

Support Initiative for Multimedia Applications:

**Video Conferencing in Education:
Meeting Teachers and Learners Support and Training Needs**

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Table of Contents

	Page
Availability	4
Acknowledgements	4
1. Abstract	5
2. Introduction	6
2.1. Objectives	6
2.2. Background	6
2.3. Method	6
2.4. Scope	6
3. Study 1 : Current Academic Research	8
3.1. Objective	8
3.2. Background	8
3.3. Method	8
3.4. Scope	8
3.5. Results	9
3.6. Discussion	10
4. Study 2 : Current Training Resources	11
4.1. Objective	11
4.2. Background	11
4.3. Method	11
4.4. Scope	11
4.5. Results	12
4.6. Discussion: Resource materials - User Centred Design	13
4.7. Pedagogical Issues: Avoiding a technology driven scenario	13
5. Study 3 : Towards Appropriate Training Resources	15
5.1. Objective	15
5.2. Scope	15
5.3. Background: Minimalist instruction.	15
5.4. Method	16
5.5. Results	17
5.6. Discussion : FAQ or minimal manual ?	20
Annexe 1 : Summaries of Current Academic Research	21
Annexe 2 : Summaries of Current Training Resources	26
Annexe 3 : Draft structure of FAQ on Video Conferencing	28
Annexe 4 : Prototype Video Conferencing Minimal Manual	29
References	31

Availability

This document is available in postscript format from the World Wide Web at: <http://www.icbl.hw.ac.uk/~cjs/sima.ps> . Further information on obtaining documents involved, including literature reviews and the minimal manual can be found below on page 20.

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1. Abstract

This document reports on the current status of training resources for video conferencing in education. Three studies were undertaken between September 1994 and February 1995.

Firstly, a literature review of current research was undertaken, to elicit skills and knowledge requirements of users within education. This review found good coverage of hardware and software aspects of video conferencing. However, poor attention was given to pedagogical factors within the articles reviewed.

Secondly, training resources were located and assessed with respect to the user needs identified or found deficient within the initial study. Two conclusions were drawn from the training resources reviewed: The resources covered did not address specific pedagogical scenarios which may occur in education based video conferencing, and the delivery style of the training material was not particularly task oriented or user centred in design.

Thirdly, an on going video conferencing training resource was designed to address the lack of user centred design in current training resources. Using HCI techniques, a prototype minimal manual was produced.

The Minimal manual is detailed in Figure 7 and Annexe 4 within this document. To attain the widest possible audience, this document was constructed as a paper based document and in parallel as an electronic resource available on the World Wide Web Internet computer network. Both this document and the resulting minimal manual can be found at <http://www.icbl.hw.ac.uk/~cjs/sima1.html>. The Minimal Manual prototype has also been posted to the Alt.Education.Distance Internet newsgroup and the Distance Education On-line Symposium mailing list (DEOS-L).

Conclusions from this study are based solely upon the documents and resources covered within this research. Resources and documents reviewed below are evaluated with respect to their relevance to the needs of users of video conferencing in education. This should not be taken as an implication of their overall ability with respect to other areas of video conferencing that they may address.

2. Introduction

2.1. Objectives

This document describes an investigation to identify training needs and appropriate designs for training resources for educational based video conferencing. It aims to provide a guide to training and support for teachers and learners involved with video conferencing. This was done by identifying user needs from current research literature, critically reviewing current training resources and by the production of a new training resource based upon meeting these first two objectives.

2.2. Background

As with many technologies which have been the domain of the expert, Video Conferencing, by way of the desktop computer, is becoming accessible to many in the general "user" population. One consequence of this is a need for better training and support, as non-technical PC users have to assume the role of presenter, cameraman, sound technician, and studio manager.

In a business environment, video conferencing can be applied easily to distance based meetings. The cost/benefit and protocols for this use of the technology are clear and easily defended. A characteristic of education is the varied pedagogical approaches of teachers. In an educational environment, video conferencing may be used for teacher led distance education initiatives (similar to the typical business scenario). However, many other scenarios may occur, from "one on one" teacher/student dialogue, to "many on many" student led discussions. This creates new and previously unforeseen problems which are unique to the teaching domain, and in many cases go beyond the designers original remit for the technology.

These education specific characteristics of video conferencing equate to a set of skills and knowledge which have not been necessary before. New expertise must be presented in a rational, untechnical manner to avoid the technology driven situation, which past experience shows to be less than useful (Bates, AW. 1991, Kling, R. 1983). If video conferencing is to enhance education, then it must be used appropriately and within context. It is necessary not only to examine the areas where video conferencing can be used effectively, but also to highlight its inefficient uses where found.

2.3. Method

Based on expert contacts and existing literature, a list of current literature was drawn up to include both research material and training resources. Three separate areas for research were identified and approached independently. The first study concerns current research projects, both published and available electronically. The second looks at training materials published and to what extent they address the needs of the educational sector. Finally, based on principles of user centred design, and using the results from the above research, a new, prototype training resource was designed.

2.4. Scope

All three studies focus on the needs of the current educational video conferencing domain. However, some of the findings can be related to the general field of video conferencing, and therefore it is of use in other application areas of this technology.

Video conferencing using current ISDN technology is addressed. This study concentrates on single, point to point, local and remote services, rather than multi-point systems. This document does not cover broadband, broadcast quality teleconferencing, satellite communication, or analogue Plain Old Telephone Systems (POTS) telephone transmissions.

In typical education scenarios, there may be no support staff (studio managers, technicians) present during conferencing, and that users may have little or no technical experience. Typical scenarios include desktop conferencing between two sites where each site may have one or more active participants, where both sites are actively involved in dialogue or discussions.

The reviews undertaken are in no way exhaustive. They were performed to a strict time limit and therefore the authors had to be selective with source material. The conclusions made, however, do point towards areas for future research and training to address.

3. Study 1 : Current Academic Research

3.1. Objective

The initial investigation was concerned with extracting information, whether explicit or implicit, on the training needs of users of video conferencing, from current published research materials.

3.2. Background

Research papers are notoriously a "hard read". Although the amount of research into the new video conferencing media is extensive, it is not always the best source of literature for newcomers to learn from. This literature review aims to provide a summary of training needs which have arisen from current video conferencing research, without the need for an exhaustive read through academic articles. A table listing the relevant strong and weak points of each article was produced for easy reference. Note that this only indicates the relevance of these articles to the specific domain of video conferencing in education and does not reflect on the quality of the reports overall.

3.3. Method

Articles were selected according to local expert advice, personal contacts, and contacts referred to within other research papers. Topics specifically looked for within the papers included hardware and software set up, coping with hardware properties(audio and video), presentation aspects, dialogue and interaction details, and further educational specific issues. Overall, 12 research papers were reviewed (fig 1). A table of how these papers fared on each of the above criteria was compiled and is illustrated in the results section below (fig 2). Summaries of each individual paper can be seen in Annexe 1.

3.4. Scope

Time limited the literature survey to the selection of a small number of highly pertinent articles. Of these, some were not specifically concerned with ISDN based video conferencing. However, some areas of video conferencing are hardware independent, and so these papers still contain relevant information.

Fig 1 : List of research papers reviewed.

Author	Title	Journal
Azarmsa, R.	Teleconferencing: how to be a successful host	TechTrends 1987 Vol 32, No 4: 19-24
Borbely, E	Challenges & Opportunities in extending Classroom and Campus	Ch 4 in Mason & Bacsich
Bruce, M & Shade, R	Teaching via Compressed Video Promising practices and potential pitfalls	DEOS - News Vol 4, No.8 , 1994
Davis, N	ISDN Technology in Teaching	Ch 10 in Mason & Bacsich
Kendall & Oats	Interactive Video Vs Traditional Classroom methods	DEOS - News, 1994
Kristiansen, T.	ISDN Telephony in Norway	Ch 7 in Mason & Bacsich
Lafon, J-L	A French Experiment in Distance learning by ISDN: 'Le Visiocentre de Formation'.	Ch 9 in Mason & Bacsich
Lange, J	Videoconferencing for education and training.	Ch 8 in Mason & Bacsich
Latchem, C., Mitchell, J	ISDN-based Videoconferencing in Australian tertiary education	Ch 6 in Mason & Bacsich
Mason & Bacsich	ISDN applications in education and Training	London, IEE publishers (Book) 1994
Purcell, P., & Parr, G.	Video Conferencing in a multicampus setting	Ch 5 in Mason & Bacsich
Rodgers, R.P. & Ng J.	Report on the Second International WWW conference, 1994	WWW '94 (Chicago) Multicasting Report: http://www.nlm.nih.gov/reports.dir/multicasting.dir/report.html
University College, London	MICE Project	Mice Home Page: http://www.cs.ucl.ac.uk/mice/mice.html

3.5. Results

Video conferencing research can be divided in to phases which reflect the sequential nature of video conferencing activities: from the initial setting up of the hardware, through practices in dialogue within a conference, to the teaching and learning theories needed when using the medium. Overall, the 12 articles reviewed showed a bias towards the initial areas of video conferencing support. Many noted how to overcome problems of the hardware and bandwidth, such as coping with delay and projection of images. Presentation skills necessary for using slides and images are also well covered. However,

little research shows the use of pedagogical studies to evaluate the different scenarios which might present themselves in an education setting. Also, it should be noted that no single article contained useful information on every topic within video conferencing. This point is illustrated by the low average score for each of the six topics reviewed in fig 2.

Figure 2. Review of Research: Summary						
Key : ***** Excellent Reading ***** 3-4 points covered						
* Not relevant ** 1-2 points covered						
Author	Initial Room Setup	Hardware Software Setup	Coping with Media	Presentation Skills	Dialogue / Social Interaction	Education Related Issues
Azarmsa, R.	*	***	*	*	**	*
Borbely, E	**	*	***	***	*	*
Bruce, M	**	**	***	***	*****	*
Davis, N	*	*	**	*	*	*
Kendall, J.	*	*	*	*	***	*
Kristiansen, T.	*	*	*	**	**	*
Lafon, J-L	***	*	**	***	*****	*
Lange, J	**	**	**	*	*	*
Latchem, C	*	*	**	*	**	*
MICE	*****	*****	*	***	*	*
Purcell, P	*	***	*	*	*	*
Rodgers, R	**	**	*	**	*	*
Average	1.75	1.83	1.67	1.83	2	1

3.6. Discussion

Although there have been many articles on video conferencing to date, many have concentrated on the initial set up of the system, neglecting the important topics of what to use this medium for. Other studies are overly confident of the hardware, offering glowing cost/benefit analyses without covering the practical pedagogical issues concerned with using the systems. A number of articles have been well written and produce informative information on video conferencing issues. However, these have been written more for academic appraisal rather than as training or learning resources and so are difficult for the non-researcher to read. Therefore, there is a clear deficit in empirical studies on specific pedagogical issues within the video conferencing domain. Research needs to be carried out on how video conferencing might cope the wide range of education scenarios. A key question is: are the skills and knowledge needed when conducting a lecture (which involves little interaction between sites), in any way different from the techniques needed when involved in a multiple student led informal discussion, with a large degree of interaction?

Further conclusions are covered in the general discussion below, which incorporates both academic research and published training resources.

4. Study 2 : Current Training Resources

4.1. Objective

The aim of this study was to evaluate current training resources available for video conferencing, with respect to the specific needs of the education community. In particular, the shortcomings of current training resources were identified.

4.2. Background

Training resources need to have good content and good delivery style. Although most contain excellent information, often the delivery style of training material prevents knowledge from being easily learned. This study aims to first evaluate current training resources, and secondly to propose a new resource with the content of those reviewed but designed with a more user centred approach.

4.3. Method

Only four video conferencing training resources were identified (fig. 3). Users of distance education systems were contacted via email and Internet newsgroups to obtain references for the resources they use. These contacts yielded no resource materials : in itself evidence of a possible lack of training material. The reviewed documents were therefore obtained mainly through the advice or recommendation of domain experts. Manuals were assessed on both their strengths and weaknesses in two areas, firstly, on content, and secondly, on delivery. The content of the training resources was assessed where possible using the same criteria as those used in the literature survey. The delivery style of the training resources was critically appraised with respect to the user centred design techniques discussed by Carrol in his "Minimal Manual" work. Five human factors issues were appraised: task orientation, error recognition and recovery, access to information, efficient and succinct information delivery, and detailed examples (Carrol, J., 1988).

4.4. Scope

The scope of this part of the investigation was limited by the amount of training resources found in this area. Video conferencing was often addressed

Fig 3. List of training resources surveyed.

Author	Title	Publisher
Burge, E. & Roberts, J.	Classrooms with a Difference	Distance Learning Office Field Services and Research O I S E, Toronto University, (1993)
Edinburgh University Computing Services	The SuperJANET Video Network Users Guide	Edinburgh University Computing Services, (1994)
Goldstein, J. & Goldstein, J.	Video Conferencing Secrets	Navitar, Inc., Rochester NY., (1993)
Meredith, S.	Video Conferencing in Education and Business: A Manual for Users and Studio Managers	University of New England, (1993)

as a small chapter within more general distance education manuals.

4.5. Results

The study reported two sets of results for the resources assessed. Each was handled separately and the results are summarised below and in figures 4 & 5. More detailed reports on the four manuals can be found in Annexe 2.

4.5.1. Content

Figure 4: Content of Training resources						
Key : ***** Excellent Reading ***** 3-4 points covered * Not relevant ** 1-2 points covered						
Author	Initial Room Setup	Hardware Software Setup	Coping with Media	Presentation Skills	Dialogue / Social Interaction	Education Related Issues
Burge, E.	***	***	**	***	**	*
Edinburgh U.	**	**	*	*	*	*
Goldstein, J	*	*	*	***	*	*
Meredith, S.	***	***	***	****	****	*
Average	2.25	2.25	1.75	2.75	1.75	1

The manuals mainly covered physical aspects of coping with the technology. Much has been learned from the broadcasting industry which can be applied to setting up the physical properties of a video conferencing room. Three of the manuals highlighted the skills needed for giving good video presentations. Information on how to keep dialogue and interaction flow going between local and remote sites was well covered in one manual. Further information was provided on how to co-ordinate the different personalities which can arise in two way, free form discussion. No information was found detailing specific education related pedagogical issues.

4.5.2. Delivery

Figure 5: Delivery styles of Training Resources					
Key : ***** Excellent Reading ***** 3-4 points covered * Not relevant ** 1-2 points covered					
Author	Task Oriented	Error Recognition	Succinct Information	Example Scenarios	Access to Information
Burge, E.	**	**	***	*	***
Edinburgh U.	*	*	*	*	*
Goldstein, J	*	*	***	*	****
Meredith, S.	***	*	*	**	***
Average	1.75	1.25	2.0	1.25	2.75

Of the four resources reviewed, one had a good delivery technique, with excellent access to information and resources. Unfortunately, this manual only covered the skills needed for presentations within video conferencing, and was therefore of limited relevant content although excellent delivery (Goldstein & Goldstein). Generally, the four resources showed little user centred design or efficient structure of information. A summary of user centred design issues for the four manuals is shown in fig.5. Further discussion on the implications of these results is detailed below (Section 4.6.2).

4.6. Discussion: Resource materials - User Centred Design

A training resource which contains highly relevant information is only useful if the user can gain access to this information quickly and easily. A dictionary, for example, is a comprehensive source of words, but a poor resource for finding synonyms. Good training resources need a method of delivery which is oriented towards actual user tasks.

Most of the training resources reviewed in Study 2 allowed users to access information quickly, through well designed structure and good references. For Example, the contents page of the Meredith resource is well structured and allows the user easy access to "Techniques for a successful interaction". However, once at this section, the delivery method is little more than a large amount of text with few headings : this is certainly not conducive to efficient information exchange or retrieval. Few instances of succinct, efficient information were found.

Error recognition and recovery is vital in good user training because most users only consult resources to solve individual errors or problems. This detailing of common faults or their symptoms, was found in only one training resource.

Examples of interactions or tasks were generally detailed as case studies. These case studies were usually academic research papers, and therefore were not easy to read and could contain a large amount of irrelevant information. Examples must be clear and relevant to users (not to academics). This must stem from concentrating examples on real tasks that users might perform.

Some of the resource material reviewed above contain highly relevant, useful information. However, overall the structure of the material does not lend itself to easy extraction of information. As shown above, the one manual which was written effectively contained information in only a very limited domain (Goldstein & Goldstein). Therefore, there clearly is a need for training resources which allow users to find information quickly and effectively, with little deviation from their desired path of action. This need can be addressed by a user centred approach to the design of training resources. Material must be designed in a manner which is logical to the user and their tasks, not to the domain expert or technician.

4.7. Pedagogical Issues: Avoiding a technology driven scenario

From the above research initiatives, it is clear that there is a lack of training resources which address the pedagogical issues involved in educational video conferencing. The specific areas within education, where video conferencing techniques can be used most effectively, need to be addressed. Typically, the classroom applications of video conferencing are very different from business based video conferencing scenarios. The education sector can use products in ways which can be outside their original intended use. Current manuals do not make any clear indications of what guidelines to apply in each specific situation. For example, guidelines for presentations (where dialogue is

usually from one to many) may not necessarily be relevant for collaborative, student led discussion, where many people are engaging in dialogue between both sites. Teachers need to know how to use video conferencing effectively within the many classroom situations which can arise, from student lead discussion groups to one on one teacher-pupil initiatives. Little research into these pedagogical issues has been forthcoming in current literature. Perhaps more pertinent to the users of this technology, these issues are also not addressed in current training resources. Current resources, although useful in some areas, do not seem to cover this aspect of video conferencing.

This is symptomatic of any new technology. To begin with, the leading force is always a cost benefit analysis. Then, as the technology begins to establish itself, research and training initiatives move towards promoting how the technology can replace original techniques. This is technology driven situation can lead to an unwillingness on the part of the user to "confront" the technology. At this stage, there must be a concerted effort on the part of designers and managers of the technology to adjust to the users. This somewhat radical approach needs to take place so that the technology is successfully integrated into the working environment, being seen as a tool and not as a hindrance which needs extra effort or knowledge to use. This user centred approach should increase the use of the technology, without conflicting with user's resistance to change.

From a research and training needs viewpoint, it is therefore imperative that further study must be done to give teachers and learners a definitive guide to using video conferencing in practical scenarios.

5. Study 3 : Towards Appropriate Training Resources

5.1. Objective

The objectives of this part of the study were to explore alternative designs for training resources and to produce a new prototype resource based on the conclusions of the previous two studies in this report.

5.2. Scope

Training resources can be assessed in terms of both their content and their delivery. The scope of this study is focused on the delivery style rather than on the content. This choice was made due to the lack of clear information on how to address the shortfall in content of current training materials. The prototype shown below is a starting point for a good training resource, which can be improved through user feedback and further iterative design.

5.3. Background: Minimalist instruction.

Few people ever read documentation. This has been the conclusion of many studies into the support and training of users. Work has been undertaken to provide new techniques of user support because of the well documented failings of previous resources (Carrol, 1988, Rettig, 1991).

Most users are driven by curiosity when using new products. A user is more likely to ask the question "What does it do?" rather than "Where's the instructions?". This property of humans to learn by doing is not often exploited in training resources. One of the major successes in the application of human factors techniques has been the construction of more user centred, "minimal" manuals. The basic premise behind this "less is more" approach to design is to construct training materials which are task centred, and appropriate to the real needs of the users. The rules of thumb for producing such a resource are outlined by Carroll (1988) :

- Focus on real tasks and activities
- Slash the verbiage
- Support error recognition and recovery
- Allow guided exploration

Although there is some debate over why this instruction works (Draper & Oatley, 1992), the consensus is that this approach to the design of documentation is more successful than previous types of training resources

Another user centred approach to learning resources is the F.A.Q. (Frequently Asked Questions, or "Fack"). These documents originate from users asking each other questions about a common product. Here, it is the users who drive the quest for information about a problem, resulting in a resource which is highly relevant to user demands, and perhaps less technical than a typical manual. In the construction of an FAQ, there tends not to be a single technical author or expert with all the answers, but instead, many users, each of whom have knowledge of different aspects of the product: a user who answers one question may also be seeking several solutions themselves. This free form, co-

operative approach has stemmed from the electronic user support groups of the global Internet computer network. As an electronic document, an FAQ usually starts as one or two common questions on a topic and then slowly grows as users resolve old problems and confront new ones. A moderator will usually compile and edit the FAQ, with new questions (and answers) usually being mailed to this moderator for inclusion within the next version of the FAQ.

In prototyping a new training resource for video conferencing, both the minimal manual and FAQ methods of user centred design were considered.

5.4. Method

5.4.1. FAQ

Most Internet electronic newsgroups have a moderator who compiles an FAQ. Information on creating FAQ's was gained from the resources within the global Internet network (Lewis, C. 1995, Hersch, R., 1995). The Internet newsgroup Alt.Education.Distance was approached, asking users who had questions on video conferencing to submit them for compilation into an FAQ.

Most feedback was from users who expressed an interest in the compilation of an FAQ, but little information on actual questions about video conferencing in education were forthcoming. This meant that the FAQ prototype was attempted by thinking of questions which might be asked, judging by the results of the studies detailed above. From these user needs, answers were thought of to the questions that users might ask. Although FAQ are normally compiled from a known list of questions and answers, this method had to be adopted due to the lack of user feedback.

This method produced a good structure to which answers could be applied. Since this was produced by information retrieval rather than using feedback from actual users, the FAQ structure was adopted for a minimal manual approach to the new training resource, as shown in Figure 6.

Fig. 6 : Problems with the FAQ approach

Sample FAQ question :
Q: How do I overcome ISDN bandwidth problems?
 What additional hardware can compensate low bandwidth?
 What visual cues need to be addressed with slow frame rates?
 What techniques can be used for addressing audio quality in low bandwidth?

Minimal Manual heading :
About that delay:
 Visually:
 Orally:

This example shows a typical FAQ question, which was not a question from real users, but one which was thought might be asked. This can therefore not be a real FAQ, but the structure of the question was useful in deriving headings for the minimal manual.

5.4.2. Minimal Manual

The basic structure of the FAQ was useful in creating a good foundation for the minimal manual prototype. The following human factors themes were then used in the further production of this prototype:

Employ task centred design:

Video conferences can be divided into a set of sequential tasks. Keeping with the task oriented design, the prototype resource was produced as a set of instructions covering each area of a video conference, from the planning phase (weeks or months before), to the evaluation phase (weeks later). Each section was covered by single, brief paragraphs. It was intended to produce a manual which was at most two sides of A4, to allow it to be easily read and printed onto a single card for practical use.

Assume world knowledge:

One of the keys to creating minimalist instruction is to assume the user has at least some intelligence. Basic information should be presented once and then assumed, and detailed knowledge should be illustrated within concrete examples.

Support user exploration:

An amount of incompleteness can be written into manuals to reduce the amount of unnecessary reading material, and to stimulate users into thinking of ways to use the technology in their particular application of the resource.

5.5. Results

The minimal manual approach to the prototype resulted in a small resource covering most aspects of a generic video conferencing session. Due to lack of user feedback, the current manual does not yet address the deficit in most current training resources, i.e. advice on pedagogical scenarios, planning or design. However, this design should be seen as an ongoing concern. It is hoped that with further information and feedback from the users of video conferencing in education, a more complete manual can evolve. The first draft of the video conferencing minimal manual is contained in Figure 7 Below. With further literature review and pedagogical experimentation, this prototype can be revised and adapted, although this is out of the scope of this document.

As detailed in the method above, the FAQ attempt was rejected as inappropriate at this time. However, with further contact from other people involved with video conferencing in education, a good FAQ resource can be produced for technicians, teachers and students alike. Discussions are ongoing within the Internet "Alt.Education.Distance" newsgroup, and with the electronic mailing list "Distance Education On-line Symposium" on how to proceed with an FAQ for video conferencing. The draft structure of the attempted FAQ is shown in Annexe 4, and may well be used as an initial structure for the eventual FAQ on this topic.

Figure 7 : Minimal Manual for Video Conferencing

Fig.7 A Prototype Video Conferencing Minimal Manual V1.0
Page 1

Weeks/Days before:

Share information between local and remote sites:
How many students/presenters will be at each site
How many sites
Mail accompanying literature for support of conference

Room set-up:

Screens:
ideally, each site should have two screens, one showing outgoing video, and one showing incoming video.
aim to have *no more than* as many people per screen as inches across display (i.e. a 25" monitor can be viewed by no more than 25 people)

Microphones:
Lapel microphones are the preferred audio system for presenters
Add ambient microphones throughout room for added realism and accessibility
Try to avoid "push to talk" microphones: they interfere with natural dialogue
Voice-activated, "VOX" microphones tend to break up the audio signal.

Audience(s)
Remote: Cameras should be placed so a remote site can see both the presenter and local audience (if present).
Local: Audiences should be able to see both remote site and local presenter.

Presenter
Plan and rehearse presentations.
Allow involvement of remote site *and* local site: do not forget to involve both audiences.
Special considerations should be given to the timings of the presentation.
A slick performance is especially needed when video conferencing:
think about :

- Time speaking Vs Time summarising
- Time explaining Vs Time for audience to think it over

Just Before:

Encourage informal interaction between sites
Personal introductions of participants
Games for breaking the ice
Camera panning around room (if possible)

Figure 7 : Minimal Manual for Video Conferencing

<p style="text-align: center;"><u>A Prototype Video Conferencing Minimal Manual V1.0</u></p> <p style="text-align: center;">Page 2</p> <p>During:</p> <p>About that delay</p> <p>Orally Speak clearly and try to maintain a constant volume Pause often for reflection Allow for time delay when in a discussion Clearly indicate when you have finished talking and are expecting a reply.</p> <p>Visually Most subtle expressions will either be lost or exaggerated. Avoid excessive movement Avoid pointing devices (will not be seen) When initiating conversation, use hand signals to highlight who is speaking Keep pictures or images on screen for long periods of time Do not move pictures once they have been positioned Avoid poor quality (second generation or worse) video Wear low contrast clothing (subtle colours)</p> <p>Keeping the remote audience's attention</p> <p>Orally Give attention to talking through presentations Explain clearly each new area of the presentation Constantly summarise each section pause often for questions actively attempt to involve the remote audience by asking questions, etc.</p> <p>Visually Use different media to keep attention (slides, images etc.) Allow for visual gags where possible (cartoons etc.)</p> <p>Discussions Allow for breaking the ice between sites Have one controller or chairperson who oversees interactions Attempt to involve everybody from all sites Attempt to use personal names where possible Begin talking by visually and orally identifying your name and site Allow long time for turn taking</p> <p>Just After:</p> <p>A virtual Coffee bar Allow for period of "warm down" This must be done with the VC link still active as there is no informal period after the session when any student can interact with lecturer in an informal "coffee bar" setting.</p> <p>Day(s) After: Send out (and get back!) questionnaires to participating students for feedback to incorporate into the next session.</p>

5.6. Discussion : FAQ or minimal manual ?

An FAQ usually stems from users beginning to interact with a product, encountering a problem, and *then* asking for help. The subsequent questions are then recorded along with answers by experts or other users, and an FAQ is slowly compiled. This form of document provides the intended users with a small, brief, easy to reference document. However, creating such a document relies on questions to begin with. An initial draft of a video conferencing FAQ was developed. However, with only domain experts for reference, the FAQ became somewhat contrived and hypocritical.

The solution has been firstly to produce a minimal manual based on perceived user needs arising from the research performed above. This should provide users with a concise, task-oriented resource of good quality. Secondly, this document should hopefully produce user feedback from the education domain. It is hoped that a distance education-biased FAQ on video conferencing can stem from this document as an ongoing, evolving user resource.

This third study continues beyond the time scale of the SIMA project, to allow for user feedback on this minimal manual. All comments, criticisms and feedback on this work are gratefully received and can be sent via email to cjs@icbl.hw.ac.uk. Further work is continuing and can be found on the Internet at the following sites :

This document (postscript format):

<http://www.icbl.hw.ac.uk/~cjs/sima.ps>

The minimal manual can be found at (html format):

<http://www.icbl.hw.ac.uk/~cjs/minimal.html>

And as postscript format at :

<http://www.icbl.hw.ac.uk/~cjs/minimal.ps>

Notes on the literature review can be found at :

<http://www.icbl.hw.ac.uk/~cjs/sima1.html>

Further information on video conferencing can be found at :

<http://www.icbl.hw.ac.uk/~cjs/vc.html>

Annexe 1 : Summaries of Current Academic Research

Author : Mason & Bacsich
Title: ISDN applications in education and Training
Publisher: London, IEE publishers

Summary of chapters relevant to Training needs for users of VC software and hardware.

Challenges & Opportunities in extending Classroom and Campus :
Columbia Borbely, E.
VideoConferencing in a multicampus setting Purcell, P., &
Parr, G.
ISDN-based Videoconferencing in Australian tertiary education
Latchem, C., Mitchell, J., Atkinson, R.
ISDN Telephony in Norway Kristiansen, T.
Videoconferencing for education and training Lange, J.
A French Experiment in Distance learning by ISDN: 'Le
Visiocentre de Formation' Lafon, J-L.
ISDN Technology in Teaching Davis, N.

Chapter 4:

Challenges & Opportunities in extending
Classroom and Campus : Columbia
Borbely, E.

Summary :

Columbia University runs a Video Conferencing link between remote sites, using digital US standard 56Kbit/s telephone lines. Sites are in the region of 120 miles (190 Km) apart. The hardware used here is not compatible with the BT desktop system: Columbia is using true Video Conferencing with a backup team of technicians controlling cameras, sound and lighting. However, some of the training problems they have experienced are similar to those expected of the desktop V.C. systems.

Training Difficulties Found:

- 0.5 second delays on VOX voice operated video
 - a protocol allowing for this hardware limitation had to be developed and explained to new VC users.
- Further protocols were needed to allow the remote students to stay involved with the project : Pauses built in to lecturer presentations.
- Use of camera technicians to ensure that shots of the blackboard were relayed to the remote sites for the correct amount of time.

Chapter 5:

VideoConferencing in a multicampus setting
Purcell, P., & Parr, G.

Summary :

The University of Ulster has four campuses spread over the Province of Northern Ireland. For some time they have been using dedicated 2Mbit connections between their campuses for Video Conferencing. A new narrow-band system was introduced in January of 1993, using BT's VC7000 ISDN video conferencing hardware (The fore-runner of the VC8000).

Training Difficulties Found:

- For use with overhead projectors, cameras had to be focused rigidly on the screen for a considerable period of time in order to give the video compression system time to fully resolve the image. A considerable amount of time was needed for the transmission of overhead slide movements and other gestures by the lecturer.
- Added functionality came from projecting the VC7000 image using video projectors onto a 10x6 ft (3mx2m) Screen, and connecting the audio output to a public address system. A radio microphone was used to accept questions from the audience.

This chapter concludes that the success of the new system in being a useful medium for education rests more on user acceptance than on the technology itself. It cites the University's ongoing user appraisal studies of the hardware as a positive response to this need. However, there is little discussion in this paper of the actual problems involved with the system's implementation.

Chapter 6:

ISDN-based Videoconferencing in Australian tertiary education

Latchem, C., Mitchell, J., Atkinson, R.

Summary :

Over 70 sites currently use some kind of ISDN Video Conferencing in Australian tertiary education. Although originally most used 2Mbit/sec or 384Kb/sec links, the advantages of video compression have meant that 128Kbit/sec (ISDN-2) is becoming the standard due to its price/performance ratio.

Training Difficulties Found:

Atkinson states that Video Conferencing's potential currently outweighs its usage.

Concludes that more research is needed into the instructional design and learning aspects of Video Conferencing.

Acknowledges that it is easy to produce poor learning material with Video Conferencing.

Insufficient research has been done to highlight the strengths and weaknesses of Video Conferencing with respect to other distance education media.

Chapter 7:

ISDN Telephony in Norway

Kristiansen, T.

Summary :

Norwegian Telecom Research have produced a desktop Video Conferencing platform which runs at 64-128Kbit/sec, and is similar in design and appearance to BT's VC7000 hardware. Their system is set up between campuses across Norway. Large projected screens were used in lecturing, with multiple microphone inputs for audio communication.

Although the paper does not specifically detail training difficulties, some interesting points are raised.

Training Difficulties Found:

Students need to be allowed period of time to adjust to having distance lectures.

New presentation techniques must be developed due to the limitations and eccentricities of Video Conferencing.

Training is needed to get teachers and pupils to exploit the technology, but this chapter does not attempt to address this need.

Chapter 8:

Videoconferencing for education and training

Lange, J.

Summary :

Lange claims Video Conferencing is different to past failed education revolutions because educators do not need to change their lecturing habits. This in itself is a contentious issue. This chapter advocates spending high to gain significant increases in profit, using an initial investment of £20,000 - £80,000 per video conferencing set-up. However, some points considered highlight problems with the ISDN systems.

Training Difficulties Found:

Dynamic echo cancellation: major problems can occur with systems where the two systems can not accept synchronous input. In systems where there is an appreciable time delay (more than .5 of a second), a rehearsed protocol must be used to communicate on an interactive level.

Remote camera control gives the lecturer more a concept of their audience when addressing just a screen.

Multiple video and audio inputs allow for a greater feeling of "presence".

Chapter 9:

A French Experiment in Distance learning by ISDN:

'Le Visiocentre de Formation'

Lafon, J-L.

Summary :

Two campuses in France have set up a ISDN-2 video conferencing network. The set up includes specific, ergonomically designed classrooms both for the lecturer and students. Although it has been greeted favourably, staff and students alike admit that more interactivity should be encouraged between the students and the lecturers.

Training Difficulties Found:

Use of large monitors and audio P.A. systems eliminated problems associated with sitting at the back of a lecture room.

The monitor has the functionality of an overhead projector, but it is the only image that can be seen by the recipient students. Careful preparation of slides and documents is essential to keep the students' attention from wandering.

Students have to be attentive to the monitor, as they cannot rely on the information being present for long periods of time - unlike a standard blackboard.

The Video Conferencing system acted to accentuate the normal lecture: a good lecture becomes better, yet a long boring lecture can seem much longer and more boring.

The lecturer feels isolated from the class because of the lack of background audio "hum" that is present when actually in a lecture hall.

The lecturers had to spend more time preparing material, having to plan timings of overheads and develop a "screenplay" for the lecture.

Lecturers found it difficult not to talk through the entire lecture, feeling they had to fill in all silent gaps: a problem associated with inadequate communication feedback .

A maximum of one hour of lecturing was set. Every 20 minutes of lecturing, a pause was introduced for summarising and questions from the floor. This formalises the interaction within the lecture and leads to less spontaneity from both sides of the network.

Chapter 10:

ISDN Technology in Teaching

Davis, N.

Summary :

The University of Exeter has networked links to several surrounding Secondary (12-18yrs) schools. The ISDN-2 links are used mainly for remote teaching, and have no Video communication. The system comprises of an audio telephone channel, and a shared computer desktop. A tutor can remotely control the student's desktop, thus demonstrating his or her expert knowledge on a personal level.

Training Difficulties Found:

Long delays between voice and desktop manipulation was confusing, and meant a new protocol of communication had to be introduced.

Delays meant the remote interaction took longer than a face to face communication session.

Author : Azarmsa, R.(1987)

Title: Teleconferencing: How to be a successful host.

Publisher: Tech Trends Vol 32 No.4 19-23

Summary

This article is somewhat dated. However, it does provide useful pointers on hosting video conferences:

Viewers should be no further from the TV set in feet than the size of the monitor in inches (roughly).

The number of people in an audience should also equal the size of the monitor in inches (again, generally speaking).

Video tape the session where possible for future evaluation

Run Pre-checks of the system !

Establish general ground rules or protocols between the local and remote sites
Encourage participants to keep notes in addition to the conference itself.

Author : Bruce, M & Shade,
Title: Teaching via Compressed Video : Promising practices and potential pitfalls
Publisher: DEOS - News, Vol 4 No.8 , 199

Summary :

Research based at the College of Education, Wyoming. Four school districts were involved in multi-site video conferencing, with the potential for increasing this number to a further 16 sites if successful.

The subject matter consisted of a series of wide ranging lectures taught to 1st and 2nd year undergraduate students.

Training Difficulties Found:

Bruce and Shade found that 16 students at four sites was a better configuration than 4 students at sixteen sites. In general, students to site ratios should be higher than sites to students.

Equipment

Should have at least one incoming and one outgoing camera for visual feedback.

Students need a period of time to adjust to seeing themselves on TV screens, as initially they are reserved and shy about being seen.

Microphone Issues

Ambient room microphones as well as lapel mikes should be used where possible

"Push to speak" mikes discourage contributions to conversations and are "unnatural"

Remote sites found it difficult to cut in to a conversation spontaneously

Leadership

To add to site dialogue, the instructor/leader needs firm control to give all sites chance for comment

Non-verbal and Verbal Communications

Compression means subtle gestures are lost, or look exaggerated

Use of gestures is useful to identify remote speaker

Author : Kendall & Oats
Title: Interactive Video Vs Traditional Classroom methods
Publisher: DEOS - News, 1994

Summary :

This research has been carried out at Washington State University, using high bandwidth Microwave based video conferencing links. Although this system is different in many ways from ISDN based video conferencing, similar difficulties arose.

The research centres on the use of video conferencing to teach course material over 4 separate campus sites. The staff teaching on the course were given various questionnaires in the hope of measuring the felt effectiveness and satisfaction of lecturing over the network.

Training Difficulties found - A problem with dialogue and interactivity

In general, the staff consulted were satisfied with the over all use of the system. The majority (66%) were satisfied that the system was at least no worse than a standard local lecture. However, the one area where the video conferencing failed to deliver was in how interactive their seminars were. Most staff felt less involved with remote students, and were unable to keep remote lectures from becoming cold or impersonal. The report recommends to increase the use interactivity between sites with more with more dialogue and use of mail/email facilities.

Ongoing global video conferencing projects

User support & training

MICE Project: University College, London

Summary:

Multimedia Integrated Conferencing for European researchers. The MICE project is concerned primarily with using video conferencing through the MBONE conferencing system. This uses high bandwidth connections via the Internet to transmit video/data/audio information between many sites.

Training / Support concerns:

From the MICE home page, it is possible to gain information on how to set-up and initialise the hardware and software necessary to use MBONE based video conferencing. Their tools page gives good hardware and software user guides. Other on line user documentation includes a page on getting started with video conferencing, detailing hardware, software, and physical requirements such as lighting, a step by step countdown list of tasks to perform before a video conferencing session, and their presentation hints page. Overall, these pages provide support for hardware and software installation, and some hints on presentations, although these do not go into specific details, and are certainly not exhaustive.

**Report on the Second International WWW conference, 1994
WWW '94 (Chicago) Multicasting Report****Summary:**

Using the MultiCasting backbone (MBONE), the Chicago conference on the World Wide Web was reached by over 400 remote viewers. In general, these remote users supported this initiative. However, many technical difficulties were experienced with this "multicast". The conference was set out as an experimental use of the (then) very new hardware, and this was stressed to the users at both the local and remote sites. An "Interlocutor" was present at the multicasting machine to co-ordinate responses from remote sites. During discussions, the interlocutor acted as an intermediary between the local site and the questions coming in from the network.

Training / Support concerns:

Before the conference, information on limitations on MBONE conferencing, including the protocols for interaction and dialogue between remote and local sites, were made available on the Internet. This was done in the hope that this would diffuse some of the problems associated with the dialogue between sites.

One major problem with the multicast arose out of the low bandwidth of the Internet connection. The organisers stressed that this was due to a technical fault, and so should not be regarded as symptomatic of the MBONE system. Many remote viewers complained about the visibility of the video for presentations - presenters were not made familiar in advance to the use of colour in preparing slides for video captures. Many remote participants complained specifically about the use of pastel colours with grey backgrounds, and clashes of texts with backgrounds (for example, blue on white).

Technical support was only available over email or other networked services. Technicians should have been present to deal with the many problems which occurred. Ambient noise caused much interference with the conference, as no personal microphones or headsets were used. The workstation was placed on a standard Audio Visual cart, which meant it was difficult to type or use when technical difficulties arose.

The interlocutor was not able to adequately cope with using the software, controlling the remote interactions, and acting as the multicast host. More technicians should have been present and these tasks should have been performed separately.

Recommendations arising from the conference:

A number of useful recommendations were suggested after the conference. Major fundamental recommendations were noted, such as having one multicasting unit for every room, (instead of moving the system around the conference halls), making sure rooms have adequate lighting, having rehearsals, notifying participants of any limitations or special considerations for presentations, and having technical support staff within easy reach.

A remote user survey carried out after the conference highlighted the frustrations felt by users would could not see clearly due to poor lighting, camera movement, and poor resolution on distant camera shots, and could not hear properly due to background noise levels, and poor microphone positioning.

Annexe 2 : Summaries of Current Training Resources

Author : Burge, E., & Roberts, J.(1993)
Title: Classrooms with a difference : A Practical Guide to use of Conferencing Technologies
Publisher: Ontario Institute for Studies in Education

Summary:

Initial Section : Teaching Needs

An in depth look at the learning and teaching process with respect to different type of distance conferencing. The book is split into an initial section on the theory of teaching and learning, and a second section which covers the different types of distance learning technologies.

The book identifies four different models to teaching .

- Teach what I know - structural, rote teaching
- Teach what I am - Highlight guidelines for learners to follow up
- Develop Minds - Provide the basis for discussion, and let learning happen indirectly
- Develop People - Informal, personal style of teaching

However, these points are not well followed up in the second half of the book.

This makes it difficult to decide which of the above methods can be most effectively applied to distance education.

Second Section : Training Needs

A number of different distance education technologies are covered. Each contains a checklist which concerns the physical and social aspects of the media:

- Physical factors of the room, hardware, and cameras
- Adjusting to "technophobia"
- The use of time management skills when conferencing
- Establishing protocols for group discussions

Areas not covered

The manual does not seem to address how to incorporate the methods of teaching that it describes in to the conferencing media it advocates. It does not include any pedagogical examples of the different educational uses for video conferencing. In its chapter on compressed video conferencing, it stresses that users of the media must be prepared for a learning curve when using the system. However, it does not appear to address this need.

Author : Edinburgh University Computing services (1994)
Title: The SuperJANET Video Network - Users Guide
Publisher: Edinburgh University Computing Services, Issue 1.1 16.05.94

Summary:

This document is a good example of a resource which does not address user needs. It briefly defines video conferencing, and then gives a step by step guide for organising a video conference using SuperJANET. This guide contains instructions on the necessary paperwork for organising a video conference. There are no details on how to set-up the hardware, when to use the system, or what possible problems may occur. In short, this is actually a guide on how to book a video conference, not how to use the technology.

Author : Goldstein, J. & Goldstein, J.(1993)
Title: Video Conferencing Secrets
Publisher: NAVITAR Inc., NY

Summary:

This manual is a document detailing how to improve presentation skills. It has been aimed at the use of Video Conferencing in business in particular. The book is well laid out in small, manageable sections with brief paragraphs stressing each point clearly and effectively. However, it has little scope for anything other than presentations on broadcast quality video conference systems. This book contains no information on dialogues, interactions across sites, or other communication issues. It covers only one way presentation from one site, and should be seen as a book on television broadcasting secrets, rather than on video conferencing secrets.

Author : Meredith, S.(1993)
Title: Video Conferencing in Education and Business : A manual for users and studio managers
Publisher: University of New England Distance Education and Open Learning Centre

Summary:

The New England University video conferencing manual is a comprehensive guide to video conferencing in business and education, supporting both end users and technical studio managers. It contains relevant and useful sections on :

- Advantages and limitations of the hardware
- practical advice on planning a conference
- descriptions of slide show and presentation skills
- Techniques for successful interactions
- Applications of video conferencing
- Coping with problems

This manual gives good advice to users of video conferencing. However, despite its excellent content, it is quite difficult to read, perhaps due to the amount of information contained within it. Of the training resources studied, this was the one which best met users needs. Many of the points reproduced in the step by step minimal manual came from within this resource.

Annexe 3 : Draft structure of FAQ on Video Conferencing

Draft 0.1 of Video conferencing Frequently Asked Questions

0.1 What is in this FAQ?

0.2 Where can I get hold of FAQ's

0.3 What is covered in this FAQ?

This FAQ is primarily concerned with ISDN -based video conferencing, using both standalone systems and those incorporated into desktop computers.

1.0 What is Video Conferencing

Video Conferencing is an all encompassing term for telecommunication using video, audio, and sometimes data transmission. It ranges from broadcast quality (as seen on TV News interviews etc.) to low-resolution 1-2 frames per second video conferencing over low bandwidth networks such as slow parts of the Internet.

1.1 What is broadband video conferencing ?

1.2 What is ISDN video conferencing ?

1.3 What is Desktop video conferencing ?

2.0 How do I overcome ISDN bandwidth limitations?

2.1 Additional Hardware

2.2 Visually

2.3 Orally

3.0 How do I get/keep the other site interested ?

4.0 What sort of overheads work ?

Annexe 4 : Prototype Video Conferencing Minimal Manual

Weeks/Days before:

Share information between local and remote sites :

How many students/presenters at each site,
How many sites,
Mail accompanying literature for support of conference

Room set up:

Screens:

ideally, each site should have two screens, one showing outgoing video, and one showing incoming video.
aim to have *no more than* as many people per screen as inches across display (i.e. a 25" monitor can be viewed by no more than 25 people)

Microphones:

Lapel microphones are the preferred audio system for presenters
Add ambient microphones throughout room for added realism and accessibility
Try to avoid "push to talk" microphones: they interfere with natural dialogue
Voice-activated microphones tend to break up the audio signal.

Audience(s)

Remote: Cameras should be placed so a remote site can see both the presenter and local audience (if present).

Local: Audiences should be able to see both remote site and local presenter.

Presenter

Plan and rehearse presentations.
Allow involvement of remote site *and* local site: do not forget to involve both audiences.
Special considerations should be given to the timings of the presentation.
A slick performance is especially needed when video conferencing:
think about :

- Time speaking Vs Time summarising
- Time explaining Vs Time for audience to think it over

Just Before:

Encourage informal interaction between sites
Personal introductions of participants
Games for breaking the ice
Camera panning around room (if possible)

During:

About that delay

Orally

Speak clearly and try to maintain a constant volume

Pause often for reflection
Allow for time delay when in a discussion
Clearly indicate when you have finished talking and are expecting a reply.

Visually

Most subtle expressions will either be lost or exaggerated.
Avoid excessive movement
Avoid pointing devices (will not be seen)
When initiating conversation, use hand signals to highlight who is speaking
Keep pictures or images on screen for long periods of time
Do not move pictures once they have been positioned
Avoid poor quality (second generation or worse) video
Wear low contrast clothing (subtle colours)

Keeping the remote audience's attention

Orally

Give attention to talking through presentations
Explain clearly each new area of the presentation
Constantly summarise each section
pause often for questions
actively attempt to involve the remote audience by asking questions, etc.

Visually

Use different media to keep attention (slides, images etc.)
Allow for visual gags where possible (cartoons etc.)

Discussions

Allow for breaking the ice between sites
Have one controller or chairperson who oversees interactions
Attempt to involve everybody from all sites
Attempt to use personal names where possible
Begin talking by visually and orally identifying your name and site
Allow long time for turn taking

Just After:

A virtual Coffee bar

Allow for period of "warm down"
This must be done with the VC link still active as there is no informal period after the session when any student can interact with lecturer in an informal "coffee bar" setting.

Day(s) After:

Send out (and get back!) questionnaires to participating students for feedback to incorporate into the next session.

References

Bates, A.W. (1991).

3rd Generation Distance Education : The Challenge of New Technology
Research in Distance Education, **3**, 2, 10-15

Carrol, J. , Smithe-Kereker, P., Ford, J., Mazur-Rimetz, S. (1988).

The minimal manual
Human Computer Interaction **3**.

Draper, S., Oatley, K., (1992)

Action centred manuals or minimalist instruction?
in

Holt, P. O., Williams, N. (Eds)

Computers and Writing : State of the Art
Intellect Books, Oxford, 1992.

Hersch, R. (1995).

FAQs about FAQs
Internet Newsgroup : News.Questions.Newusers, Monthly Posting.
email :sibit@datasrv.co.il

Kling, R. (1983).

Value Conflicts in computing developments
Telecommunications Policy, March.

Lewis, C., (1995).

FAQs : A Suggested Minimal Digest Format
Internet Newsgroup : News.Answers, Posted every 20 days
email: clewis@ferret.ocunix.on.ca

Rettig, M. (1991).

Nobody reads documentation
Communications of the ACM, **34**, No. 7, 19-24.