any evaluation should only focus on a specific detail, by considering it in the context of the whole.

This thesis has served to provide three things to anyone considering undertaking the delivery of or research into distance education of this nature. It provides an overview of the issues relating to distance education. This offers a research structure which allows any future researcher to build upon this work by focusing on specific areas, providing greater depth of

understanding. By using this research as a basis it may be possible to focus on certain issues in the context of the findings of this evaluation. Doing so will ensure that this work is built upon rather than simply repeated. This thesis also identifies evaluation strategies which may be used or adapted in future research or evaluation of such courses. Also, it offers a strategy based upon action research as to how one might instigate and evaluate a distance education course.

Chapter 16

Conclusions, Significance of the Research

Thus far the discussion has centred upon the specific findings of the evaluative research of the EA course. The researcher had an active role within the course construction and delivery as part of the DELTA MTS project. The purpose of this final section of the thesis is to offer the reader an insight into some key issues which were identified as a result of the research process.

A most important area of focus in any course, is the preparation and planning stage of the course provision (chapters 6 & 7). As distance education offered to a pan European audience has to cater for learners from a diversity of cultural backgrounds, the research highlighted that it was necessary to create a flexible structure for the course (Chapters 7 & 9). The course should be as adaptive as possible to ensure that strategies which are not working may be changed to suit the context in which the learning is taking place (Chapter 14). This in turn may require that monitoring mechanisms are put in place to identify points at which different strategies are adopted (Chapter 15). The research identified that, for the learner, computer conferencing is likely to be an unfamiliar working environment. The learners are therefore likely to develop and adapt ways of working and

communicating within it. As the learner adopts new strategies, a certain amount of flexibility within the course structure is needed to allow those involved in the learning experience to dictate how it is structured (Chapters 3 & 7).

Distance learning using multimedia communications requires that each individual involved takes a certain amount of responsibility and initiative for the learning process. The research identified that if the course constructed to offer a highly structured learning environment, then individuals may begin to rely upon this structure for their motivation. This may result in a loss of initiative from the individual (Chapter 4). Within the EA course, the learners involved in the course were professional people with the ability to take responsibility for their own learning. A learning environment was needed which allowed them to explore their own areas of interest and to take the initiative for their learning (Chapter 3). In order that this will take place, each individual needed to be able to identify the benefits and opportunities in taking part for themselves. If they can see value in their commitment and are given the opportunity to exploit the facilitating technology, the results are more likely to more prove rewarding the this research suggests (Chapter 14).

During the creation of the EA course, a certain amount of time was spent in discussion with the participating organisations (Chapter 7). This discussion aimed to provide a two-way information flow consisting of both information from the organisations to identify relevant content and a structure for the course, and information to the organisation relating to what

they could expect from the course in terms of process and outcomes.

In order to provide a framework for discussion, the researcher offered a possible scenario for the course structure based upon his own pre-conceived ideas (Chapter 7). The organisations involved would possibly have welcomed this, as it required less consideration and thus less time commitment from them. But by offering a predetermined course structure, important issues relating to the course creation may have been overlooked. In order to obtain more useful information it might have been better if the organisations should have been simply asked what they needed without being prejudiced by any pre-conceived solution. Whether this is practical in the real life situation is somewhat questionable, as the respondents would need to have some prior, unbiased knowledge about what distance training has to offer, in order to derive how it may be most effectively implemented within their organisation. However, this issue must be addressed if effective education is to be offered which satisfies the specific needs of the individuals taking part. One solution may be that a third party offers an overview of the functionality of the technology, to allow the participating organisations to identify for themselves how they may utilise it most effectively. The course coordinator could then, at a later date, meet with the host organisations to discuss a strategy for course implementation.

The research identified that a most important issue to consider is that the correct people should be in attendance of these preparatory meetings (Chapter 14). In addition to those who will participate as learners, managers who will need to provide time and a place for learning should

attend, along with the technical support people (Chapters 10 & 14). From the evaluation of the EA course it is clear that support to provide the learner with a suitable place and enough time to carry out their studies is vital (Chapter 15).

As the EA course was delivered within the much larger MTS project it was to a certain degree affected by the politics of the project (Chapter 7). It has already been stated that the MTS project received EC funding for its three year duration. In the researcher's opinion, there was a certain amount of "hype" surrounding the project. In order to justify the substantial investment which the EC put in, the project was widely publicised as offering an education and training solution for industries within the European Community. The publicity surrounding the project suggested that distance learning would offer education without loss of productivity within the learner's working day. In retrospect, this was damaging to the EA course, as it appears that there was a certain amount of expectation that no time allowance was needed to take part in this form of learning. As a result, there was less commitment from the individuals and as a result, less reward in terms of sharing ideas through communication (Chapter 12). It is important that, right from the start, everyone involved in taking part in a course understands that there is a certain amount of work involved if one is to benefit from the experience (Chapters 3 & 5). Highlighting this may make the proposal less attractive in the first instance but it will help to ensure that, in the future, all those involved may benefit.

Once a firm understanding has been established between the course providers and receivers, the most important issue becomes motivation for all of those involved (Chapter 14). This is especially relevant for the learners and tutors. In the case of the EA course, as well as the NKI, UTAH and BEST projects, the tutor's role as distance tutors was secondary to other activities (Chapter 6). This must not be the case if one is to fully exploit the opportunities which distance learning offers by having tutors who will motivate the learners and stimulate effective education.

In order to motivate the learners, the tutors should try to generate "high points" within the course schedule. These are topics which have specific relevance or interest to the learner group, in order to maintain a level of expectation within the learner group that will sustain their enthusiasm and interest throughout the duration of the course. One form which these "high points" may take is that groups of learners might meet face-to-face for seminars or practical work. This did happen within the EA course although it was not a formal part of the course construction and only occurred due to the initiative of some of those taking part (Chapter 14).

During the final write up of this thesis, the researcher changed vocation. Having always worked within academic establishments in the past, taking a post within a large commercial organisation provided a different perspective on the findings of this evaluation. For the first time it was possible to gain insight into the possible working environment of those whom had taken part in the EA course. The most noticeable issue since taking this new post is the pressure in the commercial world to focus on activities which produce

immediate revenue. There appears to be less flexibility to take part in activities which do not have an immediate cost benefit. For the EA course, people were prepared to make a commitment to try and fit their study into their normal working day, often without direct support from their line managers. Considering that there was no formal qualification from which the learners would benefit in the future, the researcher was surprised that people were prepared to give up their own time and effort. With hindsight, the research would suggest that the level of commitment from the learners was actually greater than should reasonably have been expected. The EA course evaluation identified that people are willing to try this form of learning under a great many restrictions, with little formal reward. This suggests that there is a great opportunity to build upon this good will in the future.

Having undertaken this evaluation, it is clear that there is a great deal related to this subject which needs further exploration. The researcher believes this evaluation has identified that distance learning using multimedia communications has great potential. As technology develops, the potential for distance learning will further increase and the demands will be even greater for understanding of how it might be effectively utilised. Finally, if this research merely takes a first step towards a complete understanding of the subject then perhaps one should remind oneself that 'every trip of one thousand miles begins with a single step'.

Appendices

Appendix A(i)

Course Material, Learner Handbook

NB, to ensure that the content and index are correct for the course booklet, the original numbering is kept. The normal numbering system is continued following this appendix.

Environmental Awareness Distance Training Course

Written By
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Nick Foskett

Produced By
Marc Lagadec

Contents

Contents

Course Introduction

Sustainable Development and Personal Responsibility
A number of questions are posed throughout this discussion. These may be used as a basis for questions and/or comments during the course.

Concern for the environment has developed strongly among the general public in recent years. It is now found on the political agenda at local, national and European Community levels.

> "These concerns have spawned new political parties, changed the policy direction of old political parties, have prompted industry leaders to action, galvanised church groups with a rediscovered missionary zeal, have pre-occupied children. Everyone is involved." (Faulkener 1992)

This concern is reflected in the developing environmental legislation at national and EC levels. The European Council (Heads of State and Government) meeting in Dublin in June 1990 issued the following statement:

> "The natural environment which forms the life support system of our planet is gravely at risk. The earth's atmosphere is seriously threatened. The condition of water resources, including the seas and oceans is causing concern, natural resources are being depleted and there is growing loss of genetic diversity. The quality of life, indeed, the continuation of life could no longer be assured were recent trends to proceed unchallenged".

Governments and Business are now beginning to include environmental issues in their planning and operations. However it is often argued that this is insufficient and that environmental issues are now so urgent, and the solutions of such economic and social significance, that the fullest possible public participation, both at work and at home, will be necessary for any resolution of these issues.

What environmental issues are important to you?
Do you think you can have sufficient understanding to discuss these issues?
Do you feel that you can take any personal action to help resolve these issues?
Do you think that environmental considerations will have any significant influence on your working life?
Does your professional experience influence how you interpret environmental issues?

The complexity of environmental issues make it difficult to set, and agree on, priorities for

action. However, attempts are being made to establish an agenda for action. In this respect an important influence in thinking about environmental issues has been the first report of the United Nations Commission on Environment and Development. This was set up in 1983 under the leadership of the Prime Minister of Norway, Mrs Brundtland. Explicit in the Commission's report was the judgement that change can only come about as a result of political action. In this debate the concept of sustainable development was introduced. Sustainable development is essentially a political term. It is one which has usefully served to catalyse the debate over the relationship between economic activity and the natural resource base on which it is grounded. Sustainable Development was described by the World Commission on Environment and Development as a development that meets the needs of the present without compromising the ability of future generations to meet their own needs.

The UN's World Conservation Strategy, which has provided the basis for national agendas, is built around the concept of sustainability. In particular the Strategy explicitly links the maintenance of ecological processes and life support systems to the sustainable utilisation of resources, and the maintenance of genetic diversity. Conditions required for sustainable development need to be seen in a global context, although action will have to be at a local level. In order to implement such action O'Riordan has suggested that we need to take account of five principles of sustainable development. These are :

1. A duty to promote sustainable development approaches to policy and investment, which are outlined regularly, (e.g. annual reports) and which form the justification for future policy and investment.

2. Creative Auditing, incorporating features of environmental wealth creation, with innovation in units of account used in auditing, e.g. energy, raw materials and resource depletion set alongside financial flows.

3. Strategic Environmental Appraisal, applying the strategies of Environmental Impact Assessment to the selection and management of sites.

4. Public Trust Doctrine; certain common properties (or access resources) are considered to be held in trusteeship by the people.

5. Rehabilitation, the restoration of depreciated environmental assets.

Do you think that in your work you could take some personal responsibility for developing a more sustainable economy?

The European Commission's fifth environmental action plan (1992) in trying to take this debate into account is designed: (a) to promote increased awareness of environmental factors across a wide range of policy areas encompassing energy, agriculture, industry and transport; (b) to promote shared responsibility between decision makers, consumers and industry; and (c) to encourage sustainable development. In the debate in the European Parliament, Members welcomed the plan in general. A Belgian Green Party member, Brigitte Ernst de la Graete, critisized that there was a fundamental conflict between industrial competitiveness and environmental protection. A Dutch Green Party member, Nel van Dijk, argued that with a forecast of a 45% growth in road traffic over the next 20 years, there was a need for new, environmentally acceptable forms of transport.

In your own working life do you see conflicting interests between company profitability and decisions concerning environmental protection?

Conflicts of priority and interest reflect the complexity of environmental issues. Roome (1992) argues that: (a) the environment is an elusive concept to define with precision; (b) the environment impinges on the public and private domains. What is done for private interest by one individual or organisation can have unpredictable implications for the interests of others elsewhere on the planet; (c) the relationship between actions and their environmental effect are delayed; and (d) society is only now beginning to develop the skills, tools, knowledge and awareness to improve our approach to environmental management.

Do you think that there is any need for you as an individual, to consider the implications of your work in relation to a wider public interest?

Huisingh, working in Sweden, has argued that global environmental impacts of modern technologies is motivating many industrial organisations to ask questions about their processes and products. They are asking questions they seldom asked in earlier years. He suggests that two approaches to the problems are being used. Most commonly, ways are being sought to modify manufacturing processes by raw material substitutions or process modifications, so as to produce current products more safely and with less waste. Also, though, product designers are beginning to "design new products with nature in mind". In doing this they are seeking to develop and utilise product design criteria that incorporate consideration of life cycle impacts into the product's design. He points out that some industrial firms are placing concerted efforts upon the identification of the problems, and solving them at their sources. In doing this, they have found that they benefit financially,

while environmental quality, both indoors and outdoors, is improving simultaneously. The shift in emphasis is from pollution control to pollution prevention. This type of approach is beginning to be applied more widely, with Governments and Business putting into place systems for monitoring environmental performance, both in terms of the use of resources and the effects of operations on the environment.

In your own work do you see yourself having any role in supporting the monitoring of environmental performance?

The issues an industry may have to face in monitoring environmental performance are not purely technical ones. Palmer, working as a chemist concerned with minimum waste reduction in the United States, analysed them as follows:

Political	**(60%)**
Bureaucratic resistance	20%
Human conservatism	10%
Piecemeal Legislation	10%
Media Sensationalism	10%
Public ignorance and misinformation	10%
Financial	**(30%)**
Disposal Subsidies	10%
Scarce Money	10%
Entrenched Disposal Industry	10%
Technical	**(10%)**
Lack of centralised reliable information	5%
Lack of assistance with the application of waste reduction approaches to individual needs/uses	5%

How far are these similar to those you might face in attempting to improve your own environmental performance?

The course which you are about to take hopes to give you some insight into these issues. The use of computer communications systems for this type of course is very new, for this reason you may find that you are unfamiliar with some areas of it. You should not find this disconcerting as the support structure should enable you to overcome any difficulties, allowing you to benefit fully from this exciting course. Most of all, it is intended to be enjoyable, good luck!

UNIT 1

Introduction to Computer Conferencing

Introduction to Unit 1

You are about to undertake a new and exciting training course on environmental awareness. It is new because it uses computer and satellite technology, to allow you to take the course without ever having to leave your place of work. Distance education has been around for some time now and its benefits have been proven over and over again. One thing that it has often lacked, has been high levels of interaction. This course will make use of the new technology, to allow the levels of communication which are vital when studying a subject like the environmental sciences.

It is not expected that you will already be familiar with the technology that this course will use. For this reason this unit will deal with all the technical and communication issues that need to be addressed before you can start the course. It will also highlight the differences between this course and traditional courses, so that you will be able to get the most from it. It will also provide a user guide to the CAUCUS conferencing system, which will help you to make full use of the facilities it offers.

By taking this course you will not only learn about environmental matters but also about computer communications technology, computer conferencing, e-mail and interactive satellite broadcasting (if taken).

The basic rationale for the course is to give insight into general environmental matters which are relevant to your industry so that you will have a general understanding of the subject area. By providing a global overview of environmental awareness, explaining the jargon and giving information on where further information can be obtained, it is hoped that you will be able to ask the right people the right questions, in the correct language. You will also, very importantly, be able to understand their replies so that you can take more informed responsibility for environmental decision-making within your organisation.

The information which follows should be read carefully, then you should try the computer conferencing exercises that are outlined at the end. If you have any problems with the technology or conferencing system, there is a technical support conference on the computer (see the CAUCUS manual later); there is also a hotline for help.

Technical support:

Charles Jennings or Robin Findlay (CECOMM)
Tel : + 044 703 235476 (24 Hrs; answerphone out of office hours)

Fax : + 044 703 233312 (24 Hrs)

If you have any questions relating to the course structure or teaching strategies:
Course Support:

Marc Lagadec or Alan Pritchard (IT CERES)

Tel : + 044 703 593478 (Office Hrs)
Fax : + 044 703 676711 (24 Hrs)

What is Electronic Computer Networking?

The Public Switched Data Network PSDN (the standard telephone network):

This makes use of the analogue public telephone system found all over the world. A Modem, MOdulator DEModulator, converts the digital signal output by a computer into an analogue audio tone, similar to that of a fax machine, which can be sent along the telephone line. At the other end, another Modem converts the signal back from analogue to digital. In this way computers can exchange data, or 'communicate'. The MTS project will use this network to provide computer conferencing facilities. The tutors and learners involved in the course will use their personal computer and a modem to connect to a large computer. This large computer, or 'host', will act as the mediator for the computer conference.

What is a Computer Conference?

CAUCUS, the computer conferencing system that the MTS will use, is one of the systems often used for educational purposes. The area of the host set aside for the conference could be analogous to a large table in an empty conference room. The list of people with access are those allowed to enter the conference room. It is at this point that discussion may start. Texts for discussion, 'items', are now sent to the host via the PSDN. The texts or conference items are analogous to papers for discussion that people place on the table in our conference room and then leave. After an item has been placed, anyone connecting to the host, 'logging on', will be informed of this new item and have the option to read it, down-load it to disc, print it or ignore it. This is analogous to someone entering the conference room and noticing a new paper on the desk. Once an item has been placed, it will remain in the conference for people to look at, at any time and as many times as they wish. Once an item is read, one may respond to it by typing the response directly, or by up-loading a pre-prepared text from an editor or word processor. The response is attached to the item as an 'extra page clipped onto the end'. Further responses are ordered according to when they were received. Along with

the text of the response is given the author's name and a date stamp. It is by way of these items and responses that open forum discussions will take place. It is common to have a number of items being discussed at any one time during a computer conference. The CAUCUS system provides a number of other useful tools to the user; it allows attention to be drawn to important items by placing a banner which is seen by all when they "log on", it allows selective searches of key words or phrases and it allows people to selectively view only new material within the conference. All items placed in the conference may be seen by anyone allowed to join the conference.

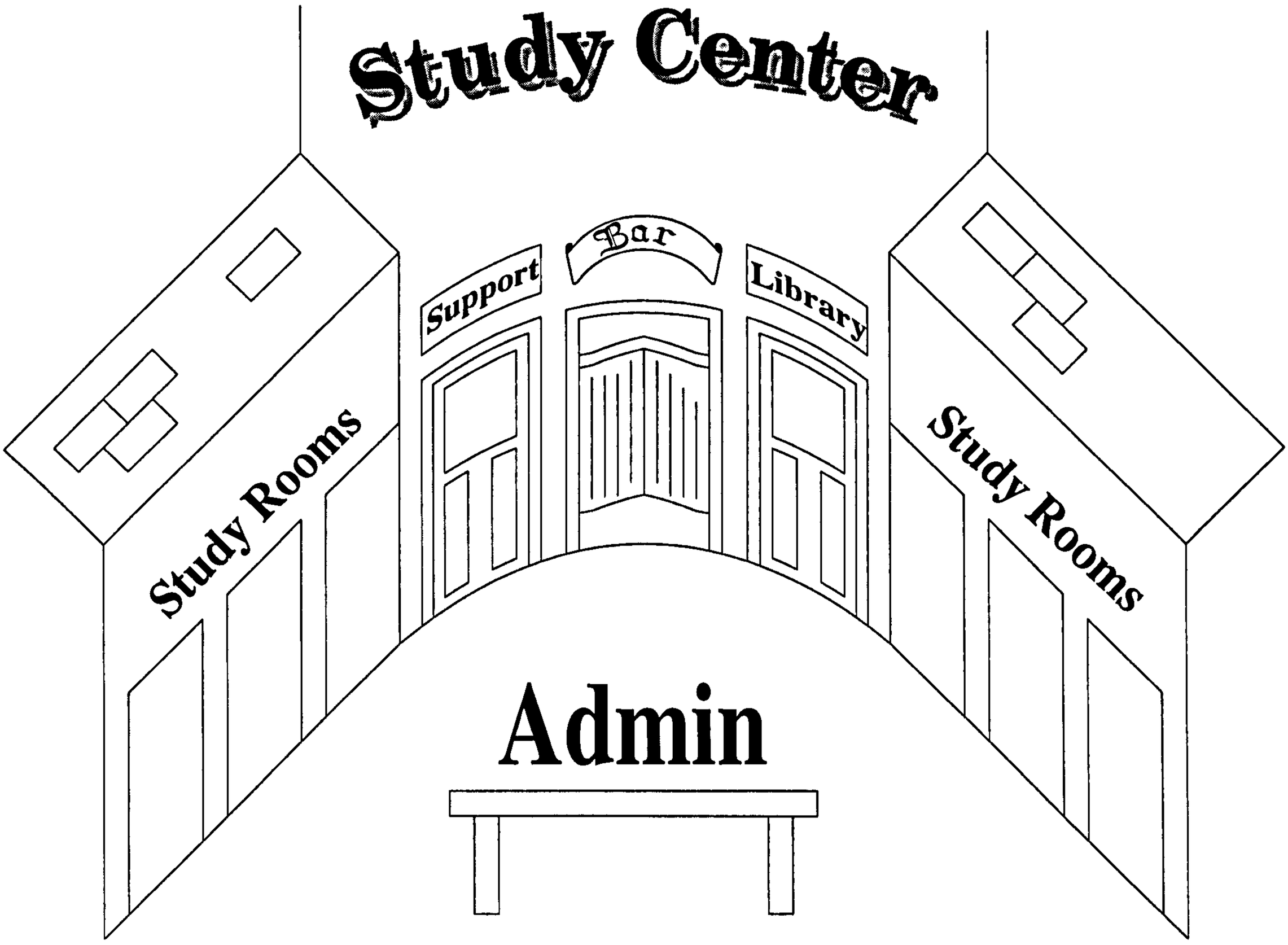
What is e-mail?

In order to allow private or selective group messages to be sent and received, the host computer also offers electronic mail. Anyone on the system may compose their message using the CAUCUS editor of their word processor (saving it in ASCII), and send it to whomever they wish. When the recipients next log on, they are informed that they have new mail and may read, reply, delete, forward or ignore it. e-mail will thus facilitate private discussion during the course.

The Direct Broadcast Satellite (DBS) seminars.

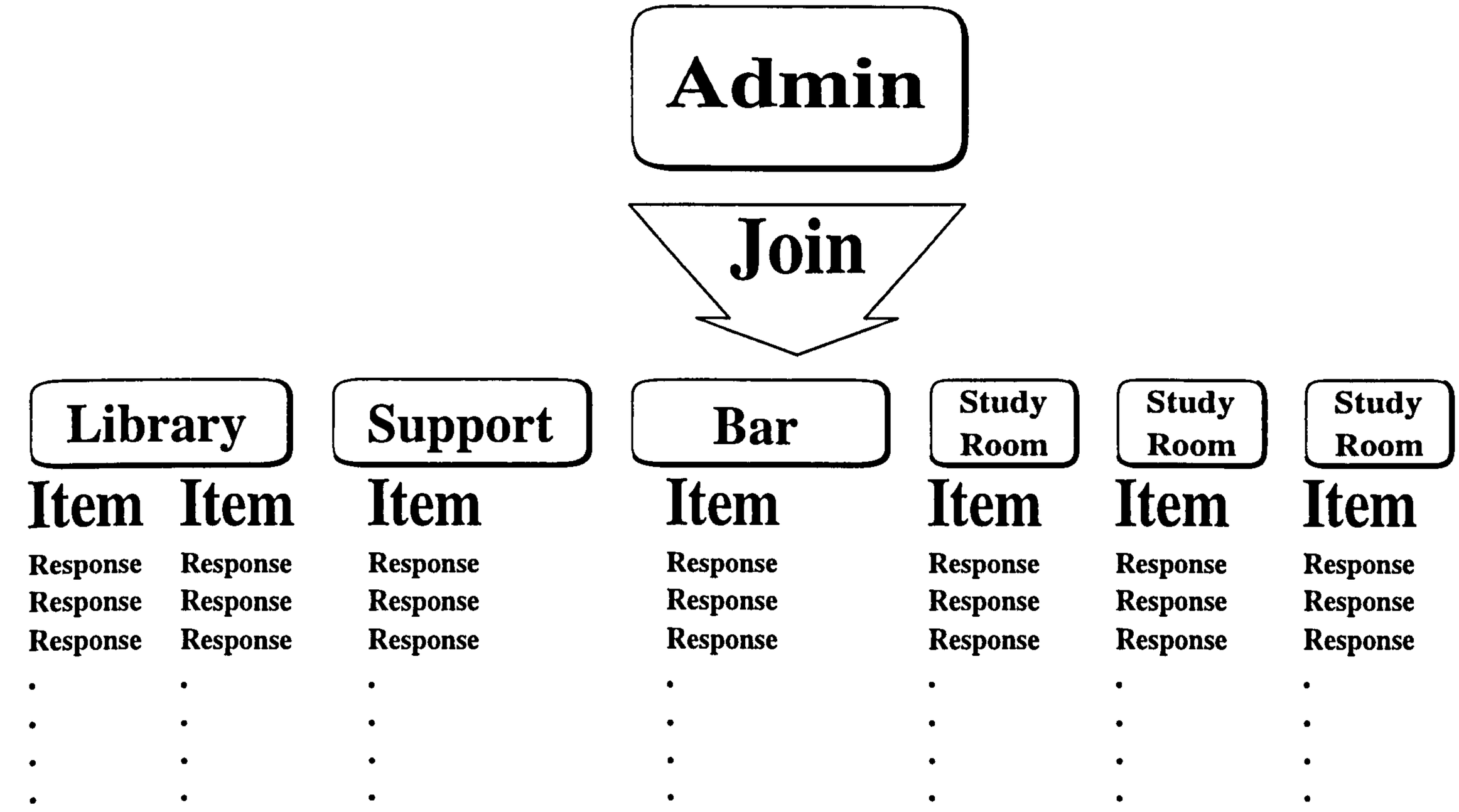
Receiving the satellite transmissions will require a satellite receiver dish and a decoder; these will need to be connected to a standard television for viewing. An ordinary video recorder will allow the seminars to be taped and used for later reference. A panel of tutors, experts and other representatives will broadcast their seminar to the learners via the European satellite Eutelsat. Learners will receive this transmission and have the opportunity to interact with the panel, by sending e-mail messages, fax messages or by telephoning. It is in this way that the live interactive satellite seminars will take place.

The EA Computer Conference Structure



The conferencing structure that the Environmental Awareness course will use will mirror the structure of a campus study centre. It has been set up to offer a familiar setting for work to take place. The diagram above shows the features that the study centre has. Each building in the study centre represents a computer conference. The Administration building (conference) has information about the course, as well as technical help. The Library has background reading and contact addresses for each unit of the course. The Pub is a general meeting room for student conversation, it is the conference which you will use for the introductory exercises at the end of this unit. The study rooms are closed initially but at the end of this unit you will be able to join these conferences, and this is where you will study during the rest of the course.

The diagram below indicates how the computer conferences will be organised to follow the above structure. When you login you will enter the main EA conference.



The CAUCUS User Guide.

Setting up the System - If you are using a modem.

Using the Windows Terminal.

Windows comes with an application called the terminal, this software is easily good enough to use to connect to the CAUCUS computer conferencing system. You can use the settings shown later, in the section "using your own connection software". But to make it easier for you, we have put the settings for the windows terminal into a file which you can copy into the terminal directory, and which will then automatically put the settings in for you. This

software would have to have been requested when enrolling, for it to have been sent with this pack. If you wish to obtain a copy of the software now, simply send an IBM formatted disc, your name and your postal address to :

IT CERES
Building 34
School of Education
University of Southampton
Hants, SO9 5NH

NOTE : To run this software you will need a copy of Microsoft Windows, running on your PC. This software is not provided.

To install the windows script file (holding the settings for CAUCUS):

Insert the disc into drive a: and type A:\INSTALL and press RETURN.
Follow the install instructions; when installation is complete you can load the Terminal application from windows. With the new software installed, you should find that the terminal now has all the settings put into it. If this is not the case, call Marc Lagadec on: 0703 593478.

To Login to the Host, you will need to start the Windows Terminal software with a modem connected up. Then Click the mouse over the word 'Phone' at the top of the window, move the mouse down and click on Dial. You will have to wait a few seconds as the software dials up the host and then you should be able to login for our CAUCUS session.

If you are using your own communications software.

To use your own communications software you will need to put the following settings in;

CAUCUS Telephone Number : 0703 336298

The Modem and communications software settings are:

8 data bits
1 stop bit
no parity
full duplex

Terminal Emulation VT52, VT 220 or VT100

If you are accessing the host using an internal network.

You will need to find out from your network manager how to get access using your internal network. Your network manager will need the following information to allow you access to the CAUCUS host:
Host NUA:
3106012049

Your First Login

When you first log on to CAUCUS you will be presented with the following:

Please Login:

Enter your USERID (you will have been provided with this by CECOMM) and press the **ENTER** or **RETURN** key.

Password:

You will then be asked to create, or choose, a password. It is best to create your own, but be sure not to attempt to use any recognisable English word (including names). It is best to use a word which you will easily remember as your Password, such as a foreign word, or a compound word (such as suescat, thereitgoes etc) or a word which includes, but isn't entirely, numbers and other characters (such as pe*ter246).

Remember: Your USERID and PASSWORD are CASE SENSITIVE.

When you first use the conferencing system you will be asked to register your name, telephone number and a few brief details. CAUCUS will then use this name to identify you on all contributions, responses and messages.

When you have finished entering your introduction, press **.s** and the **ENTER** key on a blank line and CAUCUS will register you as a user.

Commands (Some Basic commands)

These commands should be typed at the AND NOW? prompt

List All Brief (short version '**LAB**') will list all the items in the conference which you are currently in.

Show New Items (Sh Ne I) will show the text of items which you have not seen.

Show New Messages (Sh Ne M) will show all your new messages.

Join moves you to another conference. You will be asked which conference you wish to join.

Check lists new activity in all the conferences that you have joined.

Stop ends your Caucus session.

REMEMBER, help is available at any time when using the system, just type ? and press return at the AND NOW? prompt.

Using the CAUCUS Menu System.

CAUCUS has an in-built menu system which helps you to find you way around the system. The menus can be switched on and off by typing **MENU** at the command prompt. You will then be given a choice of menu types from 2 to 5, choosing 1 will give help on this topic. For the novice user the best choice is **3** - Action-oriented, long-form menus. The menu structure will help you find out what you can do in the CAUCUS system, without requiring you to know all of the commands. Later, when you become more familiar with the system, you may wish to switch the menus off by typing **MENU** and choosing **5**.

Getting Help.

CAUCUS has a powerful on-line help system, typing **?** or **HELP** at the command prompt will take you into the help section. CAUCUS will inform you of what it thinks that you are trying to do and what your choices are. You will not have to type anything to leave the help section, as it drops back to the command prompt after displaying help. You can ask for help about specific things by typing:

HELP NOVICE enter this if you are a new user to the CAUCUS system.
HELP COMMANDS shows the structure of the CAUCUS commands.
HELP VERBS to see a list of CAUCUS verbs; verbs explained in HELP COMMANDS.
HELP OBJECTS to see a list of objects that CAUCUS can act on.
HELP INSTANCES to learn how to specify instances of objects.
HELP MODIFIERS to see a list of command modifiers.
HELP EXAMPLES to see a list of CAUCUS commands which are commonly used.
HELP TOPIC to see a full list of what other help is available.

Unit 1 Learner Tasks

Read the CAUCUS user guide and, using it as a reference manual, complete the following tasks:
TASK A: adding to a conference item.

1. Login and join the Pub conference. (**Join Pub**)
2. Type **Show item 1.** This item contains a limerick, read the limerick and add your own line to the bottom of the item.

TASK B: sending an e-mail message.

1. Type **Send** at the AND NOW? prompt. You will be asked to enter the text of your message, make anything up as this is just a test.
2. When you have finished your text type press **RETURN** to get to a new line and type **.s** and **RETURN**. You will then be asked for a subject for your message, just type **'test'** and press return.
3. Then send the message to yourself.
4. Log off.
5. Login and see if the message has successfully been sent to you.

TASK C: moving around the conferencing system and introducing yourself.

1. You will each have been e-mailed to tell you which study room conference you are in.
2. Join your study conference and read item 1.
3. This item has been set up to allow you to introduce yourself to the rest of the group. Read the introductions of your study group partners and add an introduction of yourself.
4. The ten people in your study group will be working with you for the rest of the course so it is important that you know a little about each other.

The Direct Satellite Broadcast Session.

The DBS session for this unit will take the form of a lecture style presentation. D Brunner, a computer conferencing expert at the University of Southampton, will give a general talk on electronic communication and how to set up computer conferencing hardware. This will be accompanied by a live demonstration of the real situation. He will then go on to demonstrate how to log on for the first time and how to use all of the functions that the CAUCUS computer conferencing system offers. At this point the learners will be asked to log on themselves and send in messages, introductions and questions live to the studio, which will be dealt with by the presenter live on air.

UNIT 2

Identifying Environmental Issues

Introduction to Unit 2

This unit will take the form of a role-play which will use the computer conferencing network for communication. You will be split into groups of 10 and assigned a study room for your group. Each of you will be given a character to play, information that only your character knows and a map* of the area under discussion. (*included with this study pack)

This unit is intended to put the later work into context and set the scene for the course. It is also hoped that by participating, you will become familiar with the computer conferencing system. There will be no details about environmental legislation or practices in this unit, as these will be dealt with later in the course. It adopts an informal approach to stimulate communication about environmental issues, using the computer conferencing system. The content and characters in the role-play have been created to allow lively discussion and are in no way intended to reflect any real life persons.

The role-play has been constructed so that there will be conflicts of interest between the characters. It is only by exploring these conflicts that you will develop a full understanding of the subject area. You should never be afraid to say what you mean during the role-play, you are acting out a role of a person who will not necessarily have the same values as yourself.

The Background to Unit 2.

In Europe, the major players involved with tourism and the countryside combined to produce the principles for sustainable tourism below:

The Environment has an intrinsic value which outweighs its value as a tourist asset. Its enjoyment by future generations and its long term survival must not be prejudiced by short term considerations.

Tourism must not be allowed to damage the resource, prejudice its future enjoyment or bring unacceptable impacts.

A development is being planned in the hypothetical area of "Puedam" village, (Puedam, "made up" spelt backwards). The tour operator is under pressure from its shareholders, from the consumer and from increasingly stringent legislation to produce a "greener" plan. All parties involved need to be convinced that it is not just a "green wash", but that all aspects have been considered in depth.

Each person in the role-play will see the benefits and disadvantages of the development. They will be privy to information which others will not have. The characters within the group will have to discuss the best site for locating a hotel style development, which will occupy **two** squares of the grid on the map. The characters within the group are representative of interested parties in such a development. They each have differing interests; some are very concerned with a "green" development and some are less so. Initially, a proposal will be put forward for development, saying on which grid reference it is to take place, and why the area was chosen. During the next three weeks the characters will discuss, using the computer conference, where the best site would be and why. At the end of the third week of this unit you will have to reach the best compromise.

NOTE: EACH GROUP MUST DECIDE UPON THE BEST STRATEGY FOR THE TOURIST DEVELOPMENT BY THE END OF THE UNIT AND SUBMIT IT TO THE OPEN FORUM CONFERENCE FOR DISCUSSION. (See Schedule)

As you undertake the role-play you should be able to identify a number of issues. These should be categorised and listed on the sheet provided (Titled: ISSUES IDENTIFIED DURING ROLE-PLAY)

The Scenario for the Puedam Hotel Development.

You have been gathered in this computer conference room to discuss the proposed development of a hotel site in the Puedam village area. Your job is to discuss all of the aspects involved in such a development, and to try to decide where would be the best place to site the new hotel. To help you to do this, each of you has a map of the area. When you refer to any location on the map you should always give its map reference, in order that all involved will know exactly where you are talking about. For instance if you were concerned about fish stocks, reference could be made to the "Good Fishing" area centred at grid ref D10 on the map.

There are areas on the map of special interest:

The Hills; map ref A1-J1 and B2-E2, are very steep, there is not much vegetation growing on them. They are made of granite which is very tough, which means that building on them would be very costly. It has been estimated that development in this area would cost four times that of any other area in Puedam.

The village of Puedam; it has a population of a few thousand, it was traditionally a fishing village but now also has a small tourist trade. Fishing is still the main source of income for the village, but this is slowly changing as the younger generation are looking for more profitable work in the big cities. The village has a few restaurants and craft shops situated around the harbour. There is an ancient monument located at J3 which is said to date from around 100AD, which is considered valuable because it is very well preserved. The reason that it has probably lasted so well is that very little traffic passes along the road that runs to it. Recently it has been showing signs of structural decay, and restoration work is needed if it is to stay in good condition.

The area of Natural Beauty; A2-A13, B3-B13, is an area of outstanding natural beauty which has a very diverse wildlife. People have been using the area for the study of wildlife and for leisure. The area has never had proper management and, more recently, it has been showing signs of decay due to the number of visitors. A government application for national park status has never been applied for and so building on the site is still possible.

The Ferry Dock; H5. Some visitors to the village come from a neighbouring island which has a large tourist industry. They generally come for a day trip to look around the village and walk in the area of natural beauty.

The Beach; C6-C12, is a beautiful sandy beach which has excellent swimming and snorkelling, it is very safe with no currents or dangerous rocks. The beaches in this area are government-owned and no building development is allowed.

The Puedam Hamlet; C13-D13. There are only 5 houses here; it used to be a farming community but has ceased to be, as the surrounding land was not suitable for modern farming techniques. There are very poor water, gas, electrical and sewage services already in place but they are not even good enough for the few houses already there.

The Good Fishing areas; D10 and I5. The fishermen of Puedam have had very good fishing in both of these areas for generations. They have been recently complaining that the area near the ferry dock, I5, has been polluted by the ferry

boats, and the fish stocks have dropped.

The road to Puedam village; is very good, the strip which runs along the beach is in need of repair and the bridge over the river will not support large vehicles.

The Characters in the Role-Play, Public Information

The Village Mayor

The young people of the village have been moving away to the larger cities to get more money. This has meant that the village population has been in decline for the past few decades. The village used to be a prominent fishing village, one of the most important in the region. The Mayor of the village is trying to encourage the recent tourist industry that has started, in the hope that it will bring back the prosperity that they once enjoyed.

The National History Group Representative

Just outside the village of Puedam is an ancient temple. It has not had any restoration work done but still remains as one of the best preserved monuments in the country. The National History Group believe that part of the reason for its good condition is that very little traffic passes by it, and only a few tourists visit it. Recent excavations have revealed beautiful mosaics, these would be very valuable, but require expensive restoration. The representative of the history group is very worried that nearby building development will cause further structural damage to the monument. In addition, they believe that if the monument became a large tourist attraction it would not last very long, unless properly managed.

The Conservationist

Puedam is an area of outstanding natural beauty. The conservationists are concerned that a tourist development would have very damaging effects on the area. The past few years have seen many of the country's beauty spots taken over by the tourist industry. Some of the areas have been preserved very well and tourism has not affected the area badly, but in some cases it has completely taken over. The conservationists are determined to ensure that the development in Puedam will not ruin this beautiful area.

The Hotel Developer

The hotel developer has a chain of hotels throughout the country. His business has grown to be one of the largest in the country, but more recently things have been getting increasingly difficult. More and more legislation is affecting his business, the world economy is in recession and development costs are getting increasingly expensive. He feels that he is an honest man trying to earn a living and do good for the economy of his country. He feels victimised by all of the people who seem to be stopping him from doing his job.

The Tourist Industry Representative

After an initial examination of the Puedam area, it is clear that it would make a very good tourist location. The TI representative wants any development here to be as environmentally friendly as possible. It is hoped that the development at Puedam will really be a totally 'green' tourist location. For this reason, they are very concerned that everything possible is done to ensure that the tourist industry does not affect Puedam badly.

The Local Water Authority

It is the responsibility of the Local Water Authority to ensure that water pollution levels are kept as low as possible. They will also have to install any new water networks for the tourist development. They are finding it very difficult to keep to the European directives on water pollution levels, and so are hoping that this development goes well.

The Environmental Consultant

The Environmental Consultant is overseeing the discussions about the development of Puedam. The consultancy can advise on some of the issues that arise during the discussion, and they offer a number of environmental services.

The Local Government Representative

The local government has seen the prosperity that other areas have enjoyed due to the development of a tourist industry, and they would like the same for their area. They are pleased that their area is now under consideration for development. They are also concerned that their region is not spoilt by the development, and that any European Legislation is taken into account, as they see many benefits in good environmental planning.

The European Commission Representative

The European Commission are especially interested in the Puedam development, because the expectation is that it will be the most environmentally orientated tourist development so far. It is hoped that the EC will be able to learn a lot from the development of the Puedam tourist area.

The Local Fishermen

Puedam has been a fishing village for generations. The fishermen of the area have been finding it more and more difficult to earn a living. The local population has decreased and demand for their fish has fallen. They are also finding that since the ferry service began, they are having to travel further out to sea to get a good catch. They are very concerned about the effects that tourism could have on their way of life

Further information will be sent to you via the e-mail system during unit 2, this information will give more detail on your character and provide the private information which only your character knows.

UNIT

3

The Nature and Role of Environmental Legislation

Introduction to Unit 3

Environmental Awareness has, increasingly, a statutory component within it, for true environmental literacy requires an understanding of the policies and legislation which influence, direct or constrain people's interaction with the environment. The aim of this unit is to introduce managers to the nature of environmental legislation and policy insofar as it impacts upon their work within their own organisation. It examines the growing environmental awareness amongst individuals and organisations in the community, before moving to an overview of the characteristics of environmental policy and law. This is set in the context of the European Community, since it is at this level that much local and national law has its policy origins. There is no attempt to look in detail at individual elements of legislation , since this is not within the scope of this Unit. It is more an attempt to provide a conceptual framework within which the individual might operate, so as to understand the relationship between their own (and their organisation's) operations and environmental matters. Against this background, the third and fourth sections of the work engage the learner in reflection on the application and implication of environmental law within their own sphere of operation.

The work is organised sequentially throughout the three week study period, and revolves around four tasks. Each is undertaken using instructions delivered by e-mail, and using resources supplied either by e-mail or by post. The tasks themselves require reading, reflection and research within the company, and are operationalised through written tasks. These are all done on the learner's PC, and require both exchange of ideas with nominated partners , using e-mail, or contributions to discussion within small or large computer conferences.

Unit 3, Resource 1 Major events that have influenced environmental thinking. Source:- Newson (1992)

Significant individuals and events in modern environmental management:

Date	Category	Details
1864	Book	George Perkins Marsh's international evidence of land and water degradation. Raised the issue of longer-term implications of productive land use.
1956	Book	Thomas's edited compilation constituting an update on Marsh's warnings.

1952	Disaster	London smog, 5-10 December. 445 direct deaths and 4000 long-term fatalities. Led to the Clean Air Act 1956 - UK the first developed nation to act.
1962	Book	Rachel Carson's Silent Spring revealed the environmental effects of the early, crude pesticides such as DDT; established the wide geographical spread and persistence of chemical pollutants.
1967	Disaster	Wreck of the oil tanker Torrey Canyon - 117,000 tonnes of crude oil spilled and washed on to holiday beaches. Drew attention to the dangers of increasing scale of energy sources/ trade and inadequacy of government response and dispersant technology. Led to the formation of a UK government department (of environment).
1969	Picture	Apollo space programme - lunar landing/widespread 'spiritual experience' among astronauts. Earth-view established in environmental campaigns and advertising.
1972	Conference	Stockholm Conference on environmental issues affecting development. Led directly to environmental policy-making in the European Community.
1979	Book	James Lovelock's Gaia further developed the global biosphere concept and hypothesized the mutual dependence of organic material and its habitat. Transcendentalists take up Gaia as a spiritual guide; environmental science uses it to prioritize the global management task, e.g. controls on the loss of stratospheric ozone.
1986	Disaster	Chernobyl nuclear power plant USSR: 50 miles from Kiev, 32 deaths and 135,000 evacuated. Long-term, international health effects. Established, with 'acid rain', the international transport of pollution in the atmosphere. Discussion of risks in a world based upon nuclear energy given a case example.

1990	Book	Clark University's global review in the Marsh (1864), Thomas 1956) ... series. First attempt to separate the influence of three centuries of development from natural trends and cycles, i.e. the true impact of mankind.
1992	Conference	United Nations Conference on Environment and Development 'The Earth Summit' in Rio de Janeiro.*

* This is a hopeful entry!

Unit 3, Resource 2 Extracts from the European Community booklet "Environmental Policy in the European Community"

Introduction

Environment policy - developed in fits and starts over the last two decades - today commands a position at the very centre of the European Community stage.

To a large extent this can be attributed to rising popular and political alarm at the threat which uncontrolled economic expansion poses to human safety and health.

But it also reflects the fact that concern for the environment and the careful husbandry of natural resources at our disposal lies at the heart of the Community's plans to achieve a single market by 1992.

Major disasters like Chernobyl and Bhopal, global problems like ozone depletion and the greenhouse effect, and quality of life issues such as drinking water and air pollution have all contributed in recent years to a 'greening' of European public opinion, to a widening consensus in favour of 'cleaner' and more sustainable economic growth.

This idea found formal expression in the Community in 1972, when Heads of State or Government meeting in Paris laid down a series of basic environmental principles, declaring in their summit conclusions that 'economic expansion is not an end in itself'.

It was not until 15 years later, though, that the need for a dynamic policy on the environment was given explicit legal and political backing, in the amendments to the Treaty of Rome, known as the Single European Act.

In a key passage which represents the only qualitative condition anywhere in the revised Treaty, the act calls on the Commission when putting forward proposals concerning health, safety, the environment and consumers to take as a base a high level of protection.

The 1992 programme - whose course was set by the terms of the Single European Act - is too often seen in terms of one-dimensional economic benefits like additional GDP growth, market efficiency, and lower unemployment. Politicians and commentators have a tendency to forget that the new Treaty established a number of separate, if complementary, objectives for the Community designed to make sure that the material advantages of removing its internal frontiers are both evenly spread and prudently controlled.

Environmental concern lies at the centre of the single market debate and seems certain to remain so. One reason is that new solutions are urgently required to deal with the additional pollution likely to be generated by the 1992 process. By accelerating economic expansion, 1992 has effectively rendered more acute the problems which were already becoming serious as a result of Europe's growing prosperity.

PUBLIC CONCERN ABOUT THE ENVIRONMENT

Pressure from the population and from special-interest groups has been of great importance for the acceleration of environmental policy within the Community. The latest elections for the European Parliament in June of this year (1989), which resulted in a more than 100% increase of Green Members of the European Parliament, have clearly shown how much the European population is concerned about the condition of the environment. It is quite easy to see why. The quality of the environment is closely linked to the quality of life in general.

If people become ill because of the deterioration of the environment, if people read in the newspapers that life expectancy is lower in environmentally deteriorated areas, it is quite understandable that the population becomes concerned. If we follow this line of thinking one may even say that the deterioration of the environment can be the source for political instability.

Mr Carlo RIPA di MEANA, Member of the European Commission, speaking at Sofia, 16 October 1989

Another reason is that a single market will only function properly if the 12 Member States of the Community - all coloured different shades of green at the moment - are able to agree and apply common standards of environmental protection.

A fundamental challenge for the EC is to prevent unilateral moves by 'greener' countries which may be seen by fellow members as effective non-tariff barriers to trade. At the same time the Community must always guard against the danger that acting in unison will be used as an excuse for a half-hearted and ultimately inadequate environmental policy.

Importance of Protecting the Environment

Asked to put 12 main political issues in order of importance, respondents to an opinion poll throughout the European Community made protection of the environment second only to unemployment. Asked to grade how important it was 94% of those questioned thought environmental protection very important.

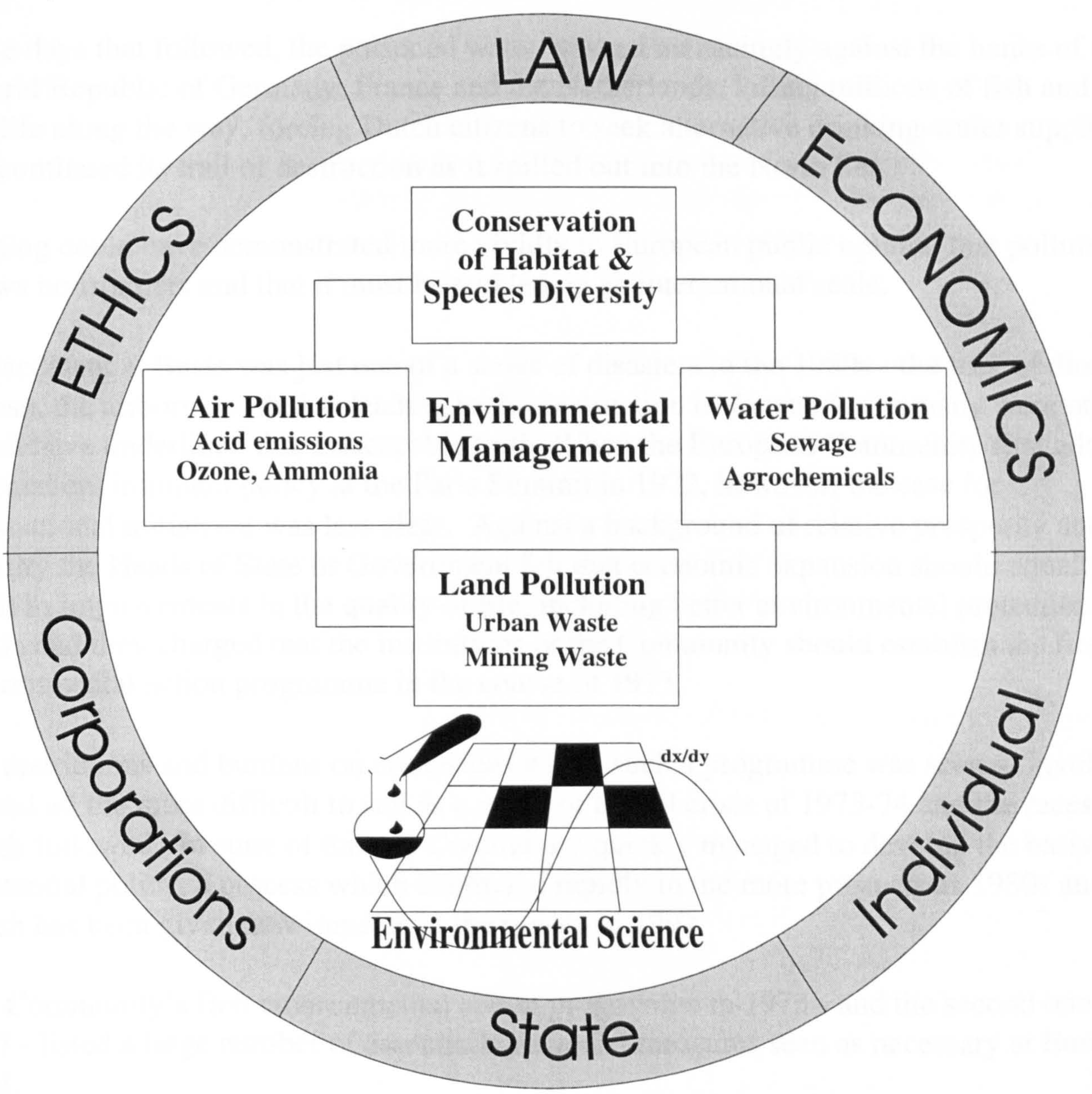
The five most important national and international issues per country
(summer 1989)
Percentage who think issues very important

	B	DK	D	GR	E	F	IRL	I	L	NL	P	UK
Environmental Policy	**90**	**97**	**98**	**92**	**94**	**93**	**91**	**94**	**95**	**97**	**91**	**93**
Unemployment	94	95	95	93	98	97	98	96	92	94	95	94
Stable prices	87	84	90	93	93	83	93	89	91	-	94	86
Personal security	80	-	-	-	-	-	-	-	-	-	-	-
Arms limitation	75	79	89	86	87	-	-	82	-	82	-	-
Balance of Payments	-	88	-	-	-	-	-	-	-	-	-	-
Pension security	-	-	95	-	-	-	-	-	-	-	-	-
Education	-	-	-	88	-	96	-	-	-	-	-	-
Terrorism	-	-	-	-	95	-	-	-	-	-	-	-
Social protection	-	-	-	-	-	94	-	-	-	-	-	-
Emigration	-	-	-	-	-	-	93	-	-	-	-	-
Northern Ireland	-	-	-	-	-	-	84		-	-	-	-
Tax reform	-	-	-	-	-	-	-	81	-	-	-	-
Site advantages	-	-	-	-	-	-	-	-	91	-	-	-
Pensions	-	-	-	-	-	-	-	-	85	-	-	-
Equal rights	-	-	-	-	-	-	-	-	-	85	-	-
Law of labour	-	-	-	-	-	-	-	-	-	-	90	-
Housing/homeless	-	-	-	-	-	-	-	-	-	-	-	94
Health service	-	-	-	-	-	-	-	-	-	-	-	94
Health reform	-	-	-	-	-	-	-	-	-	-	91	-
Combating Crime	-	-	-	-	-	-	-	-	-	-	94	-

Source: ZUES report, January 1990, based on an analysis of the Eurobarometer opinion poll,

conducted for the European Commission in the 12 Member States of the European Community in the summer of 1989.

Unit 3, Resource 3 A "model" demonstrating the factors involved in understanding environmental management. Source:- Newson (1992)



Unit 3, Resource 4 - Community Environmental Policy - Development and Change

a) "Why a Community Policy ?"

In early November 1986 between 10 and 30 tonnes of chemicals, among them deadly mercury compounds, escaped into the Rhine following a blaze at a chemicals plant near Basle, in Switzerland.

In the days that followed, the poisoned water washed menacingly against the banks of the Federal Republic of Germany, France and the Netherlands, killing millions of fish and other wildlife along the way, forcing Dutch citizens to seek alternative drinking-water supplies, and continued its trail of destruction as it spilled out into the North Sea.

Nothing could have demonstrated more vividly to European public opinion that pollution knows no frontiers and that it must be tackled on an international scale.

The accident at Basle was just one of a series of disasters in the 1980s - the leak of dioxin at Seveso, the airborne pollution leading to the destruction of forests in Germany were others - which have underlined this inescapable truth. When the European Community first adopted a formal environment policy at the Paris Summit in 1972, however, the case for transnational initiatives was less clear. Against a background of relative prosperity and stability the Heads of State or Government felt that economic expansion should equally result in improvements in the quality of life, including better environmental protection, and to this end they charged that the institutions of the Community should establish the first environmental action programme in the course of 1973.

The restrictions and burdens on companies which such a programme was seen to involve proved all the more difficult to sell as a result of the oil crisis of 1973-74 and the recession which followed. In spite of this the Community quickly managed to develop the basis of a substantial policy, a process which continued rapidly in the more prosperous 1980s and which has been given new impetus in the run-up to 1992.

The Community's first environmental action programme in 1973 - and the second one in 1977 - listed a large number of essentially remedial measures seen as necessary at European level.

It was only in 1983 with the publication of the third action programme that progress in the

Community's thinking became visible and the principles which underpin policy today began clearly to emerge.

By this stage, for example, the preventive approach - i.e. the idea that economic and social developments should be undertaken in such a way as to avoid environmental problems - had become central. The resources of the environment were recognized as constituting the basis of, but also setting limits to, further social and economic advances. And it became a central imperative that the new objectives were to be achieved by taking into account environmental considerations when formulating other national and Community policies. (This obligation is now firmly enshrined in the Treaty of Rome, thanks to the amendments of the Single European Act.)

The Community's environmental impact assessment Directive - which came into force on 3 July 1988 - is a weapon which has given force to this important principle. It integrates ecological awareness into the planning and decision-making process in all sectors, notably agriculture, the oil industry, energy, transport, tourism and regional development.

Certain categories of project - crude oil refineries, thermal power stations, chemical installations and motorway constructions, for example - must be subjected to an impact assessment. Others shall undergo such an assessment under certain conditions only at the discretion of the Member States.

The assessment has to identify the effects of a project on human beings, fauna and flora; soil, water, air, climate and landscape; the interaction of all these factors; and material assets and cultural heritage.

Under the directive the competent planning authority must take into account information and opinions received in the environmental study before taking its decisions. The public must be consulted and can propose alternatives.

Another key principle of Community policy lies in the conviction that strict standards of protection are an economic as well as an environmental necessity - that given the 'greening' of consumers and the growing demand for environmentally friendly goods, EC industry will not be successful unless it gears up to confront the challenge of an increasingly polluted society.

It is therefore at the core of Community thinking that high environmental standards should no longer be seen as imposing red tape and unnecessary costs on industry, transport, and

agriculture; rather, that strict norms can and should be associated with economic growth and job creation.

In line with this approach, the Community's ACE programme (Actions by the Community relating to the Environment) has provided valuable financial support for demonstration projects aimed at developing clean technologies, techniques for recycling and reusing waste, locating and restoring sites contaminated by waste and hazardous substances, and methods for measuring and monitoring the quality of the natural environment.

EC actions, meanwhile, are increasingly framed in the light of the 'polluter pays' principle, although there have been differences of interpretation and practice as to the extent of the polluter's responsibility: while there is broad agreement that such responsibility covers the costs of compliance with pollution control standards, there has been a certain ambiguity about the extent to which polluters should pay for damage. The Commission's recent draft directive establishing the civil liability of those responsible for creating waste is indicative of the Community's tough new approach.

A significant limitation of EC environment policy to date has been the somewhat narrow emphasis on administrative instruments - licensing standards, emission limits, bans and restrictions. While a few Community directives expressly permit economic incentives - e.g. the directives on waste oils and on large combustion plants - this tool of policy has progressed little beyond declarations of intent in successive environmental programmes. Such an approach is likely to be developed in future, as the EC's institutions search for more radical solutions to the problem.

Other limitations of Community policy have also become apparent in recent years - notably the way in which policy has been segmented according to the various media which have to be protected (e.g. air, land, water and wildlife).

Many of the problems, such as acid deposition or water pollution, arise because of the transfer of pollution from one part of the environment to another. Action to limit the damage is consequently more effective when it is taken at source (as with the 1985 asbestos Directive, and the approach to chemicals) rather than in each sector separately.

There is, therefore, an urgent need to develop Community policies not so much for the media themselves but to control the inputs on them. Hence the importance of prevention as a priority over cure.

b) "Principles of Community Environmental Policy"

The First Action Programme on the Environment listed eleven principles on which Community environmental policy is based:-

1. The principle that prevention is better than cure.
2. Environmental effects should be taken into account as early as possible in decision-making.
3. Exploitation of nature or natural resources which causes significant damage to the ecological balance must be avoided. The natural environment can only absorb pollution to a limited extent, and is an asset which may be used but not abused.
4. Scientific knowledge should be improved to enable action to be taken.
5. The principle of "the polluter pays" must apply.
6. Activities carried out in one member state should not cause deterioration of the environment in another.
7. The effects of environmental policy in Member States must take account of the interests of developing countries.
8. The Community and the Member States should act together in international organisations and in promoting international and worldwide environmental policy.
9. The protection of the environment is a matter for everyone. Education is therefore necessary.
10. The principle of "the appropriate level" shall be applied. In each category of pollution, it is necessary to establish whether action is most appropriate at local, regional, national, Community or international level.
11. National environmental policies must be coordinated within the Community, without hampering progress at the national level.

c) "The Fifth Action Programme on the Environment"

In March 1992, the Commission published details of the Fifth Action Programme on the Environment which will cover the period 1993-2000. As with the previous action programmes this contains both specific proposals for legislation over its period and the provision of a broad policy framework within which legislation may be adopted. It is not, therefore, a statement of Community Policy but a framework within which that policy may be developed. The Fifth Action Programme is entitled "Towards Sustainability", and has a number of key features:-

- ❑ An emphasis on "sustainability" as a principle of development within the Community.
- ❑ The identification of five target sectors for legislation - industry, energy, transport, agriculture and tourism.
- ❑ The sharing of responsibility for environmental protection between governments, public and private industry and the public.
- ❑ The integration of environmental objectives into all social and economic programmes of the Community.

A clear principle underlying the Fifth Action Programme is that sustainable development will not be achieved through legislation but is dependent on political and social change bringing about changing attitudes and hence changing behaviour by individuals and organisations. Action needs to be based on:-

- ❑ Working with the organisations and individuals who are the agents of change
- ❑ Attempting to change patterns of consumption and behaviour
- ❑ Developing a culture and concept of "shared responsibility" for the environment
- ❑ Broadening the range of instruments to be used to bring this about. These will include:-

    - ❑ increasing the availability of environmental data
    - ❑ emphasising scientific research and technological development
    - ❑ influencing sectoral and spatial planning processes
    - ❑ using economic and fiscal instruments
    - ❑ emphasising public information and education
    - ❑ emphasising professional education and training
    - ❑ providing financial support mechanisms for the above

d) "Environment and the Single European Act"

Although the European Community had been active in the field of the environment in terms of developing policy and directives since the early 1970s, it was not clear that the original Treaty of Rome, under which the Community was established, gave full provision for it to do so. The Single European Act (1 July 1987) introduced a new area of operation of the Community entitled "Environment", which included the specification that one of the Community's basic tasks is promoting sustainable and non-inflationary growth respecting the environment. Of particular importance in the Single European Act is Article 130R(2) which indicates that "environmental protection requirements must be integrated into the definition and implementation of other Community policies".

e) "Environment and The Treaty of European Union (The Maastricht Treaty) 1992"

The Maastricht Treaty contains a number of overt references to the environment, but three specific articles will have a major impact upon the application and development of future environmental legislation in Europe.

❑ Article 2 indicates that economic development within the EC must be sustainable with respect to the environment.

❑ Article 130 r2 requires that environmental protection must be integrated into all EC policies

❑ Article 3b introduces the "principle of subsidiarity" which requires that all decisions must be taken as closely as possible to the citizen. This introduces a legislative problem in that it is clear that environmental issues do not have "boundaries", so their control may need to be exercised at a fairly high level of authority.

Unit 3, Resource 5 - The EC Legislative Process

a) Types of Legislation

The Community uses three main types of legislation. Each is used to some extent within environmental legislation, and they operate in different ways.

❑ Regulations. This is direct law that applies in all Member States. Regulations are used only for very precise measures such as financial arrangements.

❑ Decisions. These relate to a specific set of circumstances and involved parties and are applicable only under those precise conditions.

❑ Directives. These are by far the most common legislative tools used in the environmental field. A Directive is binding on Member States as to the outcome to be achieved, but leaves it up to each state to choose the methods by which it is achieved. This means that in most cases European environmental law is, in effect, implemented through an appropriate law or statute in a particular country. Different states will have different mechanisms for implementing such Directives.

b) The Legislative Process

Most legislation relating to the environment is currently adopted under what is known as the "Consultation Procedure". This involves the Commission generating a proposal, consulting the European Parliament for an opinion, and then passing the legislation by a unanimous vote in Council. The nature of these bodies is outlined below:-

❑ The Commission consists of 17 Commissioners appointed by the Member States, together with their officials - it is in effect the "civil service" of the European Community. The Commission is divided into 23 Directorates-General (DGs) each of which has responsibility in a particular area policy. DG XI deals with environmental policy.

❑ The European Parliament consists of 518 elected representatives from "Euro-constitutencies". It is, in essence, a consultative body.

❑ The Council is composed of one Minister from each Member State.

Unit 3, Resource 6 - Approaches to Pollution Control

The diagram on the next page illustrates the various points within the environmental system where legislation and controls may be applied. The exact point at which the control occurs will depend on need and on the availability of appropriate technology. Study the diagram carefully and decide what exactly is meant by each control point that is indicated.

Two basic approaches to pollution control may be considered as commonly in use:-

a) The Uniform Emission Standards Approach

This principle assumes that emissions of pollution should be kept to a minimum, and therefore that control of pollution should be as close as possible to its source. It encourages control at points near to the "top" of the model overleaf. Its principle advantage is that it reduces the total impact on the environment to a minimum, and that emissions are often one of the easiest points to "measure" pollution and therefore assess whether standards are being matched or breached.

The control of emissions is clearly in part influenced by economic considerations. Two approaches are used in relation to different legislation - the "bpm", or "best possible means"approach requires organisations to use the the best pollution control irrespective of

cost. An alternative approach is the "bpmneec" approach, more widely used, which requires pollution control using the "best possible means not entailing excessive cost".

b) The Quality Standards Approach

This assumes that pollution is a problem because of the impact it has on specific targets. The quality of the "received" environment and its impact is what counts to individuals and societies, not how much pollution has been emitted from a source. Different sources in different places may therefore operate different emission standards, providing they are not causing a detrimental effect on environmental quality in the receiving location. Its advantages as an approach are that controls of pollution will be most stringent where the pollution has most impact, and that control and abatement will be no more expensive and burdensome than necessary. A major problem, however, lies in the issue of setting appropriate standards and defining what is meant as quality .

The argument about the two approaches has often seen the UK come into conflict with other European Member States for reasons exemplified by Haigh (1990):-

> *Since Britain has short fast rivers and is washed by a turbulent and tidal sea, there has been an obvious argument of economic self - interest for Britain not to accept emission standards for water set by the reference to what is necessary to protect, say, the Rhine, which drains many industrial areas and which is used as an important source of drinking water by Germans and Dutch. Since many of Britain's most polluting industries have chosen to locate on estuaries and drinking water is abstracted upstream, it can plausibly be argued that to set emission standards as stringent as those needed for a river that is to be used for drinking water is to fly in the face of the economic principle of comparative advantage: Britain for pollution purposes, it can be argued, is well favoured by geography just as for transport purposes or, more facetiously, for the purposes of growing lemons, it is disadvantaged by geography. Since Italian lemon growers take advantage of the sun that geography brings them, and grow lemons rather than engage in some other activity for that very reason, and since German industrialists benefit from proximity to continental markets as a result of geography, so also it is argued that Britain should quite properly profit from the*

ability to locate industries on estuaries or on the coast where acute pollution problems are less likely to arise and where the sea water can assimilate or destroy the pollutants.

ALTERNATIVE POLLUTION STANDARDS
(After M.W.Holgate (1979))

Unit 3, Resource-7 Key EC Laws in the Field of the Environment

Source:- "European Community Environmental Policy Guide"Environment Business June 1992

FIELD	SPECIFIC AREA	EC DIRECTIVE
AIR POLLUTION	SO2 and Smoke	80/779
	NO2	85/203
	Lead	82/884
	Ozone	
	Industrial Plant Emissions	84/360
	Large Combustion Plants	88/609
	Municipal Waste Incinerators	89/369 89/429
	Sulphur Content of Gas Oils	76/716 87/219
HAZARDOUS CHEMICALS	New Chemicals	79/831
	Dangerous Preparations	88/379
	Marketing and Land Use Restrictions	76/769
	Major Accident Hazards	82/501
	CFCs and the Ozone Layer	Regulation 594/91
	Genetically-Modified Organisms	90/219 90/210
	Pesticides	91/414
WASTE	Waste (Framework)	75/442 91/156
	Hazardous Waste	91/589
	Transfrontier Shipments	85/631
	Batteries and Accumulators	91/157
	Disposal of PCBs & PCTs	76/403
WATER	Drinking Water	80/778
	Groundwater	80/68
	Dangerous Substances	76/464
	Urban Waste Water	91/271
	Nitrates from Agriculture	91/676
OTHER AREAS	Eco-Labelling Awards	Regulation 880/92
	Freedom of Access to Environmental Information	90/313
	Environmental Impact Assessment	85/337
	Establishment of European Environmental Agency	Regulation 1210/90

UNIT 4

Environmental Practices

Introduction to Unit 4

This unit is intended to introduce you to environmental management techniques which are increasingly employed by large, medium and small enterprises to help analyse their environmental credentials and to resolve problems. To get a clearer idea of how and why these are carried out, to see what kind of issues need addressing, what questions need asking and who should be involved, you will be putting yourself in the position of an environmental consultant who has the task of attempting to produce a green strategy for a fictitious "non-green" enterprise. Definitions and procedures will be provided, and you will be drawing on your work from previous units on emotive and legislative issues.

The unit is divided into four sections:

Section 1. Life Cycle Analysis. This will be a fairly brief section in which you will carry out your own "LCA" on a common household product, by following an LCA procedure which has actually been used on other products. This exercise will hopefully give an indication of what is involved in "cradle to grave" studies of individual commercial products. You will be expected to work on this by yourself, to get you thinking about your own environmental position when it comes to knowledge, skills and attitude. A short report of $^1/_2$ to 1 page should be e-mailed to the tutor.

Section 2. Environmental Audit. This is the largest section in the unit, after which you should have a good idea of what an environmental audit involves. You will be working with other people in a group. The group will receive the profile of an enterprise with a poor environmental record, and the task is to come up with a green strategy to resolve its problems using environmental auditing techniques. Each person will be looking at a separate part of the audit, but the group members will later collaborate using the computer conferencing system to produce a general audit report of 7 to 10 pages. This report should be e-mailed to the tutor, who will raise points that may have been overlooked and highlight areas which seem to be causing problems.

Section 3. Environmental Impact Assessment. The enterprise, having cleaned up its act according to your advice, now plans to develop its premises further, and calls upon your group's environmental consultancy skills to do an EIA of the proposal. This time you will be initially working with one other person and then contributing to the whole group EIA report (about 5 pages), which should be e-mailed to the tutor but actually evaluated by you yourself using criteria provided.

Section 4. Promoting a green image. In this final section, your group will be looking at ways of communicating the environmental credentials of the enterprise concerned and each member of the group will consider one particular target audience. The group will submit this 'communication plan' (about 6 pages) and the green strategy to another group for evaluation using criteria provided.
NOTE : At the end of this chapter you will find the resource material needed to carry out your tasks, you will not need to use all of it, only the parts relevant to your work.

Section 1. LIFE CYCLE ASSESSMENT

Life Cycle Assessment (LCA) is a technique used to help measure and manage the impact of economic activities on the environment. It provides accurate information about the extent of environmentally damaging activities (this part is often called Life Cycle Analysis) and an evaluation of the significance and actual impact of the design, manufacture, use and disposal of a product or service (the Assessment). It is a method of gauging the overall impact of a product and its packaging. Consumers and commercial customers are becoming increasingly concerned about the environmental impacts of the products they buy, and companies now realise that green products and processes cannot simply be judged by what comes off the end of the production line. The key environmental criterion used to be efficiency - e.g. how much water did a washing machine use? How much petrol did a car consume? How energy efficient was a central heating boiler? Today, efficiency is just one element that must be considered in the quest for products which are more ecologically sound. Environmental concerns now affect every stage of the product's life cycle, from its inception right through to its final disposal. Analysing a product's environmental impact through techniques such as LCA is becoming increasingly important with the implementation of European "ecolabelling" guidelines. In March 1992 an EC Regulation[1] set out the framework for an EC-wide scheme of ecolabelling for consumer goods. Under the scheme, an ecolabel is awarded to those products which have the best environmental performance within particular product categories. A product will only be awarded an ecolabel if it meets certain "cradle-to-grave" environmental performance criteria. The eco-labelling scheme will thus require companies to examine inputs and outputs at every stage of the product's life.

[1] Official Journal of the European Communities. vol **35**, ref L99, ISSN 0378-6978

It is clear that informed decisions will need to be made about the environmental effects of production processes, given the best available scientific knowledge and understanding of intricate ecological processes.

Producers and consumers alike need a straightforward, credible and reliable method of measuring the environmental impacts of a product through its life cycle. LCA is an effective method of examining the nature and extent of these impacts. Choosing the best environmental option is not an easy matter. Which has more impact on the environment - a paper plate or a china plate? Surely it's the disposable plate - or is it? For a fair comparison between the two we would have to consider the environmental costs of the water and the detergent used to wash the china plate during its lifetime. This rather simplified dilemma is becoming more common as more people realise that products and processes have impacts right the way through their life cycles.

The LCA is divided into three main stages: Inventory, Evaluation and Response. These are frequently represented as a triangular diagram:

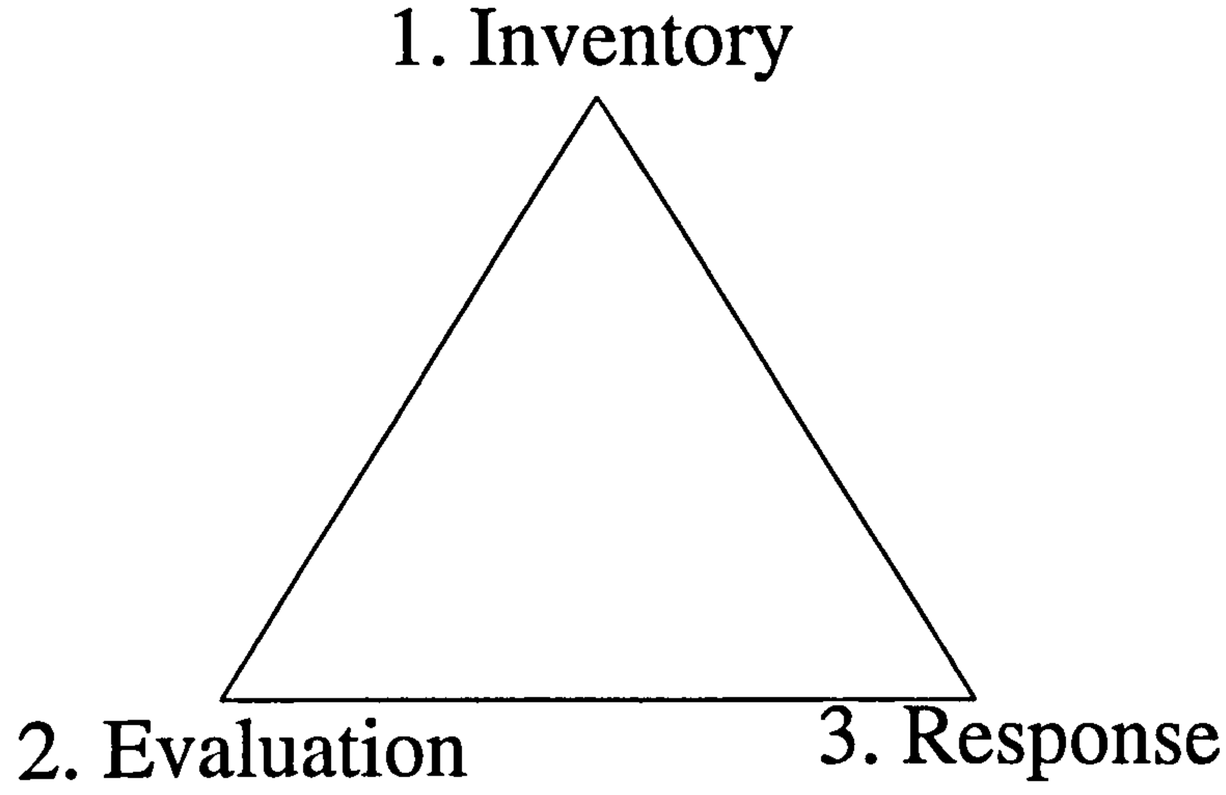


Figure 1

1. Inventory. What are the inputs and outputs during a product's life cycle?

This stage identifies and measures the factors that are likely to have an adverse effect on the environment. It identifies all the elements of a product's life cycle from cradle to grave; inputs are measured in terms of energy and resources consumed, and the outputs are measured in the form of emissions or discharges to the atmosphere, water or land.

The inventory is the heart of the LCA. It takes into account procurement (extraction, processing and transport) of raw materials, product manufacture, packaging, storage, distribution, retailing, impact in normal consumer use and final disposal. The overall process can be represented in the following diagram:

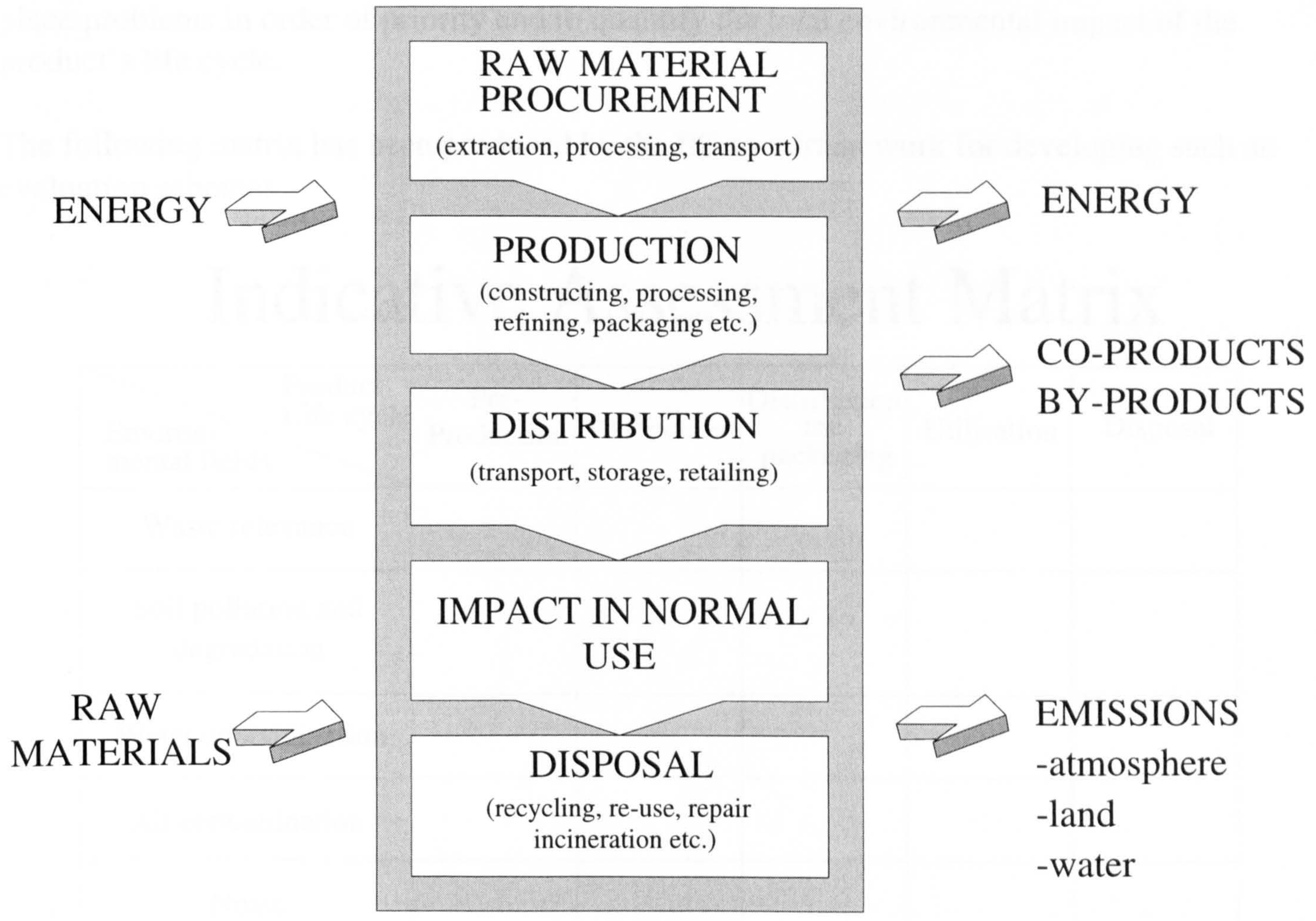

RAW MATERIAL PROCUREMENT
(extraction, processing, transport)
PRODUCTION
(constructing, processing, refining, packaging etc.)
DISTRIBUTION
(transport, storage, retailing)
IMPACT IN NORMAL USE
DISPOSAL
(recycling, re-use, repair incineration etc.)
ENERGY
ENERGY
CO-PRODUCTS
BY-PRODUCTS
RAW MATERIALS
EMISSIONS
-atmosphere
-land
-water

Figure 2

2. Evaluation. How do these inputs and outputs affect the environment?

This is an assessment of the relative significance of the data collected in the inventory, to place problems in order of priority and to quantify the total environmental impact of the product's life cycle.

The following matrix has been produced by the EC as a framework for developing such an evaluation scheme:

Indicative Assessment Matrix

Product Life cycle / Environ-mental fields	Pre-Production	Production	Distribution inc packaging	Utilisation	Disposal
Waste relevance					
Soil pollution and degredation					
Water contamination					
Air contamination					
Noise					
Consumption of energy					
Consumption of natural resources					
Effects on eco-systems					

Source: European Communities

Figure 3

3. Response. How can the environmental performance of the product be improved?
The response of the manufacturer depends on the original reasons for undertaking the LCA. It may be for competitive advantage, or to ensure compliance with environmental legislation.

Manufacturing processes are dependent on many features such as the source of raw materials, location/access and mode of transportation.

As an indication to some of the logistical complexities involved in LCA, Figure 4 shows comparative use of energy by various modes of freight transport, from a study by the Netherlands Road Transport Institute.

Mode	**Relative Energy Use** (per tonne-kilogram)
Water	57
Pipeline	60
Rail	100
Trunk roads	300
Aircraft	4,000

Figure 4

LCA is a relatively new process and scientists, business managers and environmentalists have yet to agree on terminology and methodology. Opinions, for example, differ as to how far back along the production process the LCA should begin - i.e. where exactly is the "cradle". Such boundaries must be clearly specified because studies with different boundary conditions may give different results. In principle, LCAs should consider all possible environmental effects from cradle to grave; but in practice, shortened, streamlined versions can often provide sufficient information to enable appropriate action. In terms of input and output, it is commonly accepted that anything contributing less than 1% can often be ignored.

Section 2. ENVIRONMENTAL AUDITING.

Environmental Auditing is essentially a system for checking an organisation's policies and practices, designed to evaluate and improve environmental performance. Although the term 'environmental audit' is now the most widely used, other terms such as environmental survey, assessment, evaluation and inspection are still being used, as having the same meaning, and this can cause some confusion.

There is no universally accepted definition of environmental auditing. In its strictest sense, it is a checking process to ensure that regulations and company policies towards the environment are complied with - i.e. it is concerned with auditing against standards (see the ICC definition below). A more flexible approach, sometimes called an 'environmental review', also examines environmental effects which might include examining choices and strategies (see the CBI definition below). This often serves as a precursor to the stricter form of audit outlined above.

An environmental audit can can provide key information to assist with planning and decision-making. It should result in a clear statement of what is wrong and what improvements need to be made, and this should be communicated throughout the company. Without full support and commitment from the top, it may prove to be wasteful in terms of time, resources and results. Companies are increasingly involving external consultants in the audit process, which can bring an element of objectivity to the process and introduce fresh ideas. This can also give the company a greener, more open and caring image with considerable public relations spin-offs.

The EC legislation on environmental auditing, which is now being finalised, proposes that companies registering under the scheme should conduct a comprehensive audit of a particular plant, or indeed the whole company, and that this should be validated by 'accredited external verifiers'. In the Netherlands, the 'integral environmental care system' encourages periodic internal and external environmental company reports. Although this is a voluntary initiative, the Dutch government intends to make it a mandatory system if insufficient progress is made. Sweden and Norway already have laws requiring a measure of environmental auditing, although these do not have to be verified by third parties.

Types of Environmental Audit

1. Comprehensive site audits. These are confined to a single site. They commence with an examination of site history and then proceed to evaluate production processes; resource

usage and storage; energy usage and conservation; emissions to the air, water and land; regulatory compliance; accident prevention/ emergency procedures and managerial responsibilities.

2. Compliance audits. This is presently the most common type of audit. It is a checking process enabling a company to establish the extent to which it is complying with internal policies and environmental legislation.

3. Product quality audits. These involve an assessment of safety and quality control programmes with regard to the products, labelling and packaging; involvement of the vendor; and consumer information.

4. Process safety audits. These identify and quantify hazards and risks associated with the production processes. They also cover health and safety legislation as well as safety training and procedures.

5. Occupational health audits. These involve measurement of the exposure of the workforce to air pollution, noise, heat etc.; also examining access to information, training and protective equipment.

Essential elements of an Environmental Audit

For any audit to be properly effective there are certain essential requirements: a full commitment from the management; a professionally competent and objective audit team; quality assurance; well-defined and systematic procedures; clear written reports and follow-up procedures.

Conducting an Environmental Audit.

A. Pre-audit action.
1. Confirm site or activity to be audited.
- Prioritise the installations to be audited, in relation to potential environmental impact and compliance with regulations.
- Ensure that the audit will take place during typical operations.
- Inform management and key staff of audit schedule and content.

2. Select audit team.
- The audit team is selected after the main audit issues have been identified.
- The team consists of people from inside and outside the company and a team leader is appointed.
- Responsibilities are assigned according to competence and experience.

3. Prepare the audit plan.
- Define scope of audit.
- Define priority areas.
- Determine resources needed for the site visit.
- Determine timescale for audit.
- Obtain background information about the site and company operations (e.g. by questionnaire)

B. Conducting the audit at the site.

1. Site orientation.
- Meet managers and other key personnel.
- Conduct tour of the site.
- Confirm understanding of systems, processes, personnel, regulatory laws, company policies etc. (e.g. by questionnaires, observations, interviews).

2. Gather audit evidence.
- Identify strengths/ weaknesses of systems, procedures and processes.
- Establish simple data gathering system.
- Redefine and apply testing and verification strategies.
- Ensure all findings are factual and objective.

3. Evaluate audit findings.
- Integration and evaluation of team reports.
- Discussion of preliminary results.
- Hold a final meeting with key personnel.
- Report findings to company.
- Meet site management to discuss findings.
- Request response to findings from key personnel.
- Provide site management with a written summary with recommendations (interim report).

C. Post-audit action.

1. Issue final report.
   - Prepared by the team leader.
   - Issued to all parties concerned.
   - Executive summary included for the Board.
   - Report and recommendations should be agreed by the Board.

2. Prepare and implement corrective action plan.
   - Address significant findings first, as specified in audit.
   - Monitor progress to ensure action plan is carried out.
   - Redefine corporate environmental strategy.
   - Decide on timing and structure of next audit.

Definitions of Environmental Auditing.

The 1989 International Chamber of Commerce definition of environmental auditing is now widely used in Europe:

A management tool comprising systematic, documented, periodic and objective evaluation of how well environmental organisation, management and equipment are performing with the aim of helping to safeguard the environment by:

1. facilitating management control of environmental practices;

2. assessing compliance with company policies, which would include regulatory requirements.

The 1990 Confederation of British Industry definition expands this further into an 'environmental review':

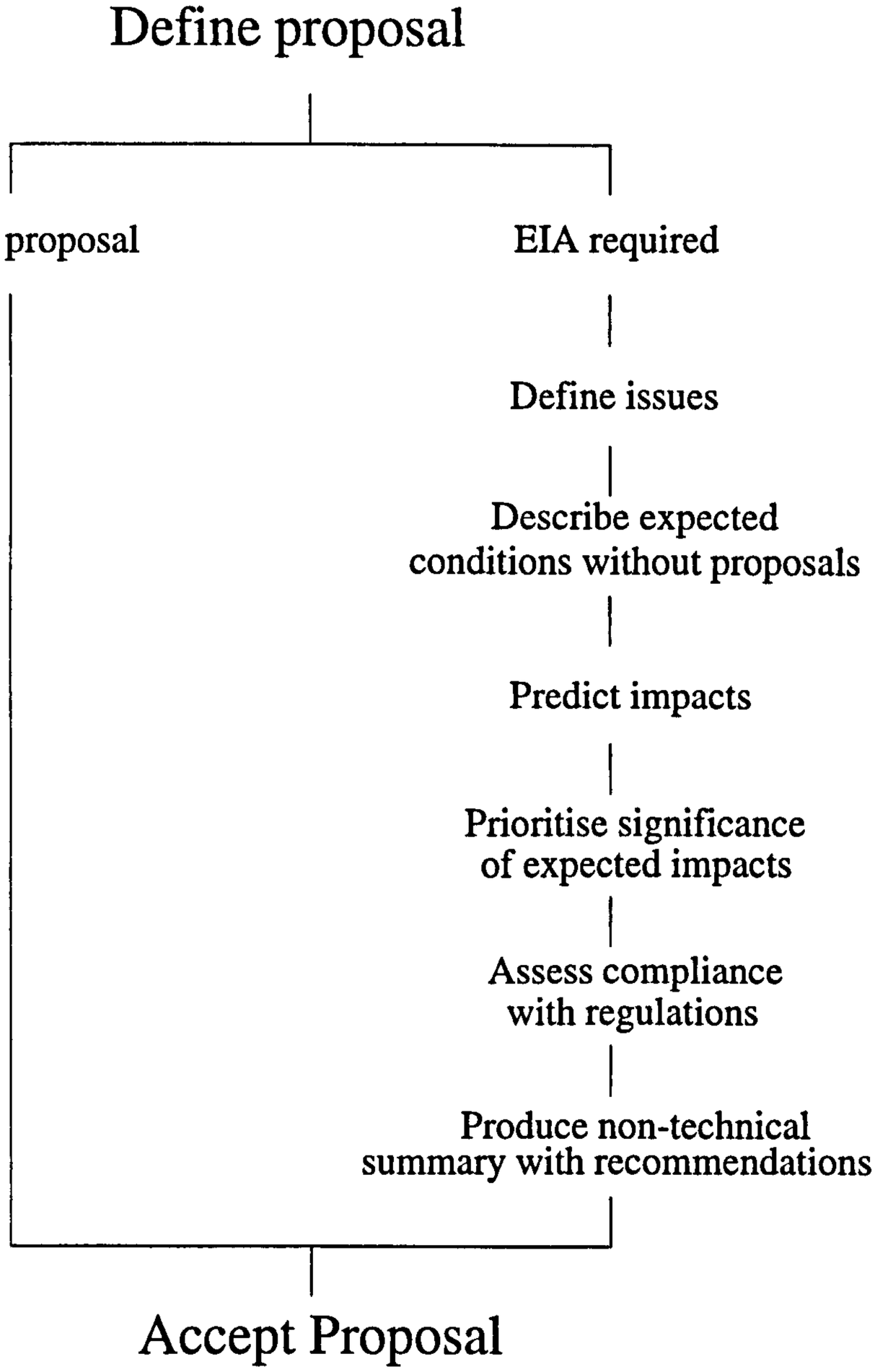
An environmental audit is the systematic examination of the interactions between any business operation and its surroundings. This includes all emissions to air, water and land; legal constraints; the effects of the neighbouring community; landscape and ecology; and the public's perception of the operating company in the local area.

Section 3. ENVIRONMENTAL IMPACT ASSESSMENT.

Environmental Impact Assessment (EIA) procedures have been designed to identify and predict the impact that proposed developments might have on the environment (both natural and human environment). An important component of an EIA is the accurate communication of this information to appropriate decision-makers. It is meant to help decision-makers to adopt the least environmentally damaging alternative as they seek to balance the demands of social and economic factors with environmental protection.

Although EIAs should generally involve careful, detailed analysis of the likely implications of a development, the level of analysis should be commensurate with the significance of the issues raised. Many countries have compiled lists of projects which should be subject to EIAs. As with environmental auditing, 'boundaries' have to be clearly specified when an EIA is being carried out. EIAs have to take into account the cyclical and random components of an environmental system, and it therefore needs a regular monitoring programme. A major deficiency in many EIAs is a failure to establish a time frame indicating when impacts are likely to be manifest (e.g.during early spring, mountainous sites can suffer huge increases in soil erosion due to flash floods from the melting snow). Significant long term, more subtle impacts can arise as a result of changes in a chain of environmental events. Thus, construction of a dam on a river will have a direct effect of preventing the upward movement of migratory fish. This might be remedied by constructing a fish ladder, or "salmon leap". However, there may also be indirect impacts on the fish populations - reduced water flow and turbulence would: i) cause the stream bed to silt up and make conditions unsuitable for fish to breed, and ii) lower the oxygen level in the water thus affecting survival. Spatial aspects are usually considered more adequately than temporal ones.

The diagram below shows the main components of an EIA:



There are standard tools for identifying impacts:
Field surveys, monitoring, modelling, literature searches, workshops, interviews with specialists, agency guidelines, general consultation and checklists.

Checklists are lists of environmental impact indicators designed to stimulate the analyst to think broadly about possible consequences of contemplated actions. Checklists that are too exhaustive can be unwieldy. A summarised checklist of impact categories is shown below:

Natural environment: fauna and flora, air and water quality, noise, natural disasters.
Cultural values.

Local economy: employment, wealth.
Aesthetics: landmarks, views, attractiveness.
Services: energy, water, transportation, housing, education, hospital care, shopping, security, fire protection, recreation.
Other social impacts: people displacement, privacy, sociability, contentment.

An EIA report should contain:
1. Description of the proposed development as well as alternatives.
2. Description of existing and expected environmental conditions without the proposed development.
3. Estimate of the probable nature and magnitude of impact on air, water and land and fauna and flora.
4. Estimate of the significance of the predicted impact on affected parties and on the environment.
5. Assessment of likely compliance with existing policies and controls.
6. Details of salient features of the assessment.
7. A non-technical summary of the assessment including recommendations for:
- acceptance of the project with inspection procedures to be followed
  after the action has been completed, or
- remedial action, or
- acceptance of one or more alternatives, or
- rejection.

Resource Material for Unit 4

Unit 4, Resource 1- for use during task 1

PROFILE OF A NON-GREEN COMPANY
This profile could be set in different European countries which would highlight some cultural and legislative differences.

Company profile - a small hotel.

This hotel has a mixture of tourists and business delegates. It has 15 twin/double bedrooms with en suite bathrooms.

Reception and the main office. The front of the building faces into the prevailing wind and, although the main door is well sealed, the reception becomes draughty when the door is opened. There are personal computers and printers at reception and in the office and these tend to be switched on all day. There is a small room leading off the main office which houses a fax machine, photocopier, binder, guillotine, etc. Unwanted office paper is thrown in the bin along with newspapers collected from the rooms. Hotel memo pads are made from recycled paper. Several of the office staff smoke and the atmosphere here tends to get rather smoky when the door and windows are closed. There are several comfortable armchairs and two slot machines in one corner of the reception area.

Restaurant. The restaurant serves international cuisine, but can provide vegetarian meals and cater for special dietary requirements. Organically grown produce is not used; there is no local 'organic farm' and the management considers the prices prohibitive and supply unreliable. Most food supplies are delivered directly from a warehouse 50km away. All meals are served in the restaurant. Bar and pool table area. Returnable bottles are saved, the rest (including broken glass) are disposed of in the ordinary rubbish bins along with bottle tops, cardboard boxes and waste paper and other 'non-organic' waste from the kitchen. Several 250W incandescent light bulbs illuminate the pool table.

Conference room. This large room is set aside for meetings. It is well equipped with over head projector with spare transparencies, high quality flip chart paper, solvent based pens and a tea urn.

Bedrooms and corridors. All are double glazed. Most rooms are supplied with chlorinated cold water from the mains; two rooms are fed directly from the cold water storage tank. The corridors are vacuumed first thing each morning and soft piped music plays all day.

Kitchen. This is the only non-smoking area in the hotel. The kitchen is clean and hygienic. There is large gas range and oven, a dishwasher and a powerful extractor fan. The two refrigerators and freezer are cooled by CFC based refrigerants. Cold storage space is lacking,

so the refrigerators are usually full and are being constantly opened. Fridges are kept at the highest permitted temperature in an attempt to save energy. Flies are a problem in summer and the electric fly repellant machine is sometimes insufficient to cope with the number of insects. All food waste is put down the waste disposal unit.

Laundry. The small internal laundry is situated in the basement. It uses high phosphate washing powder and chlorine based bleaches and the outflow pipe feeds into the hotel's main drainage system. When washing machines are operating the room becomes very warm and an electric fan has been installed to circulate the air. The main laundry is sent to a large company 100km away.

Swimming pool. The heated indoor pool is annexed to the main building. The annexe has a corrugated iron roof and in winter the thermostatically controlled heating sometimes remains on throughout the night to maintain a satisfactory temperature. The pool has an ozone based filtration system. The changing rooms and public toilets have automatic hot air hand driers and two of the showers drip very slightly.

Boiler room. This contains the gas heating boilers and the water storage tanks. The boilers are well lagged and supply adequate heating for all the rooms and the swimming pool. The hot and cold water storage tanks are next to each other and the cold water sometimes runs luke warm.

Outside. Behind the hotel is a tarmacked car park. Between the car park and the hotel, screened by a breeze block wall, is a rubbish bin compound adjacent to the kitchen wall, a now defunct diesel oil storage tank which leaks slightly onto the ground, and a securely locked storage shed well stocked with herbicides, pesticides and an array of heavy machinery such as mowers, rotivators and a cement mixer. Runoff from this whole area behind the hotel is conveyed via the main drainage system into a small stream which feeds the ornamental pond in front of the hotel. Grass cuttings are placed out of sight under the hedges around the car park.

Unit 4, Resource 2 - for use during task 1

Note : only parts of this resource will be relevant to you. Task 1 description, (e-mailed) will tell you which part.

WASTE MANAGEMENT AND CONSERVATION OF NATURAL RESOURCES

The conservation and exploitation of natural resources (minerals, plants, animals, etc.) in the immediate vicinity and futher afield should be a prime consideration at all times. We are beginning to appreciate the growing problem of disposal of waste due to its negative effects on our environment and quality of life. To achieve efficient waste management we must take

into account three key processes:
Reduction of the quantity of waste produced, by avoiding the purchase of disposable and over packaged goods.
Re-use of items in their original form for the same or a different purpose (e.g. refillable bottles, cloth towels, rechargeable batteries).
Recycling, extraction of waste materials or recovery of useful materials to meet a market demand.
Recyclable and re-usable materials are collected in designated containers, then sorted and sold for processing into new products.

METAL
Aluminium. Cans and foil are separated from steel cans with magnets, shredded, de-lacquered and melted down to make aluminium products. 95% of recyclable aluminium can be utilised and the process uses 5% of the amount of energy required for initial production. Some companies will now pay individuals for scrap aluminium by the gram. *Steel cans.* Because of the protective tin coating on the steel, these cans are de-tinned and fed into steel making furnaces. The steel can be used to make new cans and almost any kind of familiar consumer product, from refrigerators to cars.
PAPER.
After being collected paper is cleaned, re-pulped and mixed with varying percentages of virgin pulp, then made into paper used in the manufacture of boxboard, tissue, printing and writing papers, newsprint and liner-board. The demand for newspaper by pulp mills fluctuates considerably; but demand and prices for office paper tend to remain fairly constant. Recycled paper is quite adequate for most stationery products. Recycled toilet paper is now readily available, although the quality and corresponding price varies widely.
GLASS.
Bottles and jars can be crushed, melted in a furnace and moulded into new containers. Waste glass is also used in the manufacture of fibreglass, glass beads for reflective paint and certain road and sewer building materials.
PLASTIC.
Soft drink bottles and similar products can be sorted and converted into resin-pellets, which are usually melted and moulded into a desired shape.Resulting products include drain pipes, plastic bags, non-food containers and other household appliances. Some plastic containers such as liquid detergent bottles can be refilled by the suppliers. Polyethylene packaging is a preferable environmental option to PVC (polyvinylchlorine) packaging.

FOOD AND ORGANIC WASTE.

Any waste that is of animal or vegetable origin is organic waste. It can be separated for composting or for animal food:

Composting. Vegetable food stuff mixed with grass cuttings can be useful for composting and the resulting compost can be used instead of peat-based composts in gardens, (peat extraction is resulting in the decline of northwest Europe's unique wetland habitats).

Animal feed. Systems exist for the recycling of meat scraps into fertilizer and animal feed (pig swill).

Wood and bark. can be easily shredded mechanically to provide inexpensive mulch for flower beds.

FUEL.

Used engine oil is contaminated with lead and other chemicals. Extracting them allows the processed oil to be used again, either as lubricating oil or for heating. Many local authorities provide tanks for sump oil and some street garages are starting to provide facilities.

Reputable waste disposal contractors will safely remove fuel and other chemicals from a site if necessary.

TEXTILES.

Old clothes can be used as rag roofing felt. Some local authorities and charities have textile skips at civic amenity centres and rags merchants will take textiles for recycling. Lower quality rags end up as mixed rags which are separated and used for a variety of purposes such as woollen cloth, upholstery stuffing or blanket manufacture.

CHEMICALS.

These are many and varied. The following list helps to categorise them: Paints and inks (water based varieties are less toxic than solvent based ones), strippers, thinners, wood treatment/preservatives (flammable and toxic).

Garden & pet products - pesticides, herbicides, fungicides, repellents, fertilisers.

Motoring products - engine oil, brake transmission fluid, antifreeze, polish, wax, filler.

Household cleaners - bleaches, disinfectants, deodorisers, air fresheners.

Pharmaceuticals - medicines (intended to be effective at low dosages!), cosmetics, toiletries (partly used soap can be further used in public toilets).

Water treatment chemicals - softeners, hardeners, pool chemicals, water filters.

Other: fluorescent tubes, light bulbs, batteries, smoke alarms. CFCs (used as aerosol sprays, fire protection equipment, insulants and refrigerants, have an impact on the ozone layer several thousand times greater than carbon dioxide. They are very stable and persist in the atmosphere for a long time. Alternatives are now available).

Chemicals should always have health and safety data sheets available for employees to read and training in the safe use of chemicals should be given to staff. "No smoking" signs etc.,

appropriate fire extinguishers and emergency procedure instructions should be nearby.
But there are still some products which are not recycable and they are usually disposed of in **landfill site** (90%) or by **incineration**. Incineration is the usual method of disposal where no suitable landfill capacity is available within an economic haul distance.

The CBI recommends that companies should publish a statement of their policy on waste disposal, proper records should be kept and this should be the responsibility of a particular senior manager.

ENERGY USE AND CONSERVATION

Since the Industrial Revolution energy production has led to general prosperity and improved quality of life. But there is a direct relationship between energy consumption and environmental pollution and this has resulted in a range of global environmental problems such as global warming, ozone depletion and acid rain. Environmental management revolves around conserving natural resources and this can be achieved by giving priority to energy efficiency - i.e. reducing emissions and waste and switching to energy saving technology, renewable resources and forms of renewable energy such as solar, biomass (plant and animal matter), hydro, wind and wave power. Efforts and investment in the reduction of energy consumption can also provide economic benefits. The section below gives some idea of the scope for reducing energy consumption without reducing comfort, profit or safety standards or contravening regulations.

Buildings.

1. Energy conscious design features. Solar panels; double (or triple) glazed windows, the size depending on the direction they are facing; underground buildings; passive heat storage and efficient heat exchangers.
2. Insulation. Roof and pipe insulation; cavity wall insulation; external wall insulation and cladding; draught-proof doors prevent heat loss and double entrance doors and revolving doors provide an effective thermal barrier; outside windbreaks can be planted or constructed.
3. Appliance Efficiency (this often depends on regular servicing). Low energy or fluorescent lighting; air and water heating; cooking, washing, refrigeration and air conditioning.
4. Electronic management systems for lighting, heating, refrigeration etc. (e.g. thermostats, timer switches, meters in appropriate areas). Computers can be programmed to switch off if they are not being used. Bedroom lights that are switched off when the door is locked from the outside.
5. Swimming pool heating systems can be switched off at night and thermal pool covers used to retain the heat.

Transportation

Transport of supplies and staff; distribution planning; motor efficiency.

WATER USE AND CONSERVATION

Fresh water is a fragile natural resource and is fundamental to public health, food production and the health of all living plants and animals.

Sources are frequently enriched with industrial, agricultural and domestic waste and other toxic chemicals and this polluted water can be a major cause of disease. Our main sources of supply are natural ground water, natural springs, lakes (natural or artificial), rivers and occasionally oceans (although desalination plants are very costly).

Uses: Potable water is used primarily for drinking, personal hygiene, cooking, cleaning, washing, heating and cooling. It must be low in bacteria, dissolved solids and suspended solids (not exceeding defined local, national, EC and World Health Organisation limits), colourless, clear, odourless, taste good and non-corrosive in pipes and tanks.

An Environmental Audit action plan should take the following areas into account:

1. Water quality.

Assessment and improvement recommendations: the clarity,
salts, suspended solids (sand filters), iron (potassium permanganate and filtration), corrosivity, number and type of bacteria (chlorination), odour and taste (activated carbon filter), etc. In swimming pools, if ozone filters are used instead of chlorine based filtration systems, the water quality is improved and there is no handling of dangerous chlorine based chemicals. Ozone gas itself is toxic and the filtration system will require regular servicing.

2. Treatment plants.

Check that water treatment plants (local and internal) comply with regulations.

3. Identification and reduction of harmful substances.

All the materials which can get into the waste water and have a detrimental effect on the environment need to be reduced (e.g. pesticides, sprays, medicines, batteries, etc.). Cleaning chemicals can be pose a significant problem:

Chlorine is used in the laundry for stain removal, sterilising linen and to maintain whiteness. Some chloro-organic compounds degrade very slowly in the environment. As alternatives we can use less damaging hydrogen peroxide bleach which has excellent sterilising capabilities.

Phosphates in detergents sequester the hardness in water and promote the removal of suspended dirt particles. Phosphorus compounds can cause a rapid growth of algae and slime

in lakes and rivers. Low and non-phosphate biodegradable detergents are now readily available. Check disposal practices; identify the chemical content and decide which ones can be replaced by alternatives.

4. Water systems.

Hot and cold water storage tanks: stagnant water, sufficient turnover, supply and suction at opposite ends, firmly covered, vandalproof, eliminate favourable breeding conditions for *Legionnella* i.e. not less than 49°C. Plumbing: lead and asbestos piping, grease traps in kitchen waste pipes, backflow, fire prevention equipment, leaks - in a 24 hour period, one slowly dripping tap can account for the loss of 30 litres ($6^1/_2$ gallons) of water.

5. Water conservation measures.

Install meters in areas such as kitchens, gardens, laundry, etc.; repair leaks as soon as they occur; operate laundry equipment only with full load; re-channel lost water from boilers and cooling towers; set toilet flush tanks to 8 litres; install pressure regulators for shower heads; install aerators in taps; set operating procedures for each department.

OUTDOOR AIR EMISSIONS AND INDOOR AIR QUALITY (IAQ)

Ambient air quality standards have been adopted in the EC to protect public health. They apply to sulphur dioxide, oxides of nitrogen, particulates, and to lead (mostly from leaded fuel). Up to 90% of these pollutants can be removed. Indoor air is the ambient air inside a building, to which the building occupants are exposed. It is the quality of indoor air in terms of the proportions of normal air gases and the concentration of pollutants.

Potential air pollutants may include:

1. Combustion products.

Gases (e.g. carbon monoxide, sulphur dioxide, nitrogen oxides) and soot or other suspended particles from boilers, cooking stoves, generators, vehicle engines, etc. Sulphur dioxide, nitrogen oxide (NO_x) and hydrocarbons dissolve in water to form acid rain and hence acid lakes and forest dieback. Greenhouse gases include carbon dioxide from fossil fuel combustion and deforestation; nitrous oxide from fuel combustion and fertilisers; methane from animals, decomposition, landfills and natural gas leakage; CFCs and water vapour. Natural gas produces lower carbon emissions when burned than coal.

2. Chemical vapours.

From cleaning solvents, pesticides, CFCs (in aerosol sprays, refrigerator coolants, fire extinguisher foams - primarily responsible for ozone depletion so such appliances should be checked for leaks on a regular basis), paints and varnishes, etc. Annoying odours from kitchens, toilets, etc. can lower the IAQ, even when they are below levels for health concern.

3. Dust, pollen or particulate matter.

Irritating to people with allergies and respiratory weaknesses.

4. Building materials.
Toxic substances such as formaldehyde in foam insulation, plasticizers, fibreglass, asbestos (used in older buildings for insulation - especially dangerous in cement water pipes or when disturbed by roof repair work etc.).
5. Tobacco smoking products.
'Passive smoking' health and nuisance effects; fittings and decorations are degraded.
6. Airborne micro-organisms.
Commonly spread by droplet infection in poorly ventilated or overcrowded rooms (e.g. colds, flu); sometimes associated with moisture in ventilation systems (e.g. *Legionnella*).
7. Equipment in the building.
e.g. photocopiers produce poisonous ozone and should be kept in an open, well-ventilated room; dry cleaning machines using solvents, etc.

Additional characteristics important to take into account:
- **Ventilation** helps to dilute pollutants.
- **Humidity,** when high causes discomfort, mildew and consequent damage to materials; when low it reduces heating efficiency and causes static, sore throats and other irritations.
To achieve proper management of outdoor and indoor air quality, tests, control procedures and long term monitoring is essential as some pollutants will be subject to cyclical or random fluctuations.

PRODUCT PURCHASE

Responsible purchasing is a significant way in which an organisation can preserve natural resources and help protect the environment. Moral and ethical reasons aside, it is cost effective to purchase responsibly and to minimise waste at a time when landfill sites are approaching full capacity.
Certain general principles can be applied to each purchasing decision:
1. Buy only what you really need.
Scrutinize all purchase requests.
2. Buy quality.
High quality, durable goods do not need replacing as frequently, they save money and resources in the long run.
3. Buy locally.
Transportation costs will be reduced. Locally purchased food items tend to be less processed with fewer preservatives. The local economy benefits.

4. Buy in bulk.
Reducing the amount of packaging produced. Saving energy by reducing deliveries. Costs less.
5. Buy for energy efficiency.
Energy efficient appliances (bulbs, etc.) may cost more initially but will save money in the long term.
6. Buy for simplicity.
Equipment and appliances only need to satisfy the basic requirements of their jobs; extras can be costly, wasteful and unnecessary. Refined or processed food takes more energy to produce it.
7. Buy recycled or recyclable products.
This will help develop markets for these goods; only then will recycling programmes be successful.
8. Avoid disposable goods.
If they are not recycled or biodegradable they only add to the accumulation in landfills. Almost all have viable alternatives.
9. Favour environmentally friendly products.
(e.g. unbleached paper, non-aerosol cleaners, phosphate free detergents - phosphates released into sewerage can provide extra nutrients for micro-organisms and result in an increase in the amount of poisonous algal blooms in rivers). This will encourage manufacturers to make and market more of these products.
10. Minimise packaging.
It may be excessive or inappropriate for the product.
11. Beware of exaggerated claims by vendors.
Investigate some of the products in depth - especially where terms like 'environmentally friendly' and 'recyclable' are used!
12. Consider hiring instead of buying.
Especially products only used occasionally such as certain tools, Christmas decorations, etc.
13. Minimise hazardous chemicals.
(e.g. pesticides and herbicides). Apart from the obvious dangers to people. They may comprise a range of complex chemical compounds which are non-specific and can kill a range of other species as well. There are often viable alternatives to chemical control: *Biological control* - the introduction of natural predators. *Physical control* - such as blocking or trapping of animal pests (e.g. the use of ultra violet light to attract insects to electrical exterminators and flame guns to control weeds). If chemical control is used, proper management is essential, storage, protection, preparation and application.

Unit 4, Resource 3 - for use during task 2

Note : only parts of this resource will be relevant to you. Task 2 description, (e-mailed) will tell you which part.

DEVELOPMENT PLANS FOR THE NEWLY GREENED COMPANY

The hotel is considering buying a large area of heathland behind the premises and turning it into a golf course. The land is currently unmanaged although some locals still graze livestock and collect firewood on parts of it. The whole site consists of variety of dwarf-shrub and herbaceous plants interspersed with clumps of woodland. There are a few derelict farm buildings but most have now virtually disappeared. The dry heathland gradually slopes away from the hotel complex and only becomes wetter as the ground water-table comes near to the surface at the far end of the site, where there is a natural lake. The plan is to pump water from this lake for watering the course. The clubhouse will be built on the site of the existing hotel car park and a new car park is to be laid at the top end of the heath with a limestone hardcore surface - just above an area of heath supporting a large, but isolated patch of a nationally rare species of moss. Notable animals on the site include two local rarities at the edge of their geographical ranges: a venomous snake which favours damper parts of the heath and a species of nightjar which attracts numerous birdwatchers to the area.

Soils

Dry heathlands are usually found on light, acidic, sandy soils which are well-drained. They generally occur in regions where the soil receives more water from rain than it loses through evaporation. This coupled with the good drainage causes many nutrients to get washed down through the soil, beyond the reach of the plant roots. Nitrogenous fertilisers and organic matter can be added to increase the nutrient content of the soil, and the soil acidity can be neutralised by adding lime (from limestone or chalk). Where drainage is poor or the water table is close to the surface, as in valleys or depressions, a wet heath or peaty bog develops, with a much richer flora.

Plants

The dominant heath plants may live for many years and have several different distinct growth phases, each providing suitable conditions for different associated species. It is therefore important to ensure all phases are represented at all times - a situation usually controlled by a balance of natural fires and grazing animals which prevent the growth of invasive trees and shrubs. Natural or artificial depressions give rise to rich bog plant communities which often harbour locally rare species and provide breeding places for insects such as dragonflies.

Large tracts of heath support a greater diversity of plants than several smaller blocks representing the same area. Fragmentation of blocks may isolate plants with poor dispersal mechanisms and cause problems such as inbreeding. Many heathland plants are specially adapted to the soil they grow in and are therefore able to outcompete species which are more common elsewhere.

Animals

Heathlands represent a distinctive habitat for wildlife and one which is rapidly declining in Europe. The dominant heath plants may live for many years and have several different distinct growth phases, each providing suitable conditions for different associated species. It is therefore important that all phases are represented at all times - a situation usually controlled by a balance of natural fires and grazing animals which prevent the growth of invasive trees and shrubs. Natural or artificial depressions give rise to wet-heath and bog plant communities provide breeding places for insects such as dragonflies. Large tracts of heath support a greater diversity of plants and animals than several smaller blocks representing the same area. Fragmentation of blocks may isolate some of the less mobile animals and eliminate others, such as hunting birds, which require a large territory of unfragmented habitat. Nightjars are a good example of 'heathland-edge' birds which require a particular habitat combination; they prefer to breed in clearings amongst the scrub or in areas where scrub is encroaching onto open heathland and, being insect eaters, they catch most of their food over the wetter, boggy areas.

Air

Burning organic matter releases plant nutrients such as nitrogen and sulphur which dissolve in water in the air and form acidic rainwater usually precipitated elsewhere. These nutrient losses are replaced by input from falling leaves, dying plants, dung, etc. Natural fires help to maintain heathland, but if fires are too frequent or intense there are accumulated losses over time and a decline in the amount of plant nutrients available. Car exhaust produces carbon dioxide which dissolves in water to form carbonic acid. The carbon monoxide released is less dense than air and disperses rapidly. Certain species of mosses and lichens which grow on trees, walls and roofs are very sensitive to air pollution and can thus be used as pollution indicators.

Water

Although heaths may receive a high rainfall, the soils have a poor water holding capacity and they dry out very rapidly. Nutrients tend to be washed down into valleys and depressions. Nutrients are rapidly taken up by aquatic green algae which may form 'algal blooms'. When these die, their decomposition uses up vital oxygen from the water, causing

stagnation. If there are areas on hillsides where the vegetation is too sparse to anchor the soil, (through trampling, overgrazing, etc.) water runoff plays an important role in eroding away the soil, especially where there is an adjacent area of impervious ground causing local flash flooding from excessive runoff. The water-table rises and falls seasonally according to rainfall, and organisms in and around the water are adapted to these fluctuations.

UNIT 5

Looking at Case Studies, Live Satellite Presentations

Introduction to Unit 5

This is the final unit of the course, it will only be of any use to those learners who are making use of the DBS communications offered during the course.

It is an excellent opportunity to allow you to benefit from the experiences of others who have tried to implement environmental planning strategies in their corporate management. You will be able to watch live presentations given by the people at the forefront of environmental decision-making.

Before the transmission begins you will receive a document by e-mail which will inform you of the content of the presentations. You will then have one week before the transmission to formulate questions and points that you wish to pose to the presenters. Whilst the transmission is going on, you will have the opportunity to e-mail your questions to the presenters, who will deal with them live during the transmission.

As the EA course will run for three months we have decided not to pre-plan who shall give the presentations. This will be decided as the course proceeds so that we can make the subject material as relevant as possible to the issues identified during the course.

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Appendix A(ii)

Loose leaf Course Material:

Introduction Letter,
login ID explained,
map of Puedam,
Issues sheet,
Connection software explained.

Course Introduction Letter

Welcome to the IT CERES distance training course on Environmental Awareness. we hope that you will find this course both valuable and enjoyable. This introduction will explain the contents of this study pack, what you will need to do before the course starts and tell you how to get help with any problems you have. It will also give a few hints on how to get the most out of the course.

The study pack, including this letter. has been constructed to help you with your work during the course. You will need evelY part of it at some stage during the course so try to keep it together and in good condition as it will need to last me full three months of course. In the study pack you should have received:

This study pack

❑ This letter

❑ Your login ID sheet. this tells you your login and explains the code used. It is important that you understand the code as it tells you which study room conference to join and your leamer number.

❑ An information sheet which we would like you to fill in and return to us so that we can assess this project properly.

❑ Your leamer handbook. titled 'Environmental Awareness', this has all of the background infonnation which you will need. The course has been split up into units. each unit has its own chapter in the book which gives all of the relevant information to that part of the course. At the start of each of the units is an introduction. this will tell you what to expect during that unit.

❑ A map of an area known as Puedam and a sheet for issues identified. These will be used in Unit 2 of the course which is a role-play. Read the chapter on Unit 2 for more information.

❑ A schedule or timetable. This gives details of all of the events during the

course. It shows all of the tasks which you are asked to complete, the dates by which they should be completed. the satellite broadcast dates (if taken) and the start and end dates of the units.

What do you need to do before you can start the course?

❑ You will need to ensure that you have access to a computer with a modem, you should be issued with a login ID ready to use during unit one of the course which starts on 18 March '93.

❑ You should read the first chapter entitled Unit 1, Introduction to computer conferencing.

❑ We would be very grateful if you would complete the information sheet. questionnaire and send it back tous before the course starts.

❑ You should look at the course schedule so that you will have an idea of what will happen during the next few months.

❑ On the 18 March. you will be able to log on to the system and cany out the introductoly tasks to familiarise yourself with the computer conferencing system.

Where can I get help?

There are two sources of help one for technical help and one for general course help:

❑ Any general problems with the course material. tasks or course support you should contact Marc Lagadec at IT CERES on TEL: (0703) 593478 from within UK or + 044 703 593478 outside the UK. FAX : (0703) 676711, UK or +044 703 676711 outside UK.

❑ Any problems with the computer conferencing system should be directed to Charles Jennings or Robin Findlay at CECOMM on TEL: (0703) 235476, UK or +044 703 235476 outside UK. FAX: (0703) 233312, UK or +044 703 233312 outside UK.

What is the best way to get the most out of this course?

This course uses computer conferencing and satellite broadcasting to provide distance training. this is what makes it so new and exciting. The trouble is that you are unlikely to be used to communicating using a computer conference system. To get the most out of this course you should try to overcome this by using it as much as possible, not being afraid to make mistakes. Remember. this is a pilot project so everyone is new to it, you should see it as an ideal time to have a go and not worry about mistakes.

The course runs for three months which is a relatively long time. Hopefully the course material will be so interesting that you will not lose interest after the initial novelty has worn off. All parts of the course follow on and link together. missing a part of it will destroy the continuity. Unless you are involved in the whole course you will miss vital information which will allow you to explore the subject as a whole.

The tasks which you are set will often ask you to work together in groups, each member of the group making a contribution to the work. This means that you will have to rely on each others input to ensure that the task can be completed properly.

I hope that this has not frightened you too much - the only way that this course will be a success is if you enjoy doing it. So best of luck and enjoy your study of the most important subject to the continuation of our planet....

Your Login ID explained

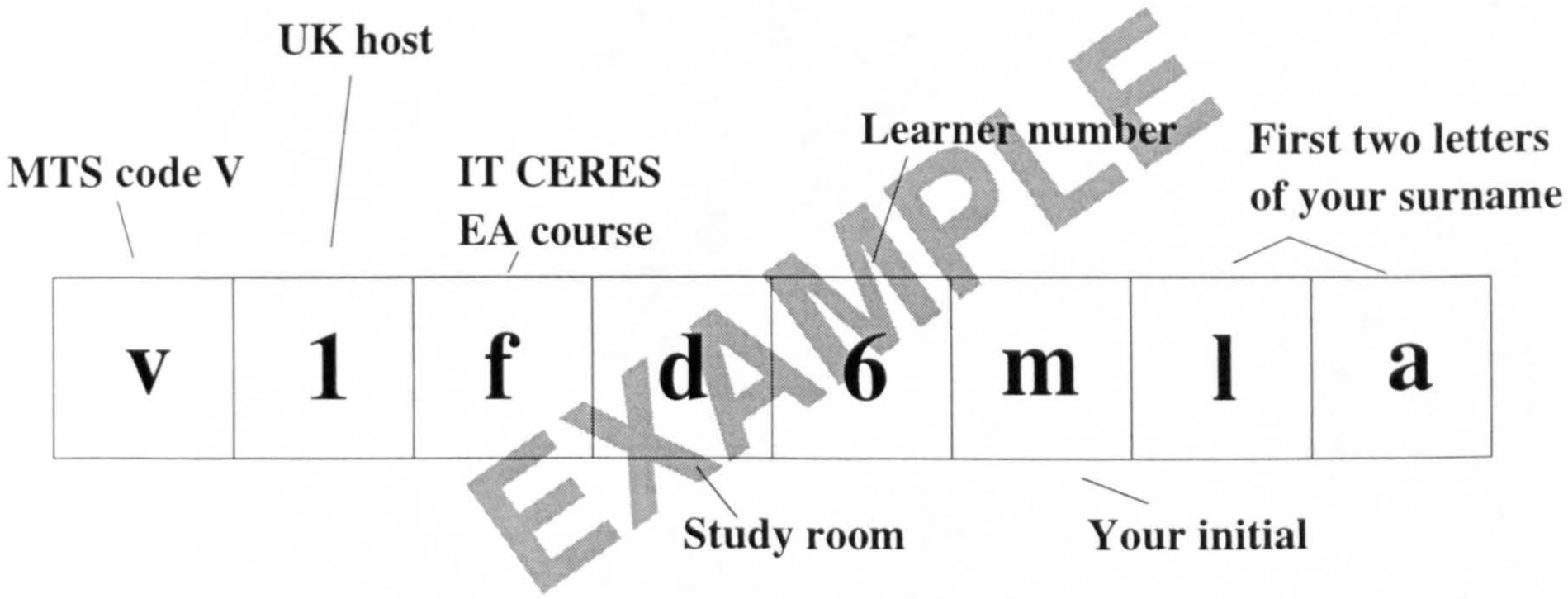
You will be asked for your login ID each time you join the computer conference system to do some work. For this reason you should keep a careful note of it. If for some reason you forget or loose it, you can call either of the help lines and we will issue a new login ID.

The login ID is a special code, it gives you information about which study room computer conference you are in and your learner number. The diagram below shows an example login ID and explains the parts of it.

The study group letter refers to which study room conference you should join, ie someone with the study group letter d should join study room conference d when working on their tasks.

The learner number ranges from 0 to 9, each study group has ten learners in it, when you are each given a separate task to work on your learner number will be used to tell you which part refers to you. ie task 99 learners 1 and 2 should look at issue 1, etc would tell learners 1 and 2 to work on issue 1.

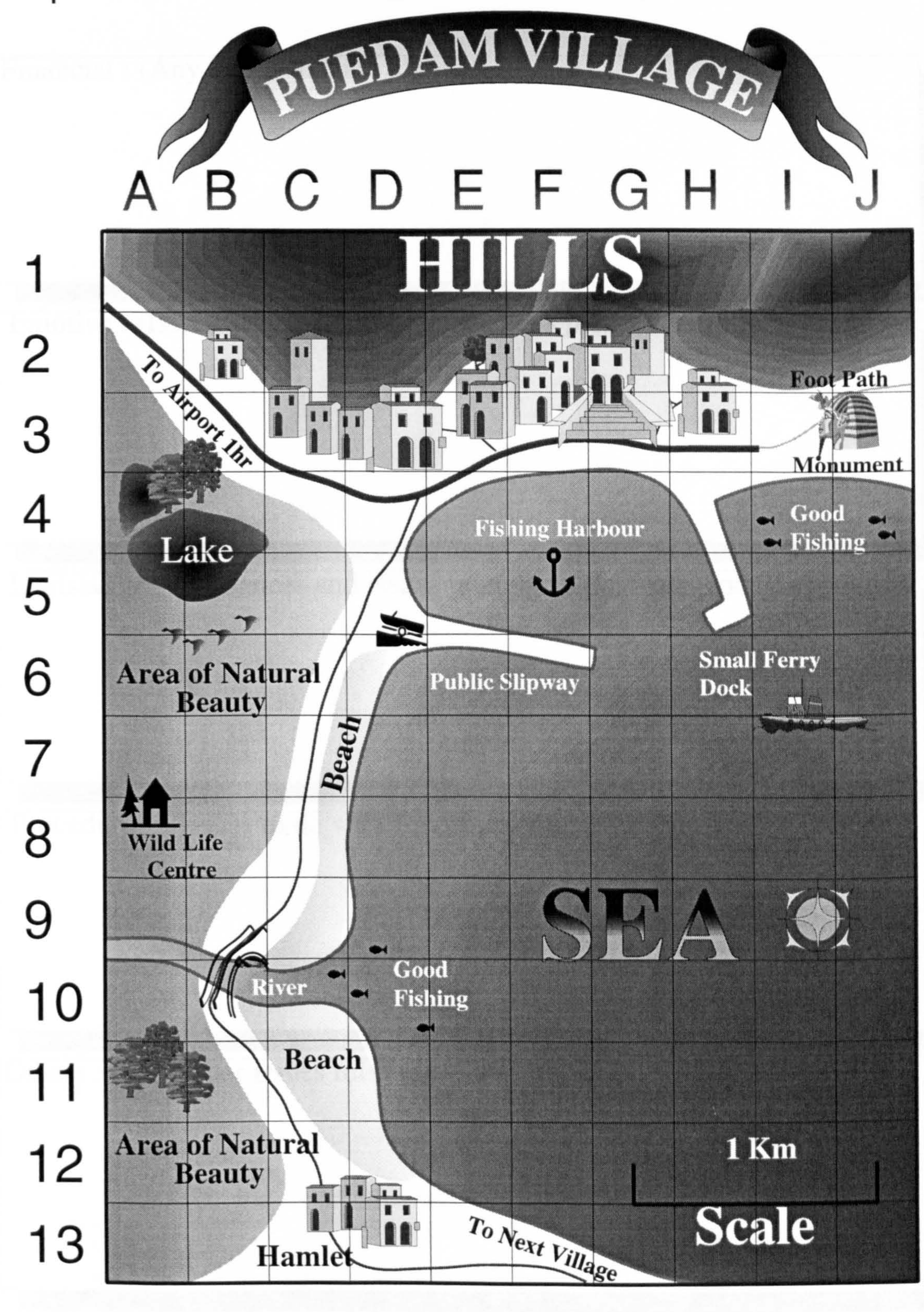
This simple system has been adopted to allow easy communication between the tutors and learners as they can send a global e-mail to all learners in study group a, or all learner 4's in all study groups etc.



In this example for Marc Lagadec, v1f identifies the EA course, d tells me that I am in study group d, the 6 tells me that my learner number is 6, m for Marc and la for Lagadec

YOUR LOGIN ID IS:	v	1	f					

Map of Puedam



Issues Identified During the Role-Play

Financial : (Any issues that are affected by costs.)

Emotive : (Issues which relate to individuals personal emotions.)

Legislative : (influences and issues relating to Environmental Legislation.)

Procedural : (Issues to do with Environmental Procedures.)

Others : (Any other issues relevant to the subject.)

Windows 3.1 connection software

To install:

- ❒ copy the terminal.trm file into the windows directory of you hard disc
- ❒ reset the computer

To use:

- ❒ run windows
- ❒ run the terminal application
- ❒ change the telephone number to: + 044 703 336298
- ❒ save the file terminal.trm file from the file menu in the terminal application
- ❒ now click on the dial button, to get to login
- ❒ if you change the level button you will go to level two and you can use the short cut buttons to see messages, join a conference etc,

If you have any problems please call Marc Lagadec on +044 703 593478

IT CERES

Appendix B

References to conference printout

The cross referencing system is explained by making use of an example rating table following the same format as those in Appendix E.

Example

❒ Intended learning outcomes criteria.

0				✗11							
1	✗12										
2	✗13										
3			✗14								
4						✗15					
5					✗16						
6											✗17
7					✗18						
8											✗19
9			✗20								
	10	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**0**

High level observed. Medium level observed. No observable reading.

A table such as the one shown was constructed for each of the five learner groups, a to e. Within this table, the number in the far left hand column indicates the learner's numbers, numbered 0 to 9. This information was readily available during the evaluation as the learner's number and group label was recorded by the host computer as part of their discussion element. As well as indicating the observed rating for each of the members of the learner group, indicated by an ✗, the table also gave a reference number. This reference number refers to a sample conference item used to qualify the rating given.

In order to find the conference sample, the reference number given for each

rating may be looked up in a table (Appendix E). This in turn gives a reference to the conference discussion. It is thus possible for any interested party to cross reference each of the ratings with a sample of the conference discussion which led to that particular rating being awarded. Taking the example of the 7th learner in the table above, their rating score was awarded as 6 and the reference for this rating is 18. Reference 18 in this appendix is of the form:

REF : 18 Item : ie 1.1 Conference : ie studyc.
Conference text used to make the rating.

Although this is not quickest way to obtain the information, the printout of the conference discussion occupies approximately 400 pages, therefore it would be inappropriate to include it within the rating scale information.

Ref	Item	Conf	Ref	Item	Conf
1	5.1	studya	24	NA	
2	17.0		25	9.2	bar
3	N/A	26	1.8	studyc	
4	6.8		27	NA	
5	3.10		28	4.8	bar
6	4.4		29	NA	
7	10.4		30	NA	
8	1.4		31	1.2	bar
9	12.0	bar	32	4.6	bar
10	NA		33	NA	
11	2.1	studyb	34	3.8	bar
12	7.0		35	1.11	studyd
13	4.0		36	2.12	
14	1.3		37	1.3	
15	10.3		38	NA	
16	4.3	bar	39	5.2	bar
17	NA		40	1.9	studyd
18	4.10	bar	41	1.7	studye
19	NA		42	1.3	
20	5.9	bar	43	2.4	
21	NA		44	NA	
22	12.2	bar	45	10.9	bar
23	1.1	studyc	46	NA	

Ref	Item	Conf	Ref	Item	Conf
47	2.7	studye	70	4.12	studyb
48	1.2		71	NA	
49	2.3		72	2.1	studyc
50	5.6	bar	73	5.5	
51	5.1	studya	74	NA	
52	3.6		75	2.3	
53	NA		76	3.4	
54	5.3	studya	77	NA	
55	3.12		78	2.7	
56	4.5		79	NA	
57	3.13		80	NA	
58	NA		81	2.8	studyd
59	4.1	studya	82	4.3	
60	NA		83	NA	
61	4.8	studyb	84	3.1	
62	3.8		85	4.7	
63	4.10		86	2.12	
64	7.2		87	2.9	
65	NA		88	NA	
66	NA		89	4.4	
67	NA		90	5.2	
68	NA		91	5.4	studye
69	NA		92	4.9	

Ref	Item	Conf	Ref	Item	Conf
93	3.6	studye	116	13.3	studyb
94	NA		117	NA	
95	5.1		118	10.4	studyb
96	NA		119	NA	
97	3.2		120	14.1	studyb
98	4.10		121	NA	email
99	4.12		122	NA	
100	4.7		123	NA	
101	13.1	studya	124	NA	
102	11.3		125	NA	
103	NA		126	NA	
104	11.4	studya	127	NA	
105	12.4		128	NA	
106	13.3		129	NA	
107	14.1		130	NA	
108	NA		131	NA	
109	11.1	studya	132	NA	
110	NA		133	NA	
111	13.2	studyb	134	NA	
112	10.1		135	NA	
113	11.1		136	NA	
114	12.3		137	NA	
115	NA		138	NA	

Ref	Item	Conf	Ref	Item	Conf
139	NA	email	162	20.4	studya
140	NA		163	18.1	studya
141	NA		164	21.5	studya
142	11.1	studye	165	NA	
143	NA	email	166	NA	
144	NA		167	NA	
145	10.10	studye	168	13.6	studyf
146	NA	email	169	NA	
147	NA		170	12.1	studyf
148	NA		171	NA	
149	10.13	studye	172	20.2	studya
150	10.1		173	22.3	studya
151	NA		174	NA	
152	22.0	studya	175	15.8	studyb
153	NA		176	NA	
154	NA		177	NA	
155	17.2	studyc	178	15.2	studyg
156	16.2	studye	179	NA	
157	15.1	studye	180	NA	
158	NA		181	NA	
159	18.2	studya	182	15.9	studyb
160	NA		183	NA	
161	17.7	studya	184	NA	

Ref	Item	Conf	Ref	Item	Conf
185	NA		208	1.4	studya
186	NA		209	21.1	
187	16.5	studyb	210	NA	
188	NA		211	4.8	studyb
189	15.4	studyb	212	5.5	
190	15.10		213	5.4	
191	NA	email	214	7.2	
192	18.1	studyc	215	10.5	
193	NA	email	216	12.2	
194	NA		217	NA	
195	NA		218	4.13	
196	NA		219	NA	
197	NA		220	3.10	
198	NA		221	NA	
199	NA		222	3.6	studyc
200	15.3	studyb	223	4.2	
201	13.1	studya	224	NA	
202	20.3		225	10.1	
203	NA		226	7.3	
204	12.3		227	NA	
205	11.2		228	11.4	
206	6.9		229	NA	
207	3.11		230	NA	

Ref	Item	Conf	Ref	Item	Conf
231	2.5	studyd	254	5.5	studya
232	4.5		255	18.3	studyc
233	NA		256	15.2	studye
234	2.13		257	16.1	studye
235	5.4		258	NA	
236	2.12		259	21.1	studya
237	5.1		260	NA	
238	NA		261	7.5	studyb
239	6.0		262	10.1	
240	3.2		263	13.1	
241	2.5	studye	264	4.4	
242	5.2		265	NA	
243	3.5		266	5.7	
244	NA		267	NA	
245	4.2	studye	268	3.12	
246	NA		269	NA	
247	4.16	studye	270	7.8	
248	5.5		271	NA	
249	4.13		272	4.3	studyc
250	10.11		273	2.6	
251	3.5	studya	274	NA	
252	22.0		275	3.5	
253	NA		276	5.6	

Ref	Item	Conf	Ref	Item	Conf
277	NA		300	10.6	studye
278	10.2	studyc	301	13.1	studya
279	NA		302	7.2	
280	NA		303	NA	
281	6.1	studyd	304	10.5	
282	4.2		305	5.4	
283	NA		306	7.1	
284	4.8		307	4.6	
285	3.4		308	NA	
286	2.12		309	18.2	
287	2.3		310	NA	
288	NA		311	5.1	studyb
289	4.1		312	5.3	
290	3.5		313	4.10	
291	14.1	studye	314	7.2	
292	6.1		315	6.6	
293	10.5		316	3.11	
294	NA		317	NA	
295	10.7	studye	318	6.3	
296	NA		319	NA	
297	5.6	studye	320	11.4	
298	13.3		321	NA	
299	10.13		322	6.2	studyc

Ref	Item	Conf	Ref	Item	Conf
323	6.1	studyc	346	NA	
324	NA		347	6.3	studye
325	10.3		348	14.2	
326	8.2		349	4.6	
327	NA		350	10.1	
328	2.5				
329	NA				
330	NA				
331	5.3	studyd			
332	6.2				
333	NA				
334	4.11				
335	4.6				
336	2.12				
337	3.6				
338	NA				
339	4.1				
340	6.5				
341	3.7	studye			
342	10.5				
343	14.7				
344	NA				
345	10.7				

Appendix C

Framework of the EA course

The Framework in which the EA course was delivered.

To satisfy specific educational demands identified within Europe, the European Commission set up the DELTA (Developing Learning through Technological Advance) projects (Mitchell & Hunter,1990). The aim of DELTA was to stimulate progress and cooperation in learning technology and its application throughout Europe. To achieve this aim, the DELTA project identified five lines of action:

- ❒ interdisciplinary concertation on present and future learning support requirements
- ❒ cooperative development of advanced learning technology
- ❒ testing and validation of advanced learning technology concepts based on systems integration
- ❒ promotion of interoperability of learning and communication; technology equipment, software and services
- ❒ creation of favourable conditions for advanced learning throughout Europe (CEDEFOP, 1991;

p88, further information: DELTA Report 1992)

In order to carry out these five lines of action, DELTA funded a number of European projects. Each one concentrated on a different area of the DELTA project within a collaborative working structure, these projects and the working structure are outlined in DELTA Report (1992).

To stimulate progress in the use of learning technology to provide distance education within Europe, DELTA funded the MTS (Multimedia Tele-School) project. As the MTS project acted as the facilitator for my research, it is necessary to give an outline of the project in order that the framework in which this study took place may be understood.

The MTS project was the largest within DELTA, it was to run for three years and had funding in the region of five million ecu. It was intended to be a truly European approach to providing distance education within Europe. Although it was an experimental project, it was to address the problems of providing education in Europe in a practical way. To achieve this the project was to construct, deliver and assess a number of distance training courses using the latest technology practicable. In addition to EC (European Community) funding, those involved in the MTS project were expected to generate private funding by encouraging 'industrial partners' to become involved. The intention was that all project partners were to generate 50% of their funding from their industrial partners and the rest of the funding was provided by the EC.

The industrial partners were able to participate at a number of levels; they were able to merely observe, they were able to influence the direction of the project or they could become fully involved by either participating in the project's activities, or taking part in the training courses offered. To construct, deliver and assess the distance training courses the project had a range of 'project partners'. The project partners consisted of organisations from various countries within the EC, each with its own area of expertise to offer. They were to act in one of three roles, working together to complete the task:

Technology Providers: organised the technological infrastructure that was used during the course delivery. This involved setting up the computer conferencing networks, organising the interactive satellite broadcasts and providing any data storage systems needed. The technology providers were:

- ❒ CECOMM (UK); CONDAT (D); France Telecom (F): provided the computer conferencing.
- ❒ University College Dublin (IRL); La Sept (F);EUROSTEP (NL); France Telecom (F): provided the production and transmission of the live satellite broadcasts.
- ❒ University College London (UK); Katholieke Universiteit Leuven (B): provided data storage systems.

Course Providers: constructed or adapted distance course material to be delivered to their industrial partners, using the technological infrastructure offered by the technology providers. The course providers were:

- ❒ IT CERES (UK): environmental awareness course for industry.
- ❒ CLEO (F): agrofoods course for European agriculture organisations.
- ❒ ERICSSON (IRL): providing an in-house training program on the use of computer-based multi-media training systems.
- ❒ BERLITZ (D): English language course for the banking sector.

Assessors: had to evaluate the project in terms of its organisation, pedagogical and technical perspectives. They also had to complete a cost benefit analysis on the project. Two organisations were involved:

- ❒ GATE Madrid Polytechnic University (E).
- ❒ WIK Wissenschaftliches Institut fur Kommunikation (D).

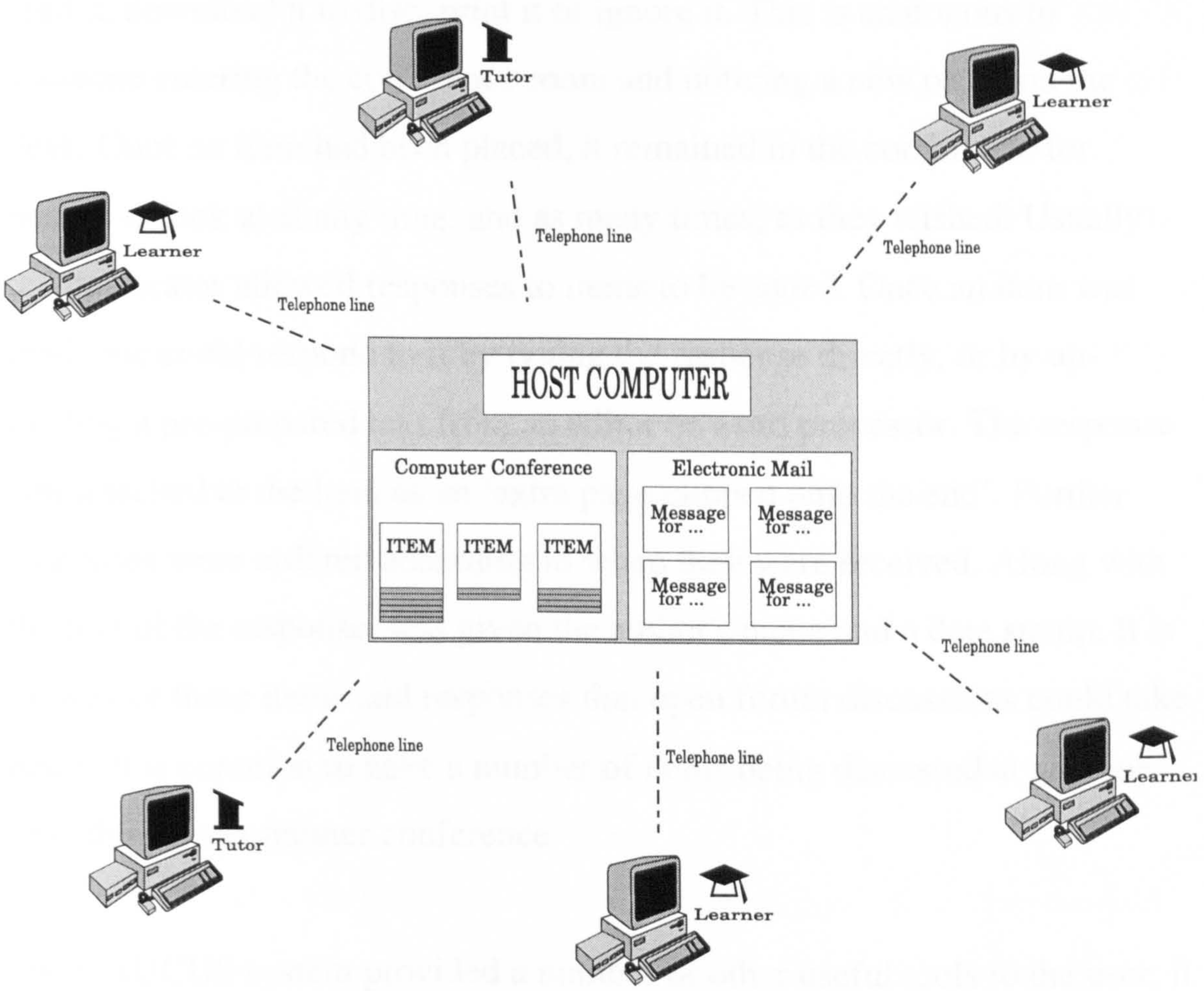
The MTS project utilised three differing technologies to deliver their distance education. Computer networking using PSDN (Public Switched Data Network), computer networking using ISDN (Integrated Systems

Digital Network) and DBS (Direct Broadcast Satellite) transmissions. During the three years that the project ran, the course providers were to deliver their courses twice, the first time during the second year of the project, 1993 and the second during the third year of the project, 1994. It was intended that during the first course delivery, PSDN and DBS was to be used as the ISDN was not widespread enough at the time for its use to be of any value. At the time, it was hoped that by 1994 the telecom companies who were installing the ISDN could offer a network that was extensive enough to be of use to the project. As there are many forms of computer networking and ways to use satellite broadcasting, it is appropriate to outline any scenarios which were used by the MTS project.

The Public Switched Data Network (PSDN)

This made use of the analogue public telephone system found all over the world. A Modem, MOdulator DEModulator, converts the digital signal output by a computer into an analogue audio tone , similar to that of a fax machine, which can be sent along the telephone line. At the other end, another Modem converts the signal back from analogue to digital. In this way computers can exchange data, or 'communicate'. The MTS project used this network to provide computer conferencing facilities. The tutors and learners involved in the course used their personal computers and a modem to connect to a large computer. This large computer or 'host' acted as the mediator for the computer conference. To try to keep telephone line charges to a minimum, there were two host computers used by the project, one in London and one in Paris. These two hosts periodically updated each

other using a similar link, but offering greater data transmission speed. CAUCUS, the computer conferencing system that the MTS used, is one of the systems often used for educational purposes. To initialise a conference, a user with 'moderator' status, usually a tutor in our case, firstly requested that an area of the host computer be set aside. As the CAUCUS system was not used exclusively by our learners, the moderator (tutor) could also inform the host of those with access to the conference.



The area of the host set aside for the conference might be analogous to a large table in an empty conference room. The list of people with access

were those allowed to enter the conference room. It was at this point that discussion could start. Texts for discussion, 'items', were then sent to the host, via the PSDN. The moderator could decide that only a select group were allowed to send items, or allow anyone with access to the conference to send them. The texts or conference items are analogous to papers for discussion that people place on the table in our conference room and then leave. After an item had been placed, anyone connecting to the host, 'logging on', would be informed of this new item, and had the option to read it, download it to disc, print it or ignore it. This is analogous to someone entering the conference room and noticing a new paper on the desk. Once an item had been placed, it remained in the conference for people to look at at any time, and as many times, as they wished. Usually the moderator allowed responses to items to be added. Once an item was read, one could respond to it by typing the response directly, or by up-loading a pre-prepared text from an editor or word processor. The response was attached to the item as an 'extra page clipped onto the end'. Further responses were ordered according to when they were received. Along with the text of the response, was given the author's name and a date stamp. It is by way of these items and responses that open forum discussions could take place. It is common to have a number of items being discussed at any one time during a computer conference.

The CAUCUS system provided a number of other useful tools to the user; it allowed attention to be drawn to important items by placing a banner which is seen by all when they log on, it allowed selective searches of key words or phrases, and it allowed people to selectively view only new material

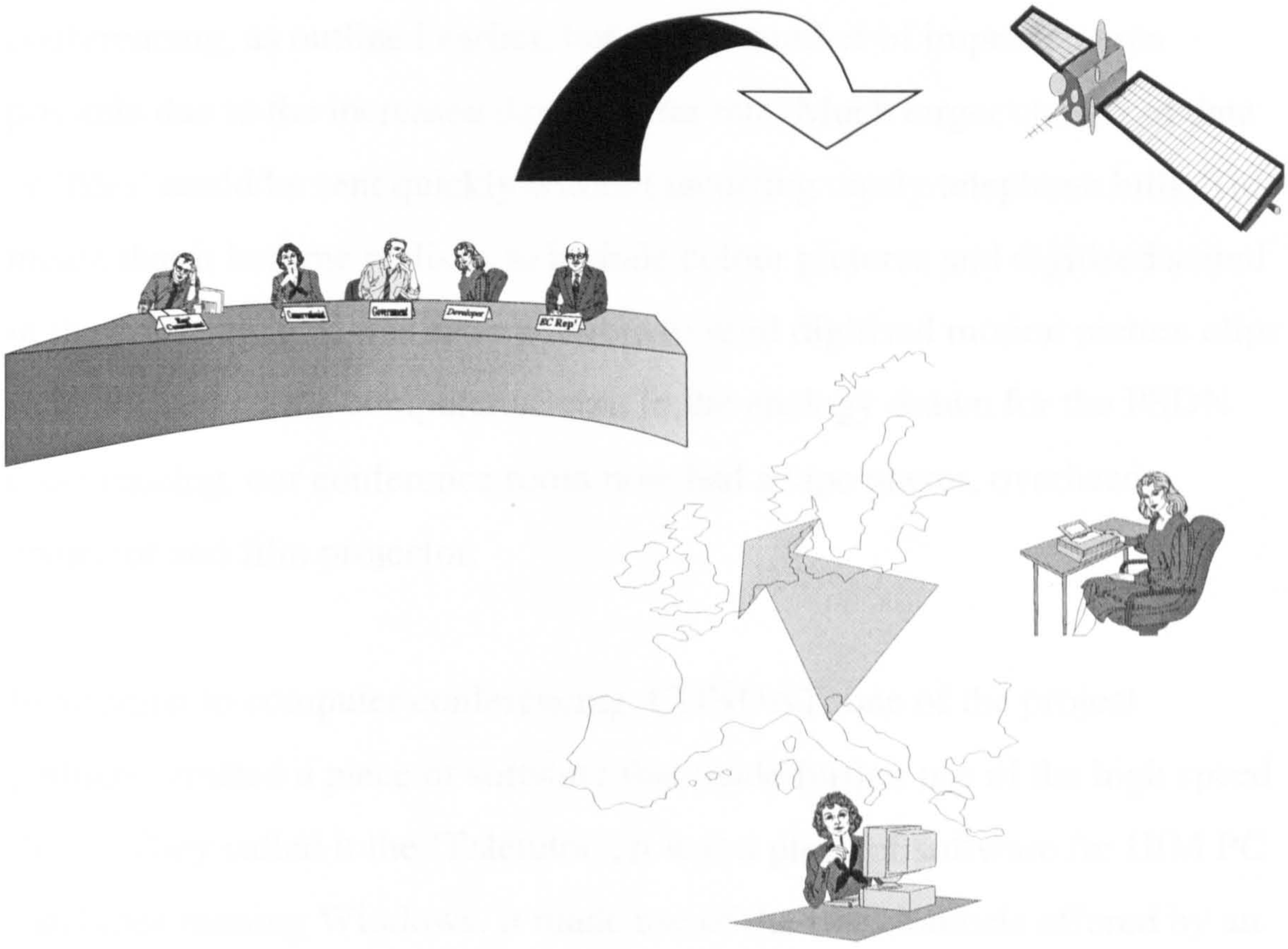
within the conference. All Items placed in the conference could be seen by anyone allowed to join the conference.

In order to allow private or selective group messages to be sent and received, the host computer also offered electronic mail. Anyone on the system could compose their message using the CAUCUS editor of their word processor, and send it to whomever they wished. When the recipients next logged on, they were informed that they had new mail and could read, reply, delete, forward or ignore it. A simple analogy between e-mail and the 'pigeon hole' system used in many organisations around the world explains how it works. The sender would prepare their document and send it electronically to the host computer along with the intended recipient's name. This is analogous to preparing a note and putting it into the recipient's pigeon hole. Sending the same message to a number of recipients was easy as mailing lists or 'wild carded' ID's could be used, these are explained in more detail in the next chapter. This is equivalent to the author copying their written message and putting a copy into each of the intended recipients' pigeon holes.

The Direct Broadcast Satellite (DBS) seminars.

In order to be able to receive the satellite transmissions, a satellite receiver dish and a decoder were required; these needed to be connected to a standard television for viewing. An ordinary video recorder allowed the seminars to be taped and used for later reference. A panel of tutors, experts and other representatives broadcast their seminar to the learners, via the

European satellite Eutelsat. Learners received this transmission, and had the opportunity to interact with the panel by sending e-mail messages or fax messages directly to the studio. This system was used to allow live satellite seminars to take place.



Schematic of satellite broadcast, used for live satellite seminars.

The Integrated Services Digital Network (ISDN).

Most of the telecom companies in Europe are now moving away from the analogue telephone lines mentioned above, and replacing them with a digital system. Making use of this means that there will no longer be the need for the digital-analogue-digital conversion performed by the modem.

ISDN offers the use of two digital channels, providing a transmission rate of 131,000 bits per second compared to the 2,400 offered by the PSDN. Overall, ISDN can transmit data roughly 60 times faster than PSDN, with increased reliability. This offers a number of enhancements over the PSDN scenario outlined earlier. It was still possible to have computer conferencing, as outlined earlier, but with a number of improvements possible due to the increased data transfer rate. Much larger chunks of data or 'files' could be sent quickly without incurring costly telephone bills. This meant that it became realistic to include colour pictures and digitised sound in the conference. It was even possible to send digitised motion picture clips to be viewed on the computer screen. In the analogy drawn for the PSDN conferencing, our conference room now had a tape player, overhead projector and film projector.

In addition to computer conferencing, CONDAT, one of the project partners, created a piece of software that made further use of the high speed ISDN. They called it the 'Teletutor'; it was a piece of software for IBM PC machines running Windows. It made use of the two channels offered by an ISDN link, one for audio communication using a telephone and the other for data transfer between the computers. It offered high level, synchronous, one-to-one interaction. Each participant had a telephone and a PC running the Teletutor. One person called the other, using the software; when the connection was made, they could pick up the phone to speak to each other whilst the computer link offered high speed data transfer. It was possible for text, picture, sound and motion picture files to be sent whilst the conversation proceeded. It was also possible for one person to remotely

control the other's machine. One machine could be made to 'mirror' whatever was happening on the other, when requested by both users. This allowed for demonstration and assistance with any computer-based work.

IT CERES, based at the University of Southampton within the School of Education, constructed and delivered a course on environmental awareness as a course provider in the MTS project. As project manager, I coordinated the construction and delivery of the course. It is in this role that my study took place.

Appendix D

Summary of comments made by those interviewed

INTERVIEW COMMENTS

UNIT 1:

- O learner had heard of term 'computer conferencing' before course, but did not know what it meant.
- O learner had heard of computer conferencing but had had no personal experience of it.
- O learner had never heard of computer conferencing before.
- O learner had briefly used computer conferencing before course, understood concept.
- O introduction to computer conferencing needed to be more comprehensive.
- O fixed exercises recommended, for example, go to library and find out the date of the Battle of Waterloo; ie structured over-simple exercises to make a more comprehensive guide.

UNIT 2:

- O was found to be useful for sharing opinions.
- O low level of interaction meant that it did not compare with a face-to-face role play.
- O interchange did not get going because the gaps between interactions were too long.
- O was a good introduction to getting people using the system.
- O good for making people think about environmental issues.
- O helped identify issues which in the first instance would not readily come to mind.
- O role play was a good way for course to start.
- O role play was good because of the necessity for the individual to have to come up with their own ideas, as they could not rely on tutor.
- O clearly made the point that there were different

perspectives.

- O discussion did not really get going.
- O there was potential for enlightening discussion which was not realised due to low participation.
- O the fact that it required discussion was a good way to get the conference going.
- O the fact that it was scheduled to take place over Easter holidays caused problems.
- O most participative unit.
- O it was most obvious for this unit what the computer conference system was there for.
- O role play should have run through the duration of the course, to allow people to make use of new knowledge gained during course.
- O was good for bringing out people's personal opinions.
- O was an interesting exercise.
- O was an emotive subject.
- O was a good way to start using the system.
- O promoted thinking about issues which otherwise would not be considered.
- O the role play was a good way to introduce the conference and get people used to it.

UNIT 3:

- O putting environmental legislation into a historical context was interesting.
- O there was too much content.
- O difficulty was not enough time and lack of participation by other learners.
- O learner found it difficult to answer questions based on the resources given.
- O questions related to the learner's organisation were considered politically difficult to answer.
- O course material was useful.
- O learner gained information from course book on environmental legislation, but not through

conference discussion.
- O there was a lot to get through and it got a bit complicated.
- O learner had trouble getting feedback from other learners.
- O was overwhelming because of the assigned tasks, and lack of feedback from other learners.
- O the first part, involving reflection on what had made the learners interested in the environment was potentially a very good aspect of the course, and quite challenging.
- O learner only carried out first part of this unit.
- O reference material was good quality and informative.
- O it was not too clear where the conferencing came in.
- O a positive aspect was the opportunity to find out how legislation was affecting other organisations, though this never really got going.
- O did not seem to flow very well.
- O unit was more factual, listing events.
- O did not provide further understanding.
- O was the worst unit because time limit was abysmal.
- O too many tasks.
- O required more research.
- O may have been breaking point.
- O quality of the material was good, there was just too much work.

UNIT 4:

- O the content was too diverse.
- O there was not enough detail given for full understanding.
- O learner did not gain very much from Unit 4.
- O did not provide further understanding.
- O the content forms part of interviewee's day-to-day work (EIA, LCA, etc).

- O putting environmental issues together was possibly confusing.
- O putting environmental issues together was also interesting.
- O needed more active participation from the tutor.
- O should have been constructed so that rather than the learner's taking responsibility for the decisions required by the tasks, they should have been guided by the tutor.

GENERAL COURSE COMMENTS:

- O learner tried to read what other people were saying, and respond to them.
- O learner tried to give relevant personal knowledge to conference discussion.
- O learner felt that new information had been learnt from others as a result of the course (though mainly from one other person).
- O learner did not make use of the course booklet or other resources.
- O the course was a good way of raising environmental awareness, but not a sure way of getting people to understand the issues.
- O in learner's opinion, very few people really got 'stuck into' the course.
- O learner found course enjoyable.
- O overall opinion of course: very interesting and very ambitious.
- O learner felt there was a need for more feedback and monitoring.
- O learner's main gains from course: identification of a good way of using computer conferencing and awareness of its possibilities.
- O biggest problems with course:

i) the technology (for example, problems setting it up, access, people not using it and system user unfriendly).

ii) the course material was too much for the time available (particularly for the latter two units).
iii) people were not able to give enough time to the course.
iv) people were not given enough background information to allow them to
contribute effectively.
v) people were frustrated by the conference system going off-line automatically for no apparent reason.

- suggested improvements: a necessity for more teaching to promote discussion.
- for the learner's organisation, a more tailored course would have been better.
- learner's organisation structured the course to include in-house presentations to complement, where all learners involved would meet face-to-face; these meetings were considered to be enjoyable, and of great benefit.
- most valuable aspect of the course: the group meetings for which the satellite broadcasts acted as a focus.
- there was nothing wrong with the conference structure.
- the conference structure was necessary.
- felt that quite a lot had been learnt about the environmental subject material, but mostly from other learners rather than course reference material.
- whenever possible, learner tried to read the comments of other learners before adding comments.
- learner indicated that usual practice was to log on, read other learners' state-ments, log off, consider reply, then log back on at a later date to put in reply.
- learner indicated on a self-made scale of 1 to 10 the opinion that sharing of relevant personal

experience with other learners took place at a level of 3 on the scale (10 being lots).

- O learner felt that the conference system was not user friendly.
- O overall opinion of course: very good, whole idea was very good; what spoiled it was that not enough people got involved.
- O biggest problem with course: lack of participation.
- O learner felt that guidelines on how to get most out of the conferencing would have helped get more participation (for example, 10 minutes a day more beneficial than 2 hours a week since regular input was necessary).
- O best aspect of the course: no set times.
- O course was not well-structured, there was not enough time allowed for various things.
- O content of course was good.
- O if the course were to be repeated, learner recommended that high users should be identified and grouped early on in the course.
- O learner did not really read other people's statements on the conference.
- O did not really learn anything from other learner's.
- O learner used course booklet occasionally.
- O overall opinion of course: good fun.
- O liked: the fact that it could be done from work (does not like travelling to courses).
- O disliked: having to go through stuff which was not found interesting, either because it was already known or because learner could not be bothered.
- O getting used to computer conferencing was useful.
- O learner felt the computer conference structure was necessary and the best way of doing it.
- O course structure made good use of the technology, although the technology was limited.

- O there was a need for more tutor involvement.
- O the course relied too much on interactive learning.
- O biggest problem with course: lack of participation (probably a motivational aspect).
- O learner never started own conference discussion, preferred other people to do that.
- O learner recommended that tutor should initiate discussions.
- O learner roved around and explored the conference system.
- O learner was disappointed with the library.
- O the conference structure was a good idea, although it did not always work, for example people putting discussion items in inappropriate conferences (mainly at start of course).
- O there were too many things that people were unfamiliar with in the course, ie computer conferencing, role plays, subject material, etc.
- O people needed longer to get into discussion than they would in a face-to-face situation; this extended time period was not provided.
- O a banner at the top of the screen constantly which informed which conference the user was in would have been useful.
- O more active participation by tutors would perhaps have set a role model.
- O potentially the opportunity to have expert input was very good, but not enough people took advantage of this.
- O people were left to their own devices too much.
- O more support faxes were needed.
- O the potential of the teaching was considerable, but lack of participation meant that the potential was not realised.
- O best aspects of the course: the potential for discussion and exchange of new experiences and information.

- a clearer presentation of the time schedule was needed.
- it would have helped to have more than one unit running in parallel.
- suggested improvements: i) cut back on content of Units 3 and 4 in order to fit into timescale.

ii) make Unit 2 run throughout the course.

iii) get people actively involved from the start by possibly having a face-to-face kickoff meeting followed by regular discussion meetings.

- thought that the course structure was well planned and well organised, could not personally think of a better way.
- the conference structure was necessary to organise discussions and provide a familiar conference structure.
- as much as possible, learner tried to take other people's comments into

account when making own comments.

- learner would often log on, read other responses, log off, prepare replies, then log on and send these replies.
- on some occasions, learner gave detail of personal knowledge to conference discussions.
- learned new things from other learners.
- used all of course pack for each unit; used no other resource material.
- course made good use of the technology.
- overall opinion of course: a good experience, it was nice to communicate with people from other countries.
- disliked:

i) access to computer was inconvenient.

ii) low participation.

- biggest problem with course: not enough people logging on.
- suggested improvements:

i) discussions should be open-forum in the

conference.
ii) recommend awarding a qualification due to need for learner motivation.
iii) need to ensure that employers of learners involved give extra time and support to learner to take part in course.
O aspects to be kept:
i) structure of the study centre.
ii) role play as a means of getting course started.
O learner found the conference system very user unfriendly, verging on the
aggressive.
O conference structure easy to understand.
O was disappointed with the library.
O problem with the conference system: if the keyboard was not pressed, system automatically logged off; to combat this, TAB key had to be repeatedly pressed, and messages sent in parts - very frustrating.
O felt that learner had learned from other people.
O learner used resource material throughout course.
O the ability to print out conference text was of great help.
O learner sometimes logged onto system, read conference discussions, logged off to prepare reply, which was later put in.
O learner sometimes put in reply straight away.
O overall opinion of course: felt like they were floundering at stages; had been expecting more instructive approach.
O biggest problems with course:
i) lack of participation.
ii) short timescale.
O best part of course: talking to other people and social interaction.
O suggestions for improvement:
i) somebody needed in each study group to act as

devil's advocate to promote interaction and discussion.

ii) more tutor involvement needed.

Appendix E

Disaggregated rating scale tables derived from conference discussions

Study Group A

❒ Competence in use of conference system.

0					X1						
1	X2										
2											X3
3								X4			
4				X5							
5						X6					
6							X7				
7										X8	
8	X9										
9											X10
	10	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**0**

Shows ability to use all facilities offered by conference system. (e-mail, show and add to an item, start a new item, move around conference structure to take part in many conference discussions).

Shows ability to show an item and add to it to take part in conference discussion.

Shows no ability to use conference system.

Study Group B

❒ Competence in use of conference system.

0				✗11							
1	✗12										
2	✗13										
3			✗14								
4						✗15					
5					✗16						
6											✗17
7					✗18						
8											✗19
9			✗20								
	10	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**0**

Shows ability to use all facilities offered by conference system. (e-mail, show and add to an item, start a new item, move around conference structure to take part in many conference discussions).

Shows ability to show an item and add to it to take part in conference discussion.

Shows no ability to use conference system.

Study Group C

❒ Competence in use of conference system.

0										✗21
1			✗22							
2		✗23								
3										✗24
4			✗25							
5							✗26			
6										✗27
7				✗28						
8										✗29
9										✗30
	10	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**0**

Shows ability to use all facilities offered by conference system. (e-mail, show and add to an item, start a new item, move around conference structure to take part in many conference discussions).

Shows ability to show an item and add to it to take part in conference discussion.

Shows no ability to use conference system.

Study Group D

❒ Competence in use of conference system.

0			✗31								
1		✗32									
2											✗33
3					✗34						
4							✗35				
5									✗36		
6				✗37							
7											✗38
8	✗39										
9				✗40							
	10	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**0**

Shows ability to use all facilities offered by conference system. (e-mail, show and add to an item, start a new item, move around conference structure to take part in many conference discussions).

Shows ability to show an item and add to it to take part in conference discussion.

Shows no ability to use conference system.

Study Group E

❒ Competence in use of conference system.

0			✗41								
1					✗42						
2						✗43					
3											✗44
4		✗45									
5											✗46
6		✗47									
7					✗48						
8		✗49									
9	✗50										
	10	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**0**

Shows ability to use all facilities offered by conference system. (e-mail, show and add to an item, start a new item, move around conference structure to take part in many conference discussions).

Shows ability to show an item and add to it to take part in conference discussion.

Shows no ability to use conference system.

Study Group A

❒ Understanding of the issues and factors relating to an environmentally sensitive hotel development.

0							✗51				
1			✗52								
2											✗53
3					✗54						
4						✗55					
5						✗56					
6								✗57			
7											✗58
8						✗59					
9											✗60
	10	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**0**

Shows understanding of a diversity of issues and indicates the inter-relationship between them. Demonstrates understanding of the concept of sustainable tourism as outlined in the course.	Demonstrates understanding that there are many issues to consider in environmental decision making.	Shows no understanding.

Study Group B

❒ Understanding of the issues and factors relating to an environmentally sensitive hotel development.

0			✗61								
1			✗62								
2		✗63									
3				✗64							
4											✗65
5											✗66
6											✗67
7											✗68
8											✗69
9				✗70							
	10	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**0**

Shows understanding of a diversity of issues and indicates the inter-relationship between them. Demonstrates understanding of the concept of sustainable tourism as outlined in the course.

Demonstrates understanding that there are many issues to consider in environmental decision making.

Shows no understanding.

Study Group C

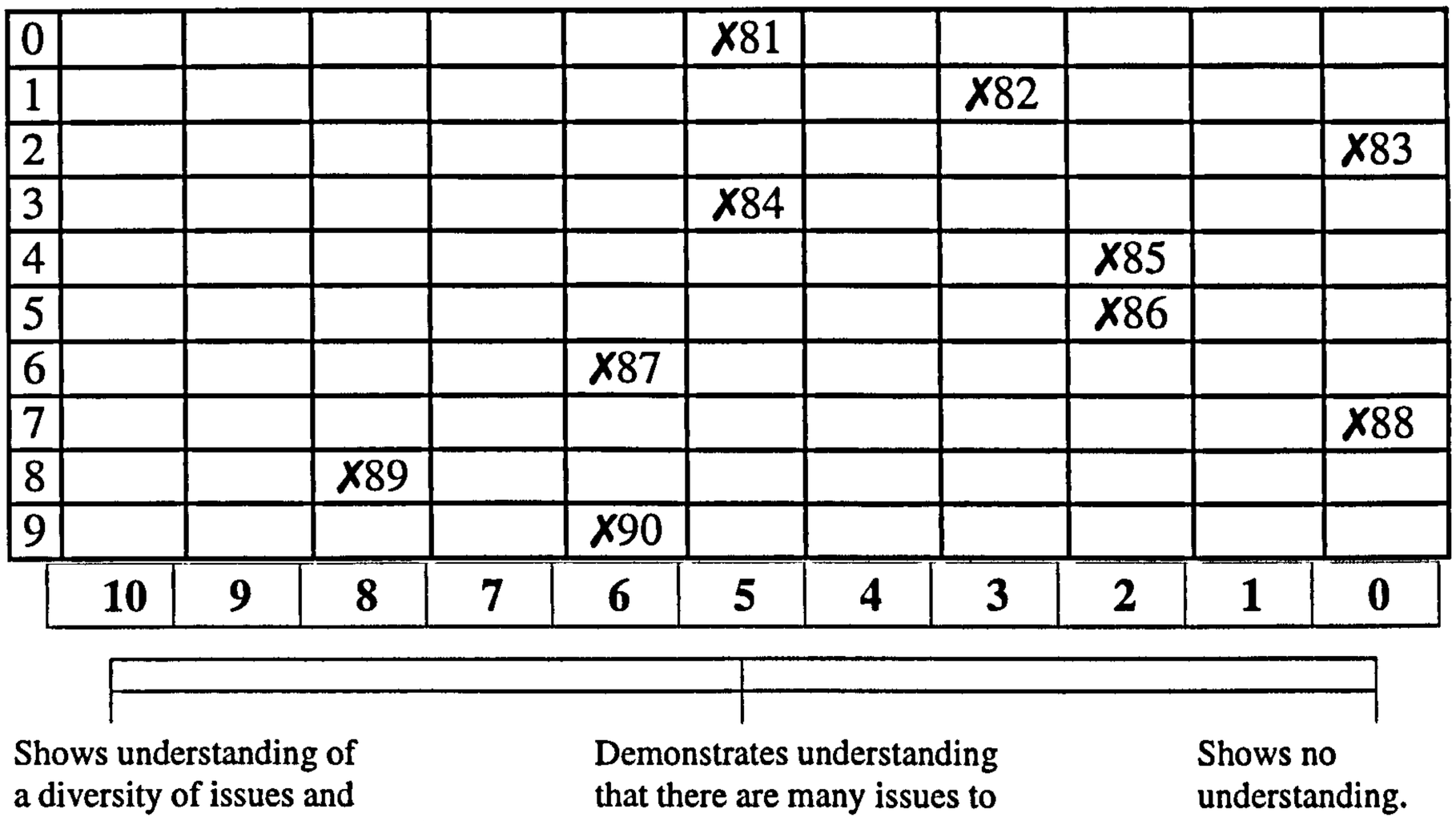
❒ Understanding of the issues and factors relating to an environmentally sensitive hotel development.

0											✗71
1							✗72				
2				✗73							
3											✗74
4							✗75				
5									✗76		
6											✗77
7					✗78						
8											✗79
9											✗80
	10	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**0**

Shows understanding of a diversity of issues and indicates the inter-relationship between them. Demonstrates understanding of the concept of sustainable tourism as outlined in the course.	Demonstrates understanding that there are many issues to consider in environmental decision making.	Shows no understanding.

Study Group D

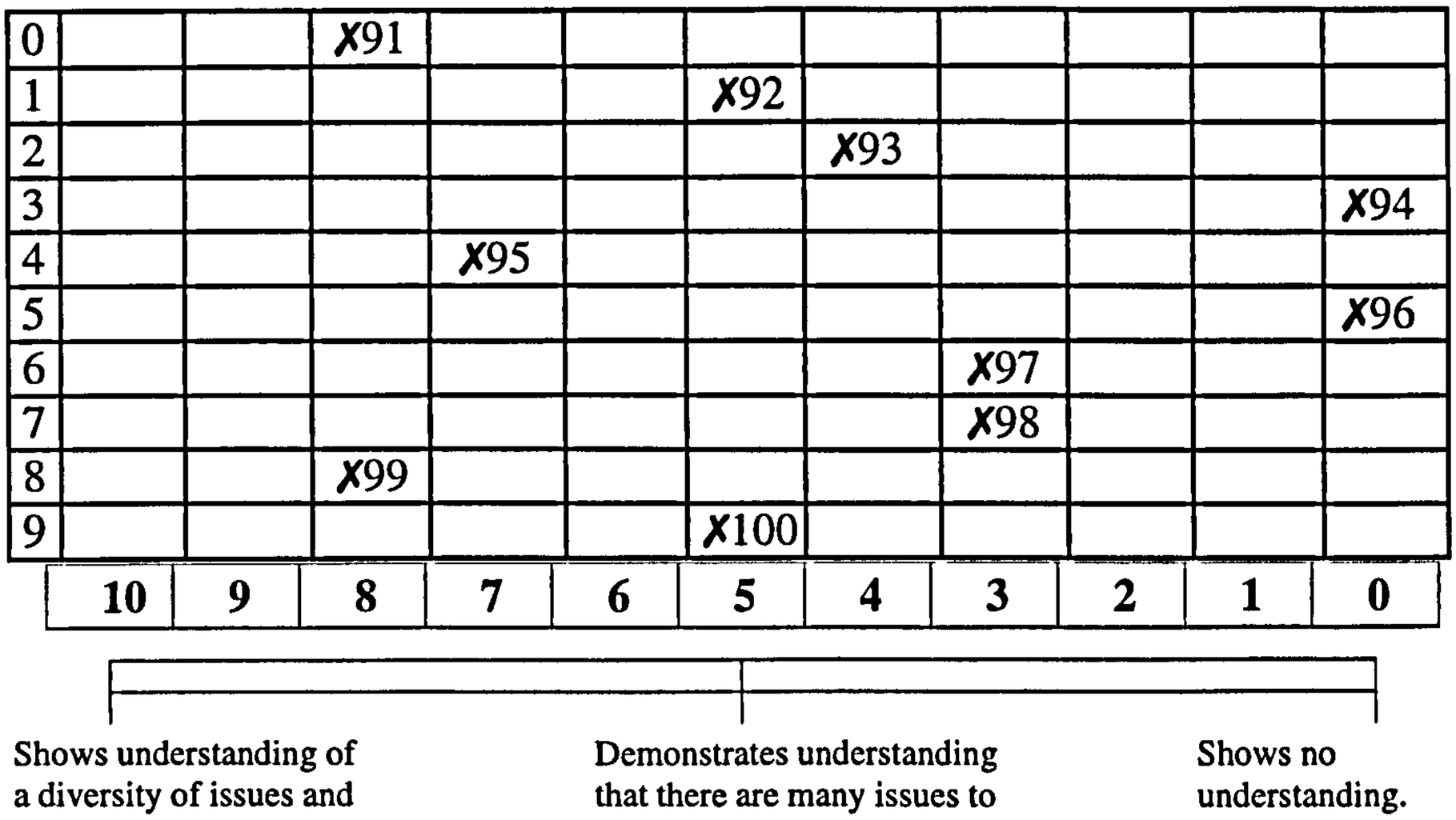
❒ Understanding of the issues and factors relating to an environmentally sensitive hotel development.



Shows understanding of	Demonstrates understanding	Shows no
a diversity of issues and indicates the inter-relationship between them. Demonstrates understanding of the concept of sustainable tourism as outlined in the course.	that there are many issues to consider in environmental decision making.	understanding.

Study Group E

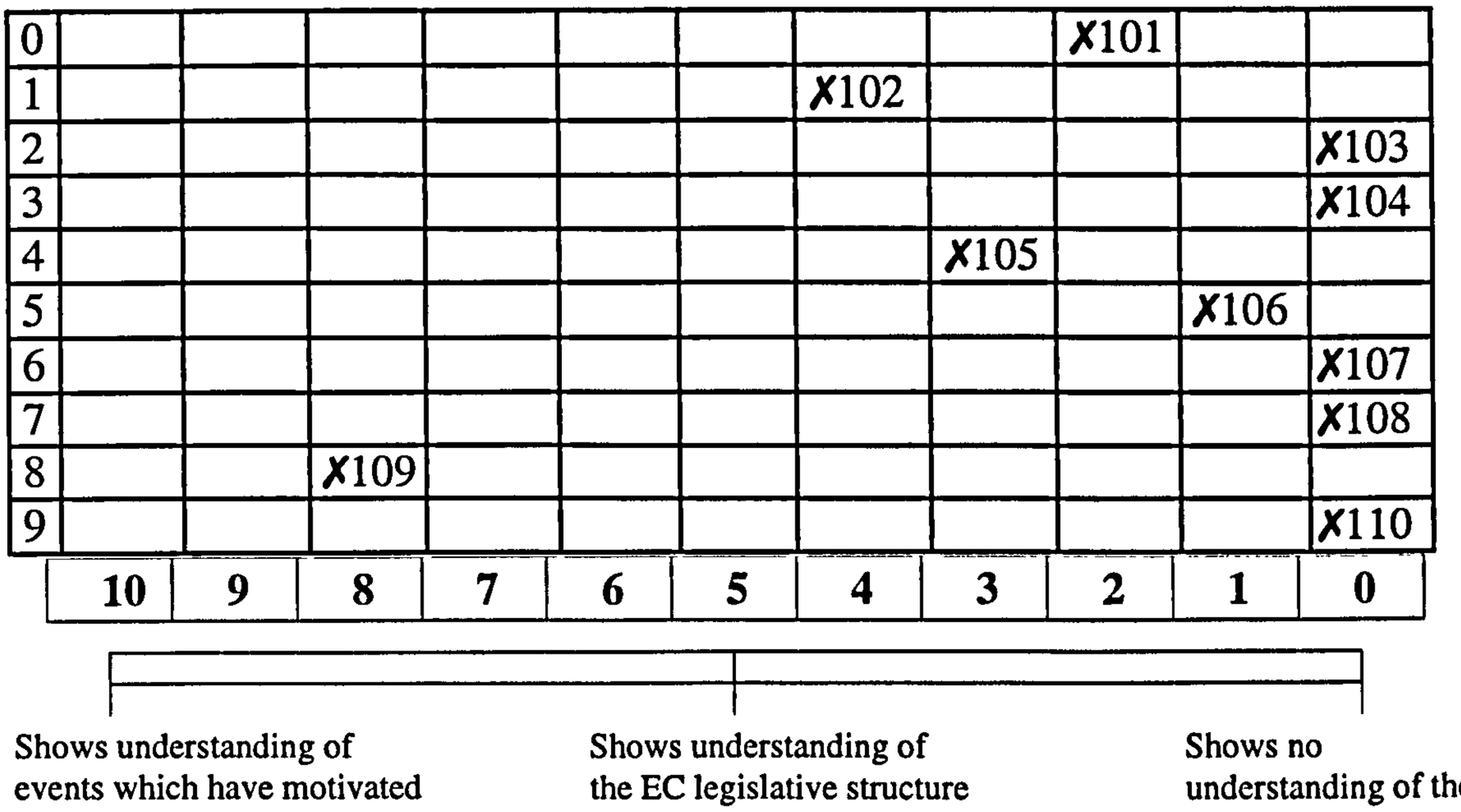
❒ Understanding of the issues and factors relating to an environmentally sensitive hotel development.



Shows understanding of a diversity of issues and indicates the inter-relationship between them. Demonstrates understanding of the concept of sustainable tourism as outlined in the course.	Demonstrates understanding that there are many issues to consider in environmental decision making.	Shows no understanding.

Study Group A

❒ Understanding of the nature and role of EC environmental legislation.



Shows understanding of events which have motivated the construction and implementation of EC environmental legislation. Demonstrates understanding of European legislative structure. Shows understanding that of the limits which this legislation has and the implications of this. Identifies further measures to supplement EC legislation.	Shows understanding of the EC legislative structure and identifies its limits.	Shows no understanding of the EC structure.

Study Group B

❒ Understanding of the nature and role of EC environmental legislation.

0										✗111	
1					✗112						
2			✗113								
3								✗114			
4											✗115
5										✗116	
6											✗117
7									✗118		
8											✗119
9									✗120		
	10	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**0**

Shows understanding of events which have motivated the construction and implementation of EC environmental legislation. Demonstrates understanding of European legislative structure. Shows understanding that of the limits which this legislation has and the implications of this. Identifies further measures to supplement EC legislation.

Shows understanding of the EC legislative structure and identifies its limits.

Shows no understanding of the EC structure.

Study Group C

❒ Understanding of the nature and role of EC environmental legislation.

0											✗121
1											✗122
2											✗123
3											✗124
4											✗125
5											✗126
6											✗127
7											✗128
8											✗129
9											✗130
	10	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**0**

Shows understanding of events which have motivated the construction and implementation of EC environmental legislation. Demonstrates understanding of European legislative structure. Shows understanding that of the limits which this legislation has and the implications of this. Identifies further measures to supplement EC legislation.	Shows understanding of the EC legislative structure and identifies its limits.	Shows no understanding of the EC structure.

Study Group D

❒ Understanding of the nature and role of EC environmental legislation.

0											✗131
1											✗132
2											✗133
3											✗134
4											✗135
5											✗136
6											✗137
7											✗138
8											✗139
9											✗140
	10	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**0**

Shows understanding of events which have motivated the construction and implementation of EC environmental legislation. Demonstrates understanding of European legislative structure. Shows understanding that of the limits which this legislation has and the implications of this. Identifies further measures to supplement EC legislation.

Shows understanding of the EC legislative structure and identifies its limits.

Shows no understanding of the EC structure.

Study Group E

❒ Understanding of the nature and role of EC environmental legislation.

0											✗141
1			✗142								
2											✗143
3											✗144
4						✗145					
5											✗146
6											✗147
7											✗148
8							✗149				
9		✗150									
	10	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**0**

Shows understanding of events which have motivated the construction and implementation of EC environmental legislation. Demonstrates understanding of European legislative structure. Shows understanding that of the limits which this legislation has and the implications of this. Identifies further measures to supplement EC legislation.

Shows understanding of the EC legislative structure and identifies its limits.

Shows no understanding of the EC structure.

Study Group A

❒ Understanding of environmental procedures.

0											✗151
1			✗152								
2											✗153
3											✗154
4						✗155					
5									✗156		
6										✗157	
7											✗158
8		✗159									
9											✗160
	10	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**0**

Shows understanding of the aims and objectives of; Environmental Audit, Environmental impact Assessment and Life Cycle analysis. Demonstrates knowledge of practical process for implementation of above and shows the ability to implement the process in a hypothetical situation.

Shows understanding of the aims of the various processes. Demonstrates knowledge of the core elements of each.

Shows no understanding of environmental procedures.

Study Group B

❒ Understanding of environmental procedures.

0						✗161					
1									✗162		
2	✗163										
3						✗164					
4											✗165
5											✗166
6											✗167
7								✗168			
8											✗169
9									✗170		
	10	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**0**

Shows understanding of the aims and objectives of; Environmental Audit, Environmental impact Assessment and Life Cycle analysis. Demonstrates knowledge of practical process for implementation of above and shows the ability to implement the process in a hypothetical situation.	Shows understanding of the aims of the various processes. Demonstrates knowledge of the core elements of each.	Shows no understanding of environmental procedures.

Study Group C

❒ Understanding of environmental procedures.

0											✗171
1			✗172								
2					✗173						
3											✗174
4						✗175					
5											✗176
6											✗177
7						✗178					
8											✗179
9											✗180
	10	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**0**

Shows understanding of the aims and objectives of; Environmental Audit, Environmental impact Assessment and Life Cycle analysis. Demonstrates knowledge of practical process for implementation of above and shows the ability to implement the process in a hypothetical situation.

Shows understanding of the aims of the various processes. Demonstrates knowledge of the core elements of each.

Shows no understanding of environmental procedures.

Study Group D

❒ Understanding of environmental procedures.

0											✗181
1						✗182					
2											✗183
3											✗184
4											✗185
5											✗186
6						✗187					
7											✗188
8				✗189							
9							✗190				
	10	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**0**

Shows understanding of the aims and objectives of; Environmental Audit, Environmental impact Assessment and Life Cycle analysis. Demonstrates knowledge of practical process for implementation of above and shows the ability to implement the process in a hypothetical situation.

Shows understanding of the aims of the various processes. Demonstrates knowledge of the core elements of each.

Shows no understanding of environmental procedures.

Study Group E

❒ Understanding of environmental procedures.

0											✗191
1				✗192							
2											✗193
3											✗194
4											✗195
5											✗196
6											✗197
7											✗198
8											✗199
9			✗200								
	10	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**0**

Shows understanding of the aims and objectives of; Environmental Audit, Environmental impact Assessment and Life Cycle analysis. Demonstrates knowledge of practical process for implementation of above and shows the ability to implement the process in a hypothetical situation.	Shows understanding of the aims of the various processes. Demonstrates knowledge of the core elements of each.	Shows no understanding of environmental procedures.

Study Group A

❒ Use of computer conference system for interaction.

0			✗201								
1	✗202										
2											✗203
3							✗204				
4		✗205									
5						✗206					
6							✗207				
7										✗208	
8	✗209										
9											✗210
	10	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**0**

Whenever possible replies to other learners statements. Presents their conference items so as to stimulate responses from other learners.

Sometimes replies to others statements, but only when necessary.

Does not use the system for interaction.

Study Group B

❒ Use of computer conference system for interaction.

0		✗211									
1	✗212										
2	✗213										
3		✗214									
4										✗215	
5									✗216		
6											✗217
7					✗218						
8											✗219
9			✗220								
	10	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**0**

Whenever possible replies to other learners statements. Presents their conference items so as to stimulate responses from other learners.	Sometimes replies to others statements, but only when necessary.	Does not use the system for interaction.

Study Group C

❒ Use of computer conference system for interaction.

0											✗221
1			✗222								
2				✗223							
3											✗224
4			✗225								
5								✗226			
6											✗227
7						✗228					
8											✗229
9											✗230
	10	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**0**

Whenever possible replies to other learners statements. Presents their conference items so as to stimulate responses from other learners.

Sometimes replies to others statements, but only when necessary.

Does not use the system for interaction.

Study Group D

❒ Use of computer conference system for interaction.

0				✗231							
1		✗232									
2											✗233
3								✗234			
4								✗235			
5										✗236	
6		✗237									
7											✗238
8	✗239										
9				✗240							
	10	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**0**

Whenever possible replies to other learners statements. Presents their conference items so as to stimulate responses from other learners.

Sometimes replies to others statements, but only when necessary.

Does not use the system for interaction.

Study Group E

❒ Use of computer conference system for interaction.

0				✗241							
1			✗242								
2						✗243					
3											✗244
4				✗245							
5											✗246
6			✗247								
7					✗248						
8	✗249										
9		✗250									
	10	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**0**

Whenever possible replies to other learners statements. Presents their conference items so as to stimulate responses from other learners.

Sometimes replies to others statements, but only when necessary.

Does not use the system for interaction.

Study Group A

❒ Use of resource materials.

0						✗251				
1	✗252									
2										✗253
3						✗254				
4				✗255						
5							✗256			
6									✗257	
7										✗258
8	✗259									
9										✗260
	10	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**0**

Shows use of resource materials provided as part of the course pack. Indicates that further resources have been utilised to provide greater detail in conference discussion.

Indicates the use of resource material provided as part of the course pack.

Show no use of resources.

Study Group B

❒ Use of resource materials.

0				✗261							
1			✗262								
2	✗263										
3					✗264						
4											✗265
5										✗266	
6											✗267
7						✗268					
8											✗269
9			✗270								
	10	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**0**

Shows use of resource materials provided as part of the course pack. Indicates that further resources have been utilised to provide greater detail in conference discussion.

Indicates the use of resource material provided as part of the course pack.

Show no use of resources.

Study Group C

❒ Use of resource materials.

0											✗271
1						✗272					
2							✗273				
3											✗274
4				✗275							
5										✗276	
6											✗277
7				✗278							
8											✗279
9											✗280
	10	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**0**

Shows use of resource materials provided as part of the course pack. Indicates that further resources have been utilised to provide greater detail in conference discussion.

Indicates the use of resource material provided as part of the course pack.

Show no use of resources.

Study Group D

❒ Use of resource materials.

0						✗281					
1					✗282						
2											✗283
3									✗284		
4								✗285			
5											✗286
6					✗287						
7											✗288
8			✗289								
9				✗290							
	10	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**0**

Shows use of resource materials provided as part of the course pack. Indicates that further resources have been utilised to provide greater detail in conference discussion.

Indicates the use of resource material provided as part of the course pack.

Show no use of resources.

Study Group E

❒ Use of resource materials.

0				✗291							
1						✗292					
2								✗293			
3											✗294
4									✗295		
5											✗296
6					✗297						
7						✗298					
8		✗299									
9			✗300								
	10	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**0**

Shows use of resource materials provided as part of the course pack. Indicates that further resources have been utilised to provide greater detail in conference discussion.

Indicates the use of resource material provided as part of the course pack.

Show no use of resources.

Study Group A

❒ Sharing of ideas, and information.

0			✗301								
1	✗302										
2											✗303
3							✗304				
4		✗305									
5			✗306								
6								✗307			
7											✗308
8	✗309										
9											✗310
	10	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**0**

Shows that they have shared their ideas on subjects under discussion within the conference system. Shares relevant examples from their own situation.

Shows that they have shared ideas on subject under discussion within the conference system.

Shows no indication of sharing ideas in the conference system.

Study Group B

❒ Sharing of ideas, and information.

0			✗311								
1	✗312										
2	✗313										
3				✗314							
4										✗315	
5									✗316		
6											✗317
7						✗318					
8											✗319
9		✗320									
	10	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**0**

Shows that they have shared their ideas on subjects under discussion within the conference system. Shares relevant examples from their own situation.

Shows that they have shared ideas on subject under discussion within the conference system.

Shows no indication of sharing ideas in the conference system.

Study Group C

❒ Sharing of ideas, and information.

0											X321
1			X322								
2			X323								
3											X324
4				X325							
5									X326		
6											X327
7					X328						
8											X329
9											X330
	10	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**0**

Shows that they have shared their ideas on subjects under discussion within the conference system. Shares relevant examples from their own situation.

Shows that they have shared ideas on subject under discussion within the conference system.

Shows no indication of sharing ideas in the conference system.

Study Group D

❒ Sharing of ideas, and information.

0					✗331						
1		✗332									
2											✗333
3								✗334			
4									✗335		
5										✗336	
6		✗337									
7											✗338
8	✗339										
9			✗340								
	10	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**0**

Shows that they have shared their ideas on subjects under discussion within the conference system. Shares relevant examples from their own situation.	Shows that they have shared ideas on subject under discussion within the conference system.	Shows no indication of sharing ideas in the conference system.

Study Group E

❒ Sharing of ideas, and information.

0				X341							
1				X342							
2			X343								
3											X344
4		X345									
5											X346
6			X347								
7							X348				
8	X349										
9	X350										
	10	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**0**

Shows that they have shared their ideas on subjects under discussion within the conference system. Shares relevant examples from their own situation.	Shows that they have shared ideas on subject under discussion within the conference system.	Shows no indication of sharing ideas in the conference system.

Appendix F

Detailed data from Part 3 of the EA evaluation

Analysis of interaction elements within each of the conference areas

The data included within this appendix was derived within the computer conference analysis to discover the amount of learner interaction which constitutes part three of the EA evaluation described within chapter 11 of this thesis.

The tables below indicate the analysis of conference activity by type:

Library : Total = 3

Type	No Logged
General Discussion	0
Task Discussion	3
DBS Questions	0
Technical Problems	0
General Problem :	0
Mistake :	0
Other :	0

Bar : Total = 92

Type	No Logged
General Discussion	44
Task Discussion	25
DBS Questions	1
Technical Problems	6
General Problem	9
Mistake	7
Other	0

Mail : Total = 89

Type	No Logged
General Discussion	9
Task Discussion	13
DBS Questions	20
Technical Problems	6
General Problem	26
Mistake	2
Other	15

Support : 13

Type	No Logged
General Discussion	4
Task Discussion	0
DBS Questions	0
Technical Problems	3
General Problem	0
Mistake	0
Other	6

Analysis of study group conferences

For each of the learner study group conferences, two forms of analysis were undertaken. The first involved selective database searches to identify the type of interaction observable within each of the study conferences. The results of this evaluation are presented in table form as well as graphically with column charts. Following this the results of an analysis of the number of interaction elements logged for each learner in the conference study group is presented. This information is presented in table form with the learners login ID in the left most column and the number of interaction elements they contributed to the computer conference discussion shown in the body of the table. The numbers indicate the number of interaction elements logged during two week periods throughout the EA course, these were:

Week **1&2** : 18/03/93 - 01/04/93

Week **3&4** : 02/04/93 - 15/04/93

Week **5&6** : 16/04/93 - 29/04/93

Week **7&8** : 30/04/93 - 13/05/93

Week **9&10** : 14/05/93 - 27/05/93

Week **11&12** : 28/05/93 - 10/06/93

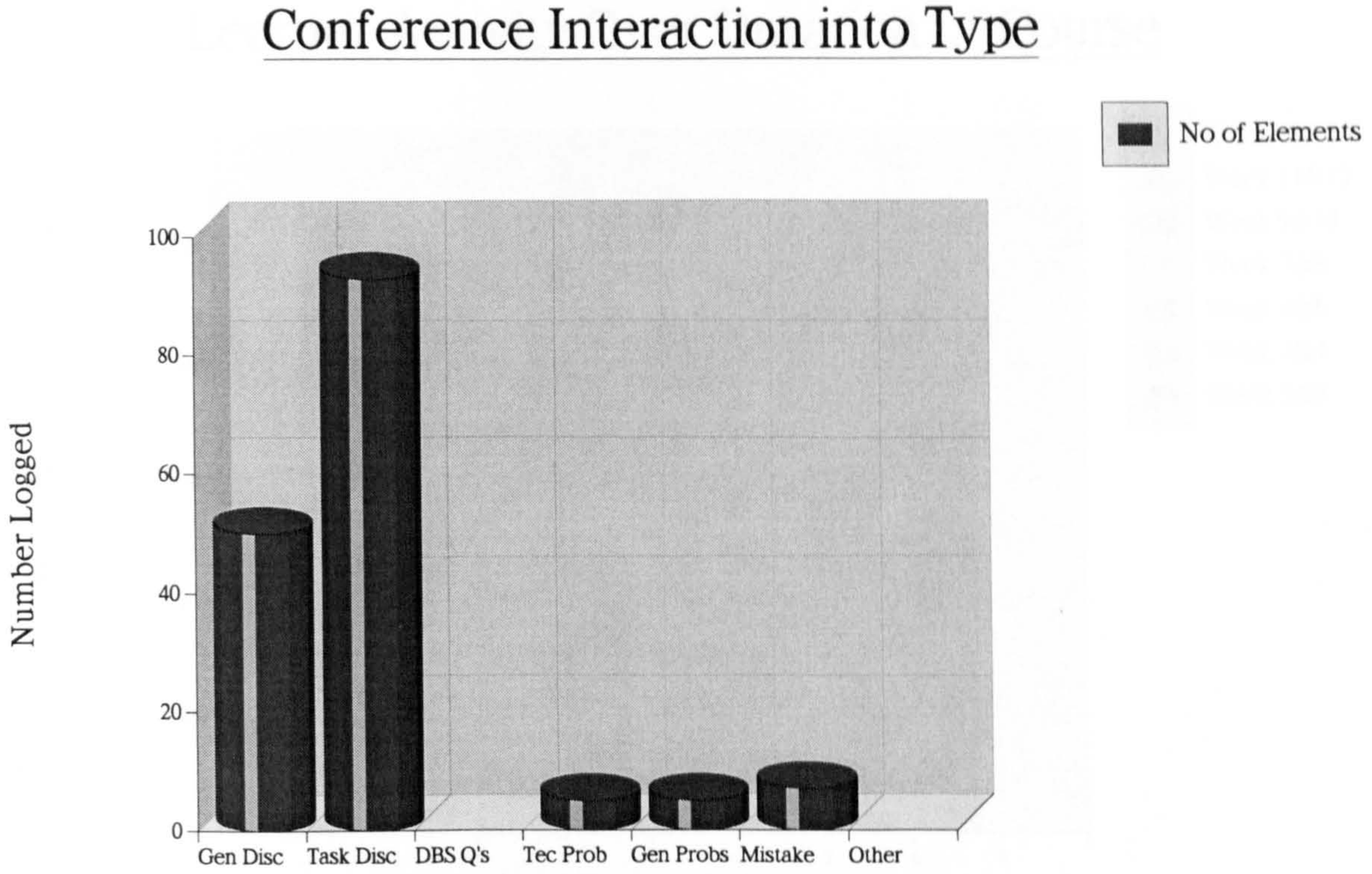
Week **13&14** : 11/06/93 - 24/06/93

In addition to this one further column indicates the **total** number of interaction elements logged for each individual throughout the whole course.

Study conference A, interaction analysis by type.

Study Conference A : Total no' of elements = 89

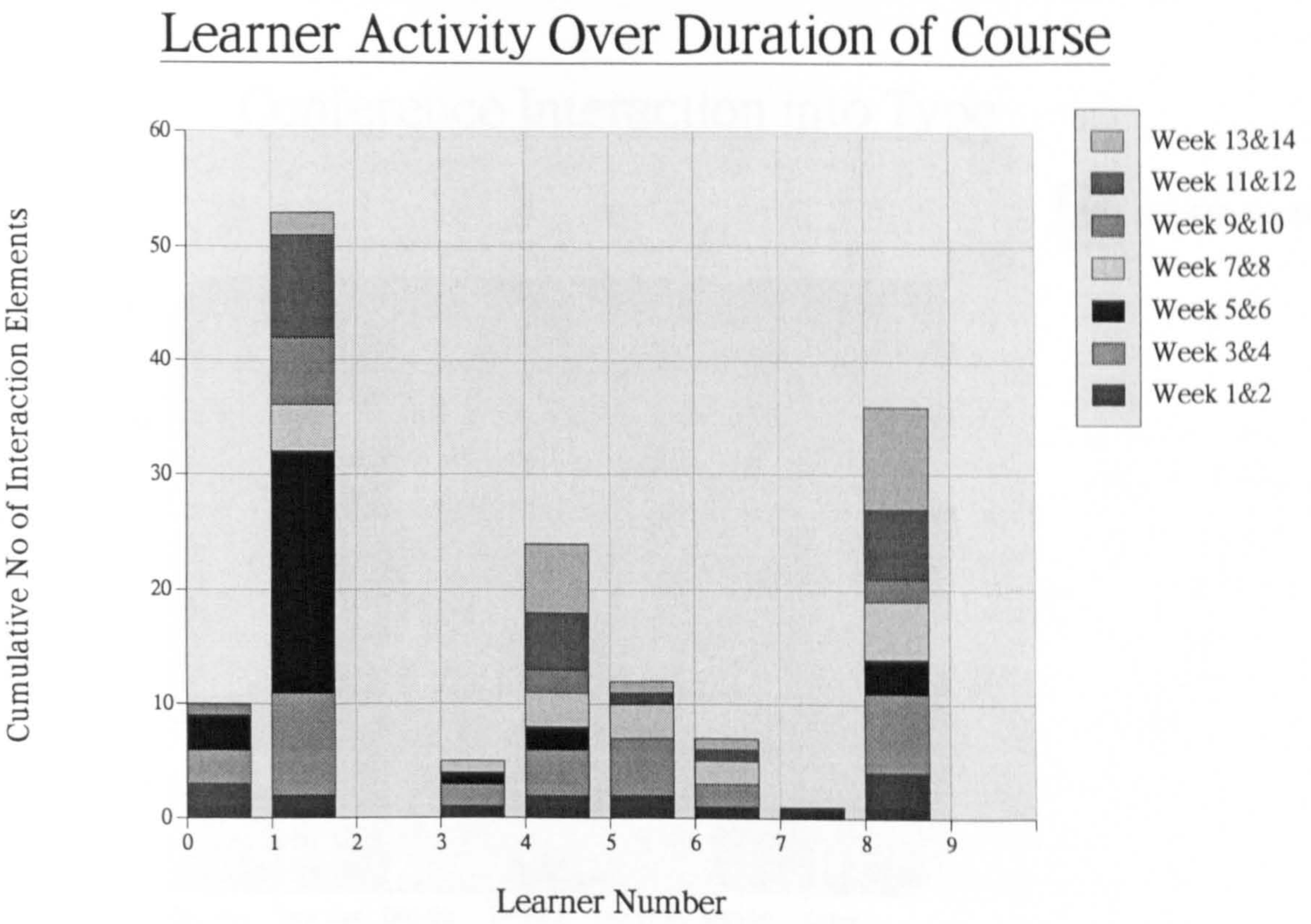
Type	No Logged
General Discussion	50
Task Discussion	93
DBS Questions	0
Technical Problems	5
General Problem	5
Mistake	7
Other	0



Study group A, number of interaction elements recorded for each individual

ACTIVITY DURING WEEK OF COURSE

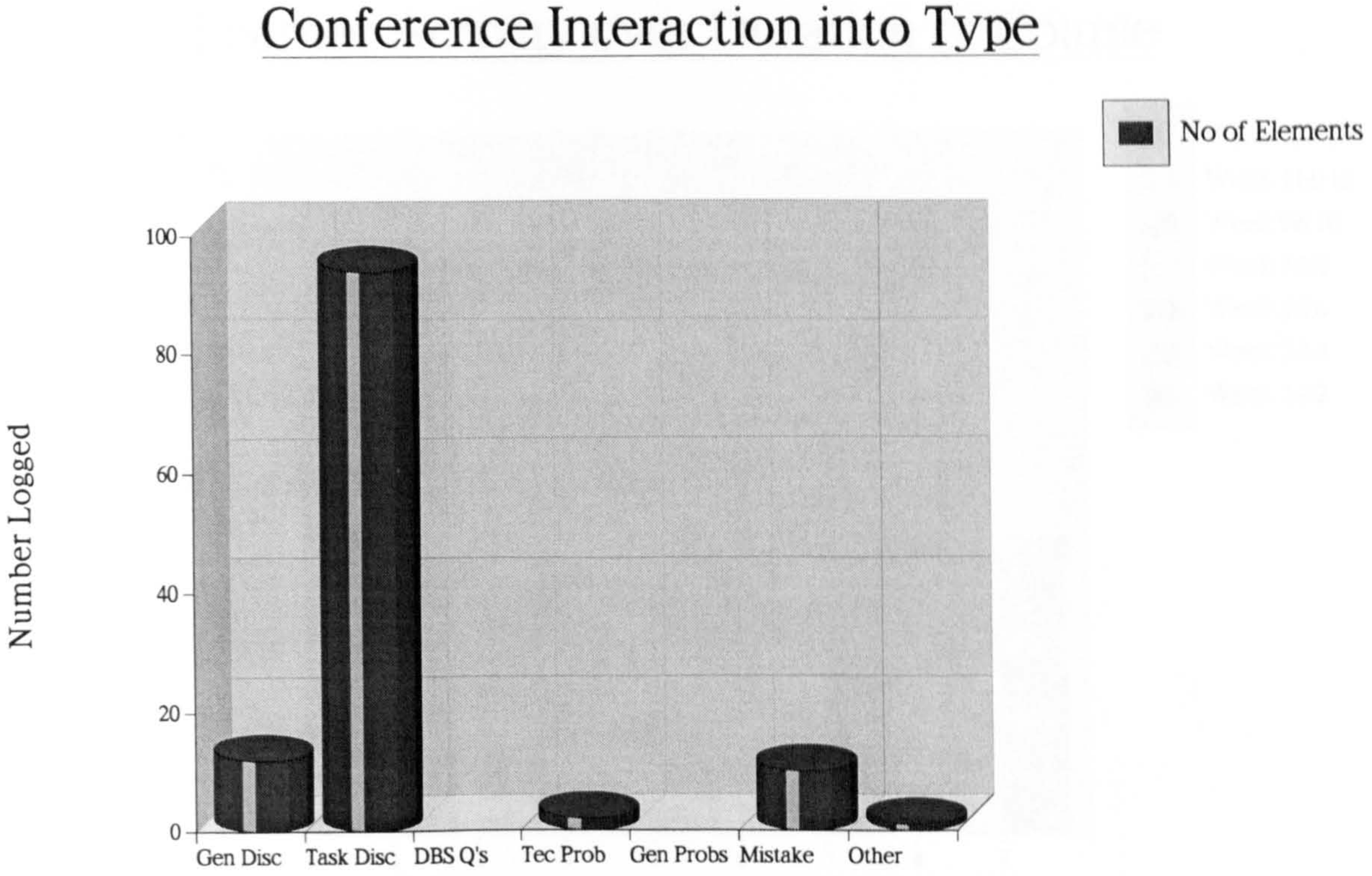
Login ID	Total	1&2	3&4	5&6	7&8	9&10	11&12	13&14
v1ca0ugj	10	3	3	3	0	1	0	0
v1ca1kba	53	2	9	21	4	2	11	4
v1ca2kda	0	0	0	0	0	0	0	0
v1ca3jro	5	1	2	1	1	0	0	0
v1ca4joa	24	2	4	5	3	2	5	3
v1ca5spi	12	2	5	0	3	0	1	1
v1ca6mon	7	1	2	0	2	0	1	1
v1ca7nsa	1	1	0	0	0	0	0	0
v1ca8jho	36	9	7	3	5	2	8	4
v1ca9nga	0	0	0	0	0	0	0	0



Study conference B, interaction analysis by type.

Study Conference B : Total no' of elements = 70

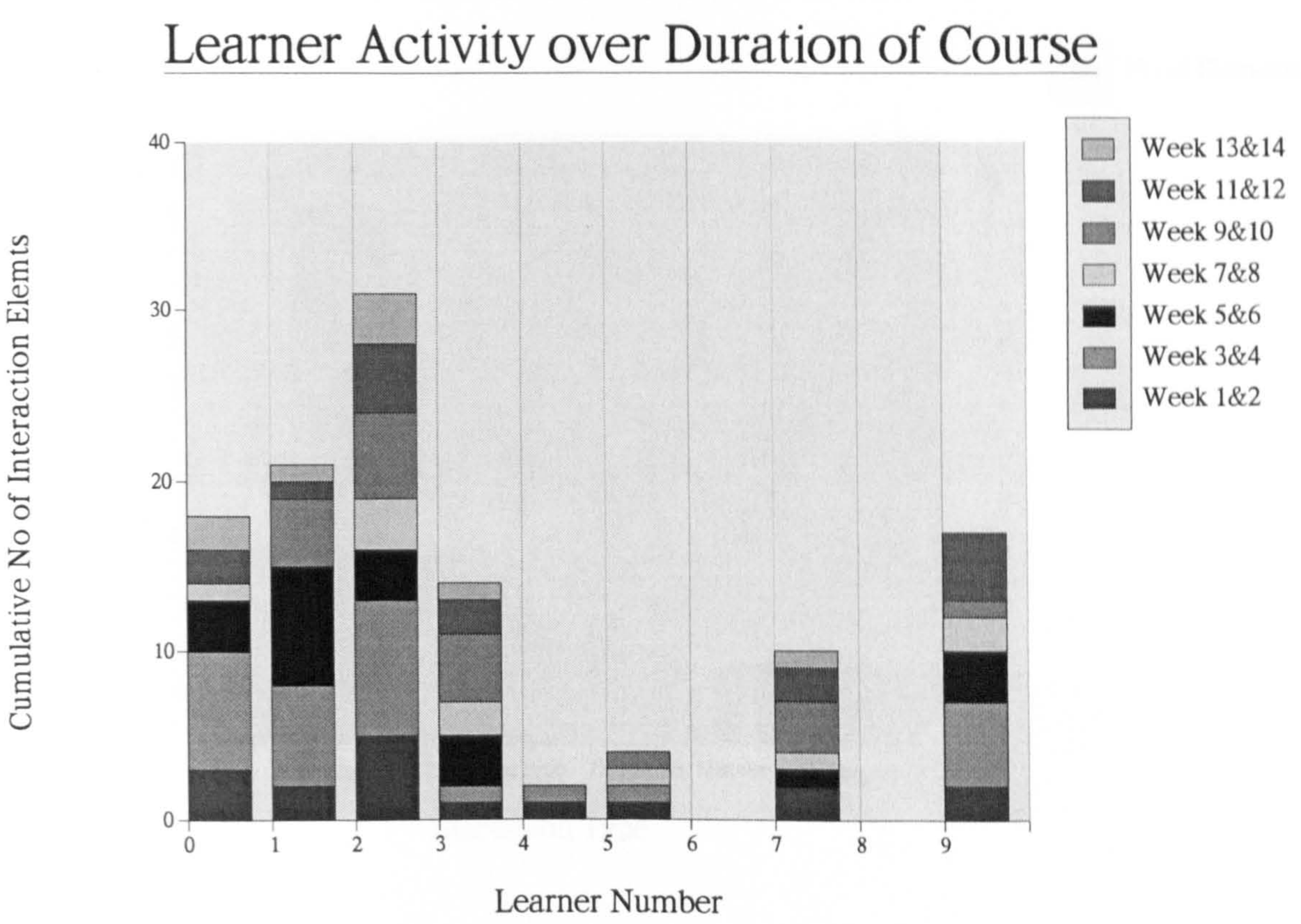
Type	No Logged
General Discussion	12
Task Discussion	94
DBS Questions	0
Technical Problems	2
General Problem	0
Mistake	10
Other	1



Study group B, number of interaction elements recorded for each individual

ACTIVITY DURING WEEK OF COURSE

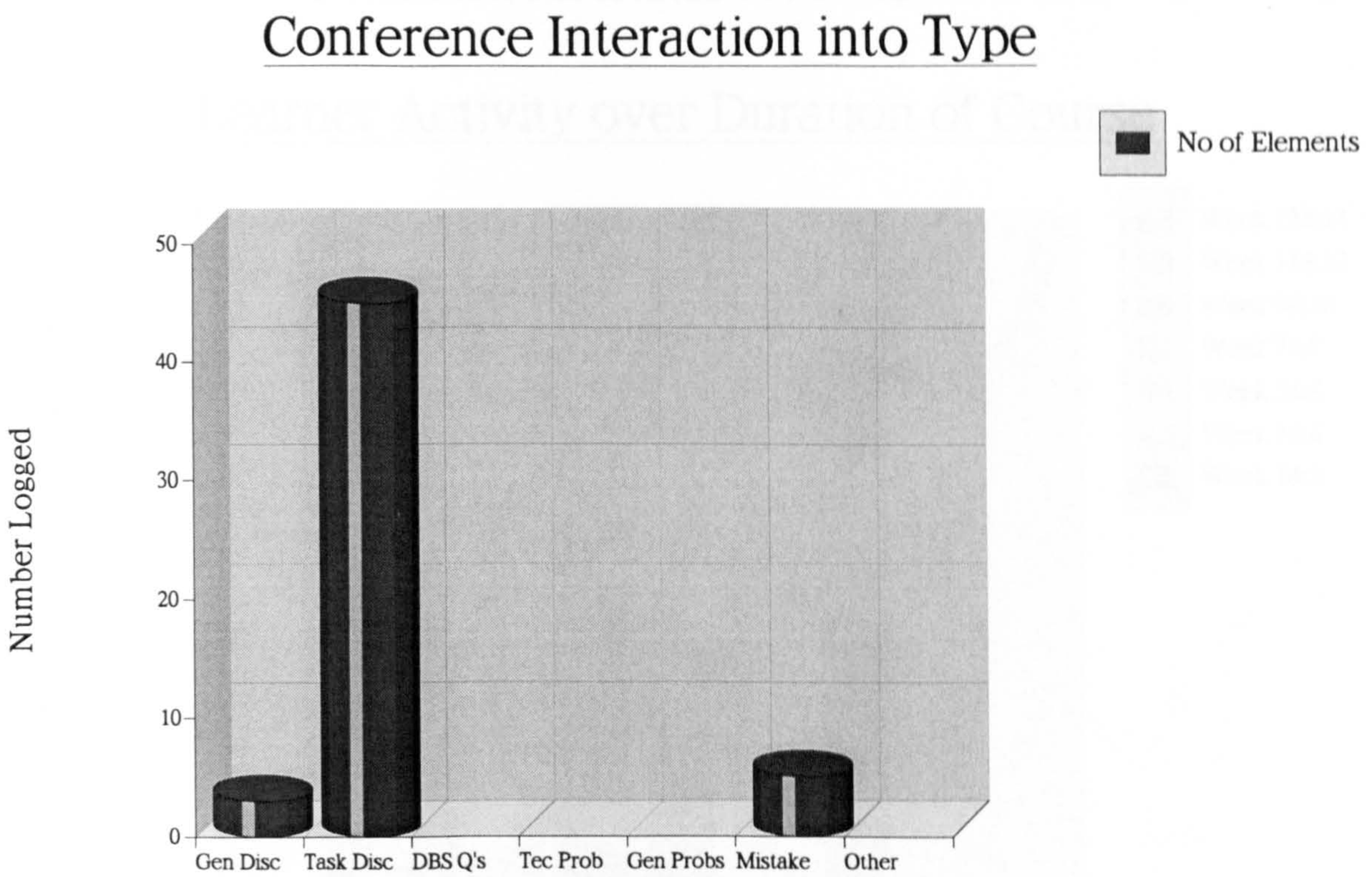
Login ID	Total	1&2	3&4	5&6	7&8	9&10	11&12	13&14
v1cb0ads	18	3	7	3	1	0	2	2
v1cb1cbo	21	2	6	7	0	4	1	1
v1cb2ael	31	5	8	3	3	5	4	3
v1cb3bro	14	1	1	3	2	4	2	1
v1cb4byo	2	1	1	0	0	0	0	0
v1cb5fho	4	2	1	0	1	0	0	0
v1cb6dke	0	0	0	0	0	0	0	0
v1cb7moa	10	2	0	1	1	3	2	1
v1cb8mki	0	0	0	0	0	0	0	0
v1cb9mgo	17	2	5	3	2	1	4	0



Study conference C, interaction analysis by type.

Study Conference C : Total no' of elements = 52

Type	No Logged
General Discussion	3
Task Discussion	45
DBS Questions	0
Technical Problems	0
General Problem	0
Mistake	5
Other	0

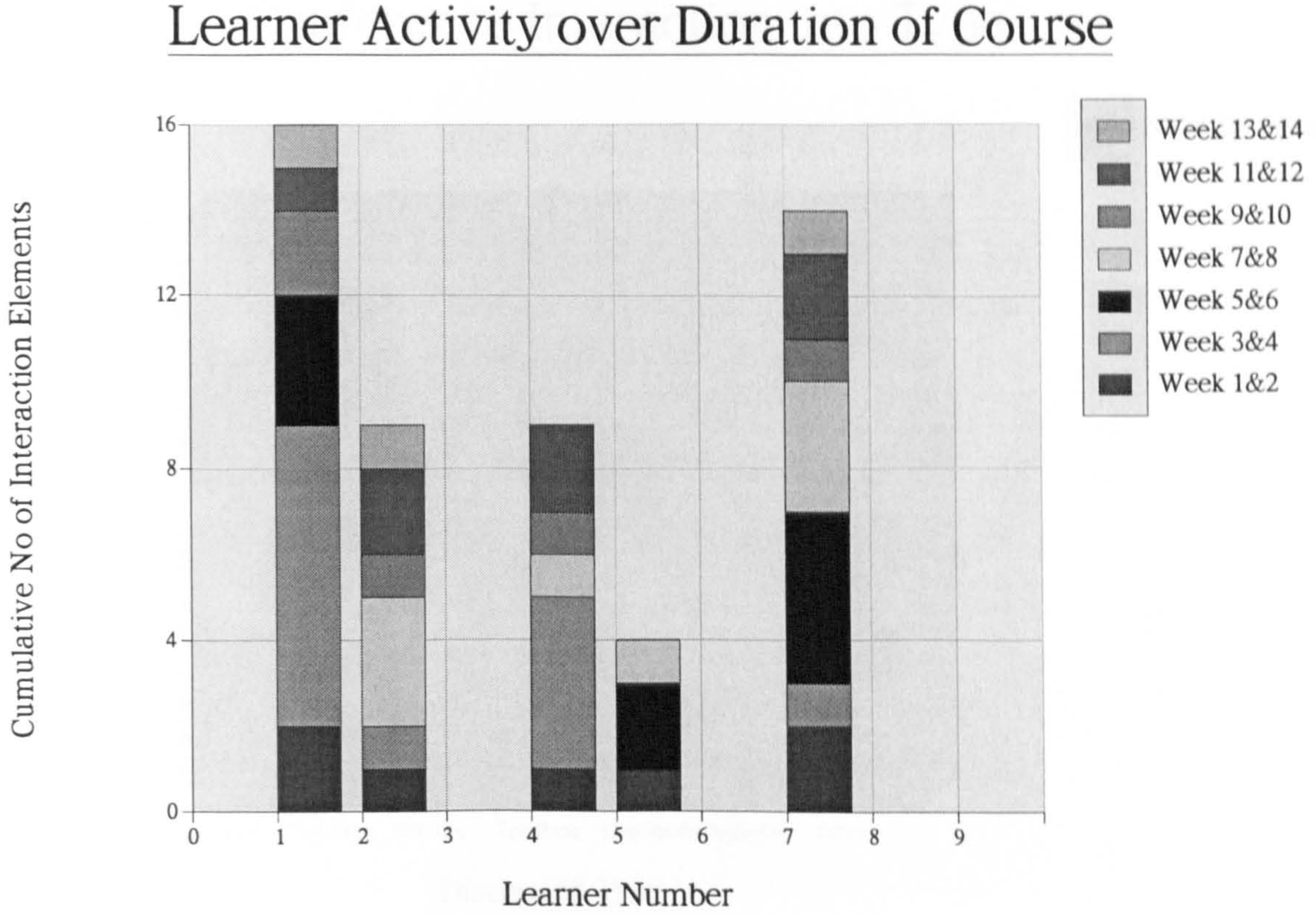


Study group C, number of interaction elements recorded for each individual

ACTIVITY DURING WEEK OF COURSE

Login ID	Total	1&2	3&4	5&6	7&8	9&10	11&12	13&14
c0tmu	0	0	0	0	0	0	0	0
c1eba	16	2	7	3	0	2	1	1
c2sra	9	1	1	0	3	1	2	1
c3gst	0	0	0	0	0	0	0	0
c4mro	9	1	4	0	1	1	2	0
c5tsm	4	1	0	2	1	0	0	0
c6jfo	0	0	0	0	0	0	0	0
c7kmu	14	2	1	4	3	1	2	1
c8tno	0	0	0	0	0	0	0	0
c9lde	0	0	0	0	0	0	0	0

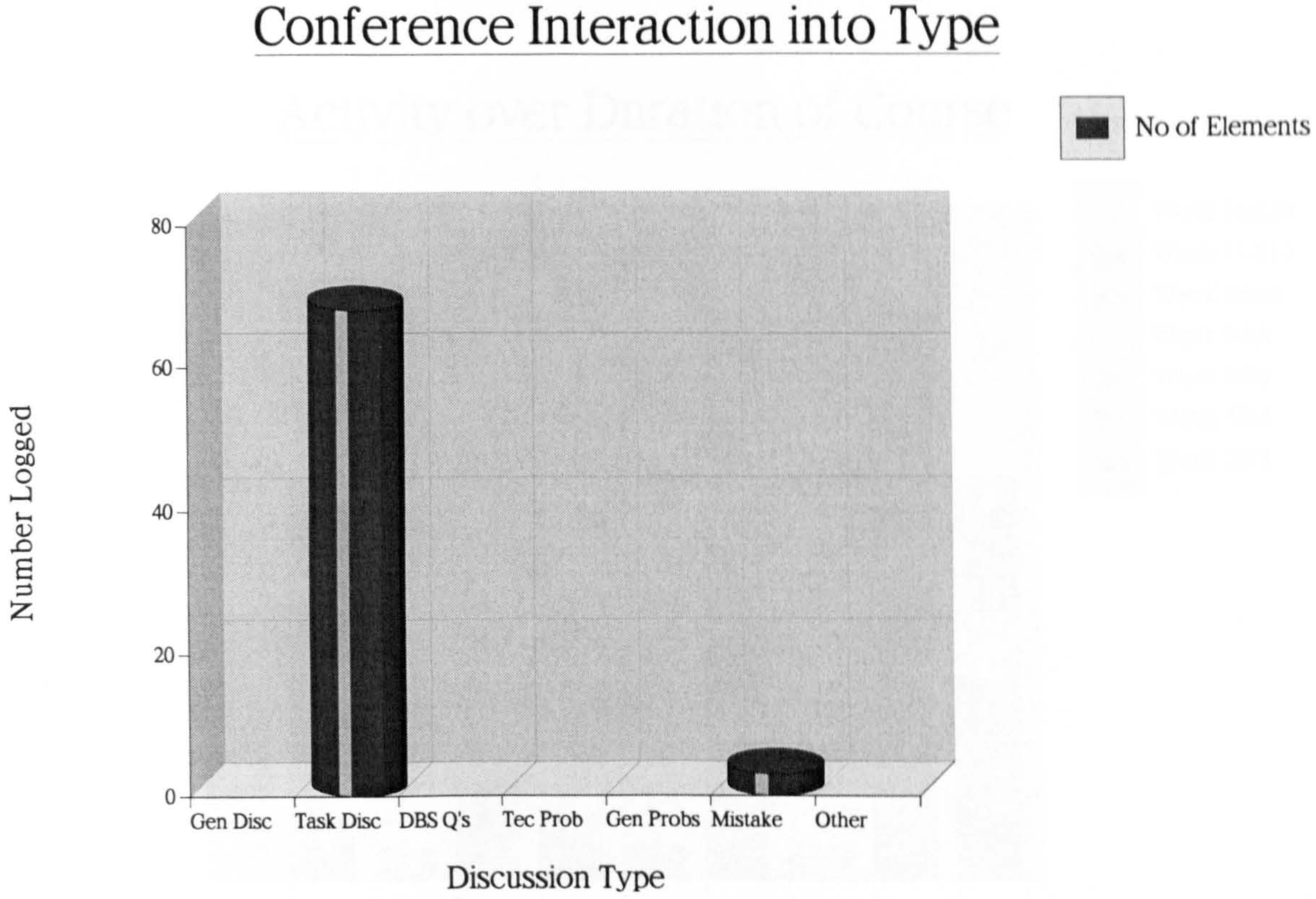
Learner Activity over Duration of Course



Study conference D, interaction analysis by type.

Study Conference D : Total no' of elements = 71

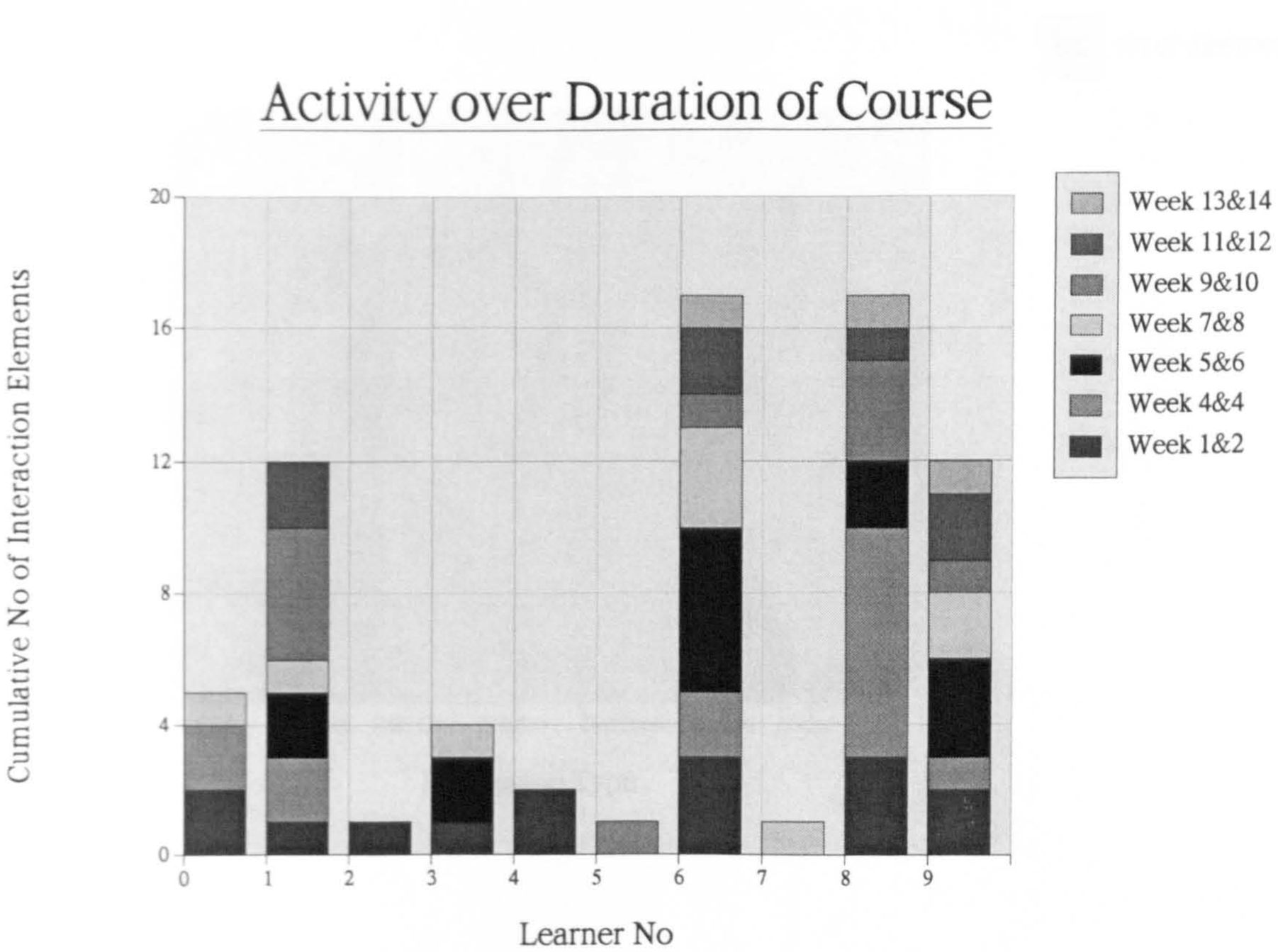
Type	No Logged
General Discussion	0
Task Discussion	68
DBS Questions	0
Technical Problems	0
Problem	0
Mistake	3
Other	0



Study group D, number of interaction elements recorded for each individual

ACTIVITY DURING WEEK OF COURSE

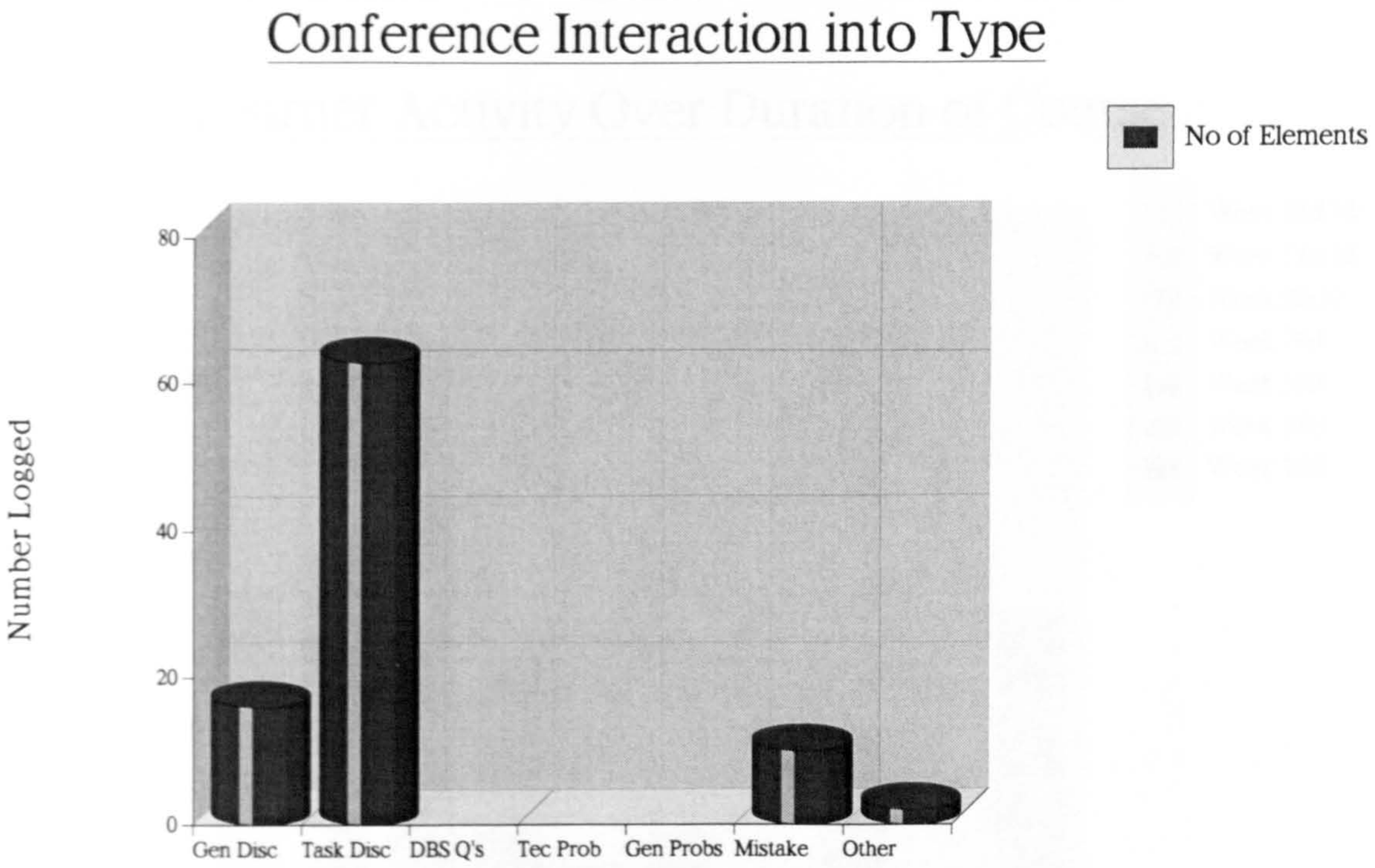
Login ID	Total	1&2	3&4	5&6	7&8	9&10	11&12	13&14
v1fd0sfe	5	2	2	0	1	0	0	0
v1fd1sbl	12	1	2	2	1	4	2	0
v1fd2ssu	0	0	0	0	0	0	0	0
v1fd3rpe	4	1	2	1	0	0	0	0
v1fd4ssh	3	2	1	0	0	0	0	0
v1fd5mde	1	0	1	0	0	0	0	0
v1fd6gch	17	3	2	5	3	1	2	1
v1fd7edr	0	0	0	0	0	0	0	0
v1fd8tre	17	3	7	2	0	3	1	1
v1fd9mke	12	2	1	3	2	1	2	1



Study conference E, interaction analysis by type.

Study Conference E : Total no' of elements = 90

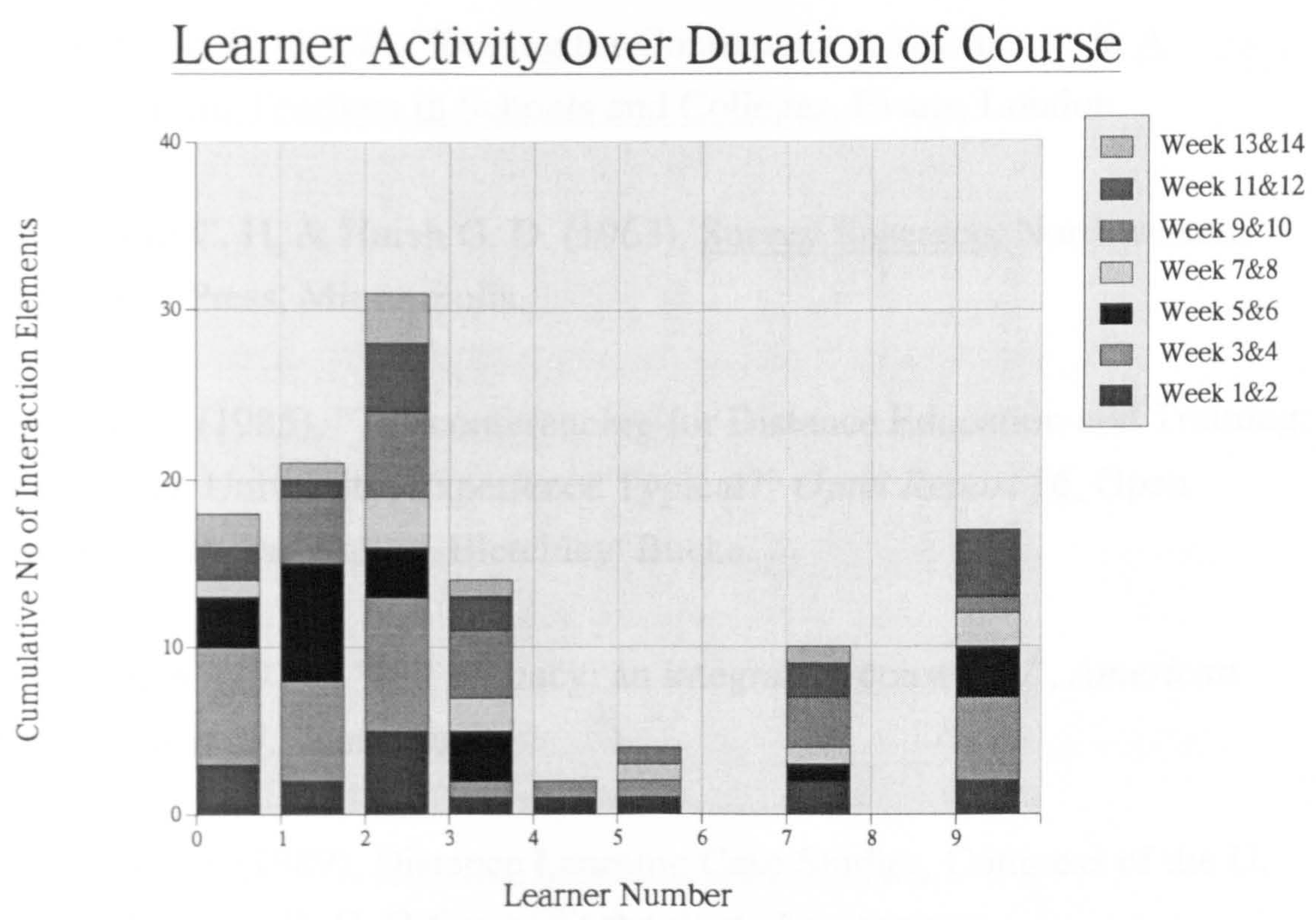
Type	No Logged
General Discussion	16
Task Discussion	63
DBS Questions	0
Technical Problems	0
General Problem	0
Mistake	10
Other	2



Study group E, number of interaction elements recorded for each individual

ACTIVITY DURING WEEK OF COURSE

Login ID	Total	1&2	3&4	5&6	7&8	9&10	11&12	13&14
v1fe0dca	15	2	3	7	0	2	1	0
v1fe1jzu	7	1	3	1	0	0	1	1
v1fe2ero	6	2	3	1	0	0	0	0
v1fe3glo	0	0	0	0	0	0	0	0
v1fe4sal	11	2	3	2	1	3	0	0
0v1fe5lar	0	0	0	0	0	0	0	0
v1fe6rla	16	1	2	1	1	2	6	3
v1fe7oho	6	1	2	1	1	0	1	0
v1fe8rno	17	2	4	3	1	2	4	3
v1fe9ead	12	3	2	1	0	1	3	2



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