Deaf Australia Online II

Final Report

A project funded by the Department of Communications, Information Technology and the Arts as part of the *AccessAbility* Program

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This project was conducted by a consortium of organisations:

Australian Association of the Deaf Inc.

Centre for International Research on Communication and Information Technologies

Victorian Deaf Society (Vicdeaf)

The Centre of Excellence for Students who are Deaf and Hard of Hearing, at Northern Melbourne Institute of TAFE (NMIT)

Australian Communication Exchange

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Tom McCaul and Renee Spencer (both ACE) conducted the research on mobile text telephony and video relay interpreting respectively, from which those sections are drawn.

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The information in this report is, to the best of the consortium's knowledge, current as at February 2001 or any earlier date as noted by particular references. While every effort has been made to ensure that the information is as up-to-date and accurate as possible, telecommunications and online services are changing rapidly and this may have led to unforseen inaccuracies.

 Copies of this publication are available in hard copy from the Victorian Deaf Society, 101 Wellington Parade South, East Melbourne, Victoria, 3002, Telephone (61) (0) 3 9657 8111 or from CIRCIT at RMIT, Building 21, GPO Box 2476V, Melbourne, 3001, Telephone (61) (0) 3 9925 2829. An online copy is available at: http://www.circit.rmit.edu.au/projects/dao2/index.html

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"Mr Watson, come here. I want to see you."

With these words, Alexander Graham Bell spoke into the first telephone in 1876 and opened telecommunications to the world….unless you were deaf, that is!

It is a little known fact that Alexander Graham Bell was a teacher of the deaf and it was through his experiments on the production of sound that he invented the telephone. Little did he realise that his most famous invention would create, for the next 100 years, huge communication barriers to those very people he was endeavouring to help.

These communication barriers continue to the present day and it is only now, with the possibility of visual communication services that these barriers have the potential to be overcome once and for all. It is hoped that through research such as the *Deaf Australia Online II* project, the recommendations made will be implemented and Deaf and hard of hearing people will have access to telecommunications that hearing people have enjoyed and taken for granted over the past 100 years.

Alexander Graham Bell and his telephone.

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Executive Summary

This project, *Deaf Australia Online II*, takes forward the actions and recommendations of an earlier research project, *Deaf Australia Online*, conducted in 1999.[1] *Deaf Australia Online* identified options to improve online access for Deaf Australians. At that time most online services could not be used effectively by sign language users because they are based on sound and/or text: text is often problematic for Deaf people because their first language is a sign language (Auslan in Australia) and many have limited literacy in written and spoken languages. The earlier project identified desirable online services for Deaf people, many of which were emerging or in early stages of development, such as videoconferencing (PC-based or public) and Auslan video clips on Websites. It was recommended that such online services be trialed to examine technical considerations for Australian conditions and to evaluate their use and usability with deaf participants.[2]

The aims of the *Deaf Australia Online II* project were:

- Conduct trials of the following online services identified by the *Deaf Australia Online* project:
  - Multi-function unit: software connected to a standard PC so that it offers choice of videoconferencing, interactive text, telephone typewriter (TTY)[3] and/or voice;
  - Mobile text unit: enables text messaging, e-mail, fax and possibly TTY;
  - Public videoconferencing;
  - Video relay interpreting (VRI): utilises a sign language interpreter to relay calls between Auslan users and hearing users without the use of a TTY. The Deaf person communicates with the interpreter via a two-way video link using compatible equipment, whereas the interpreter and the hearing user communicate telephonically;
  - Auslan video clips on the Internet: for information on services and goods;
- Better understand the approach to raising awareness and skilling Deaf and hard of hearing people in the use of online services, with a particular focus on e-mail and online chat;
- Continue to build the engagement of the Deaf community, corporates, government and other interested organisations and individuals in the use of online services by the Deaf community; and
- Build strong links with international developments.

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[1] The project's research report is *Deaf Australia Online: Final Report* by Knuckey, Slegers, Kay, Barton-Smith, Ford, Burke, McCaul, Bytheway and Kelso (1999) available online at http://www.circit.rmit.edu.au/projects/dao1/ or in hard copy from the Victorian Deaf Society, 101 Wellington Parade South, East Melbourne, 3002. Telephone: 03 9657 8111.

[2] Definitions related to deafness can be found in Section 1 under the heading 'terminology'. Throughout this report the uncapitalised term "deaf" is used when referring to both Deaf and hard of hearing people in general. Deaf and hard of hearing people are differentiated into two distinct groups where relevant.

[3] For definitions of technical terms and jargon see the glossary at the end of this report.

Although *Deaf Australia Online* focused on Deaf people who use sign language, this project has been expanded to include hard of hearing people in relevant sections.

Deaf Australia Online II was funded by a grant from the AccessAbility Program of Australia's Federal Department of Communications, Information Technology and the Arts.

Findings

Overall, the project has demonstrated the importance of online services for deaf people, and the ways in which further development will better meet the needs of deaf people. Specific findings from different activities are:

Multi-function unit and videophone

A multi-function unit, developed in Sweden, was trialed. This unit, which enables Deaf people to use their first language (Auslan) via a PC over geographical distance, has met with great support from Deaf participants. The quality of video communication for sign language at about 12 frames per second, though not ideal, is perceived to be of a minimal acceptable level. Deaf people see the unit as particularly appropriate for home-based personal communication with Deaf friends and family and for workplace communication with Deaf colleagues.

Deaf people were enthusiastic about having access to different communication channels (video, text, voice) in one unit, especially as the software can be added to a technology (a PC) that many already have at home and/or work. Some suggestions were made for improvements to the unit, for example a fax capability, and icons instead of text on the menu. However, the current cost, at $6000 plus ISDN use, is a major barrier to future access by Deaf people. One solution to make the technology available to Australian Deaf people involves gaining technical certification of the video card, sponsorship of importation from Sweden, and subsidisation of hardware and software procurement by industry and/or government.

The smaller trial of videophones indicated a lower quality of video communication for signing and their stand-alone nature and absence of interactive text were seen as disadvantages. However for some Deaf participants, videophones demonstrated the advantage of having a non-PC interface plus a modest degree of portability.

Mobile text telephony

Deaf participants see significant value in the use of mobile text units for short messaging (SMS) for activities of social communication with friends and family, work-related communication and non-work communication with businesses. Among deaf participants involved with the trial, the mobile units have been used more than any other online services, such as e-mail, TTY and fax. The presence of predictive spellers and vibrating devices to alert callees of incoming messages are highly desirable for deaf people given their expected continuing high level usage of SMS.

Extension of public videoconferencing access

Since negotiating access to videoconferencing sites in rural and regional areas, Deaf service organisations in Victoria have started to successfully extend access for Deaf people in these less populated areas. This has been done by examining and linking up to existing videoconferencing networks in public hospitals, schools and government agencies across the state and Australia. Videoconferencing has been used by the organisations to provide case management and counselling, Auslan tuition, and conduct project meetings. Initial indications suggest it could be a cost-effective way of providing some services to rural clients. The main barriers to increased use by Deaf and hearing staff at these organisations have been the cost, coupled with limited awareness of and training in use of videoconferencing due to a shortage of resources and staff time. Deaf people have found the quality of video for sign language communication at 384 kbps (and about 25 fps) to be good, but an even higher quality video performance would further improve this.

Video relay interpreting (VRI)

This trial was undertaken in four locations within Victoria: Melbourne, Bairnsdale, Bendigo and Geelong. Deaf people who participated in the trial were very positive about the benefits of video relay interpreting (VRI), compared to the current text-based National Relay Service. These included being able to communicate in their first language, Auslan, having control and confidence in the communication process and being able to feel connected to the hearing caller. The cost of providing VRI to regional and rural Victoria was less than the cost of transporting an interpreter to and from Melbourne. Using VRI is a creative and innovative way to alleviate the current shortage of Auslan interpreters in Victoria, and further investigation in the areas of training, equipment and service provision will help provide Deaf people with a quality service in the future.

Interpreters noted that interpreting during a VRI call was a satisfactory experience and they enjoyed working to give Deaf people full telecommunication access. Concerns related to protocols, training of the hearing caller and, in some situations, the desirability of using two interpreters arose. Participants felt the ideal location for placement of VRI equipment would be in the home, although placement in Deaf community locations where technological backup would be readily available was seen as the next best option.

Auslan video clips on Websites

Auslan video clips were well received by Deaf participants, especially those who found the English text difficult to understand. The clips enabled the Deaf participants to use the Web more effectively. Many participants felt that the placement of the Auslan video clip next to the English text would enable the Auslan and English to complement each other.

Auslan video clips should not be less than 10-12 frames per second. At the present time, Auslan video clips are limited in size by the download time needed to view the clips. With recent developments in streaming and scalable technology it is likely that this situation will improve in the near future and will enable organisations to place the

clips on their Websites, although the quality of the video will still depend on the line connection and the modem speed.

Skilling

Various strategies are required when skilling Deaf and hard of hearing people in the use of online services, if the learning experience is to be positive for them. Smaller class sizes, an awareness of and knowledge of how to respond to the cultural and linguistic needs of Deaf people, customised training materials with pictures, diagrams and less text and specific design of the training room to allow clear lines of vision are all factors which lead to increased satisfaction of the learning experience.

It is critical that training organisations are aware of these factors and strategies to assist Deaf and hard of hearing people are implemented if these groups of people are to benefit from training in technology which is given to the rest of the community.

Recommendations: From Research to Action

The *Deaf Australia Online II* project has identified a range of actions that would benefit both Deaf and hard of hearing people. Some of these, such as the effective deployment of a multi-function communications unit, will be leading-edge applications of online services and will ultimately be of benefit to business activities and citizens more broadly.

The actions now need to be pursued in a focused, coordinated and energetic fashion. The breadth of these recommended actions, coupled with the inherent complexity of dealing across a range of stakeholders, calls for systematised approaches to their further consideration and implementation.

We have formulated both specific recommendations for action plus an overall recommendation for coordinating these activities.

Specific Recommendations for Action

The following are recommended actions arising from the *Deaf Australia Online II* study. They have been broadly aligned with specific stakeholder groups. Whilst certain activities should be readily incorporated into existing policies, programmes and/or industry developments, others may call for new resourcing.

The numbered recommendations in column 3 are linked to the recommendations at the end of each section of the report. For example R2.1 (Recommendation 2.1) can be found at the end of Section 2 on page 28.

Stakeholder group	Activity	Report Recommendations	Recomm'n Page Numbers
Industry (telecommunications and online services)	**Multi-function units** Investigate the further development and deployment of *Allan-10* units as an initial platform for personal video technologies. Investigate as an alternative, currently available 'off-the-shelf' technology that could replicate the *Allan-10* specification. Investigate the development of new-generation personal video technologies for both Deaf users and the wider community, eg. in education, small business and teleworking situations.	R2.1 - 2.5	28 & 29
	Videophones Conduct a more comprehensive trial of usability and technical requirements in conjunction with Global Videoconferencing Technologies and other videophone providers.	R2.9, R2.10	29, 30

Stakeholder group	Activity	Report Recommendations	Recomm'n Page Numbers
	Mobile Text Telephony Liaise with the Australian Mobile Telecommunications Association to: ➢ Raise awareness and improve access to mobile telephones for deaf users; ➢ Encourage introduction of V.18 software in the Nokia 9100 range: ➢ Offer appropriate service and pricing plans including SMS; ➢ Modify text mobile telephones so they can access the National Relay Service and TTYs; ➢ Offer inaudible alerting devices as options and promote their availability and special benefit to deaf users.	R3.1, R3.3, R3.4, R3.5 - 3.7	38 & 39
	Videoconferencing Establish benchmarks for a model videoconferencing facility for deaf people in conjunction with the videoconferencing industry.	R4.5	51
	High capacity transmission Design and deploy high capacity local loop transmission that enables effective signing via affordable two-way videoconferencing.	R2.5, R4.8, R5.1	29, 52, 64

Stakeholder group	Activity	Report Recommendations	Recomm'n Page Numbers
	Auslan Video Clips Work with the Internet Society of Australia to promote the use of Auslan video clips in Websites and particularly to apply accepted accessibility and universal design guidelines.	R6.1, R6.2, R6.4	71
	Standards Liaise with the Australian Communication Industry Forum (ACIF) to: ➢ Develop Australian standards and/or codes of practice encouraging manufacturers, distributors and service providers to deploy future technologies and devices observing more universal design principles, particularly in relation to Deaf users; ➢ Support the ongoing development of ITU standards (eg. V.18) of long-term benefit to deaf users.	R2.2	29
Government (Federal, State and Local)	**Awareness raising and skilling** Fund culturally appropriate awareness-raising and skilling programs in the use of online services by deaf people.	R2.6, R2.7, R7.1 – 7.5	29, 82

Stakeholder group	Activity	Report Recommendations	Recomm'n Page Numbers
	Videoconferencing Seek funding support from relevant Federal and State government departments for deaf organisations to establish videoconferencing facilities as an integral part of their service delivery. Establish directories of videoconferencing sites	R4.1, R4.3, R4.4, R4.6, R4.7	51
	Video Relay Interpreting Liaise with the ACA, the NRSCC and ACE to support the inclusion of Video Relay Interpreting in the service delivery of the National Relay Service	R5.2 - 5.5	64
Community (Deaf and hard of hearing)	**Awareness raising and skilling** In liaison with national deaf organisations: ➢ Promote and communicate training opportunities; ➢ Promote videoconferencing benefits	R4.2, R7.6 – 7.7	51, 83
	Linking to community Undertake ongoing assessment of needs, recognising changing social and technical environments. Encourage community representation/consultation. Advice re appropriate training – best practice	R7.8	83

Stakeholder group	Activity	Report Recommendations	Recomm'n Page Numbers
Research	**Evaluation** Liaise with telecommunication carriers and equipment providers (eg. through organisations such as the ATIA) to: ➢ Evaluate implementation approaches of new telecommunication equipment; ➢ Evaluate the impact of emerging technologies (eg. 3G mobiles, Internet developments); ➢ Evaluate the value and effectiveness of Auslan video clips and other approaches (eg. Web captioning) to improve the accessibility of Web pages for deaf people; ➢ Evaluate national and international projects of relevance to deaf people (eg. WISDOM, UK).	R2.8, R2.9, R3.2, R6.5	29, 38, 71

In order to implement the above recommendations and to provide credible reinforcement to the following overall recommendation, it is important that we provide background on what is currently being pursued by the Deaf and hard of hearing community in regards to telecommunication issues.

Over many years, Deaf consumer organisations such as the Australian Association of the Deaf (AAD) have steadfastly pursued telecommunication issues that affect the right of Deaf persons to fair access and equity. In doing so, AAD has involved itself in (or been invited to) many government and industry committees and/or working parties, inquiries and other consultative instruments. In almost all instances AAD has offered its insights and knowledge to these activities on a voluntary basis. AAD has never been funded to support industry's need for consumer consultation or to advocate for the rights of Deaf people for adequate telecommunications services.

Particularly since 1997, the self-regulated telecommunications environment has further forced AAD and consumer representatives to deal with many more industry 'players' and has brought complexity to how we are able to consult with industry and government agencies. While the Disability Discrimination Act (1992) has provided a 'beacon of light' from which equity and access issues in basic service delivery must be addressed, it does not provide specific guidelines to show how it can be done and when. Consequently, consumers are forced to lobby, negotiate and consult with product/service providers to achieve a reasonable and fair level of service.

With the establishment of ACIF, the telecommunication industry is increasingly dealing with issues of access and equity. The demands of ACIF for time, expertise and information from consumers (from representative organisations) is exploding as they also struggle to keep pace with the expectations to develop codes and standards to direct the industry. Since there is no funding to support Deaf organisations to fulfil the many requests from industry and government (particularly ACA and DCITA), the burden falls onto individuals within those organisations to volunteer their time to participate in consultative processes.

Increased demands have restricted the ability of community volunteers to maintain current technical awareness and they are reliant on their networking ability, the goodwill of the telecommunication industry and others to provide the necessary information. As demands continue to grow, the time required by these voluntarily consumers increases - often at their personal expense. Clearly the capacity to remain informed and independent is essential if the community is to maintain a watchful eye and play a supportive role for industry, government and others to address before any new legislation or regulation is developed, new telecommunications services launched, or equipment is released to the public domain.

The following provides a snapshot of the extent of participation AAD and other deaf organisations have in the telecommunications advisory arena during the immediate part and current year (2001):

- ACIF Disability Advisory Board
- TEDICORE national committee
- Printacall (equipment distributor)
- HREOC Inquiry on mobile phones
- Telstra Disability Equipment Program Consumer Advisory group
- Telstra Consumer Consultative Council (national)
- Government (Federal) - Inquiry input (eg; Besley Inquiry)
- Australian Communications Authority - National Relay Service Consultative Committee
- Telstra Disability Forum
- Optus Consumer Liaison Forum
- Consumer Telecommunications Network
- Vodafone, AAPT, etc
- Telstra Countrywide (state and regional contact)
- Australian Communication Exchange Limited - consumer input
- Research Projects (Deaf Australia Online II, Video Relay Interpreting Trials etc.)
- Australian Telecommunications Industry Association, Disability consumers working party (via TEDICORE)

Cross-network consultation on issues such as SMS, mobile phone equipment, call charges, information access, etc.

Overseas consultation and contacts (TDI, USA; RNID, UK; Gallaudet University Technology Assessment Program, USA; Omnitor, Sweden, etc.)

Consumer forums / conferences such as: - National Relay Service Forum, National/State Deaf Annual Conferences, World Federation of the Deaf International Congresses, DCITA Accessibility Conferences, etc.

This extensive list can be compared to 1992, when AAD was only required to relate to Telstra and DCITA. It is also important to note that the above does not take into account considerable private time spent on 'off site' consultations, investigations, trials, reviews and other critical events in order to provide this level of representation.

Hence, the *Deaf Australia Online II* management team formed the view (after close consultation with the industry and others) that the most effective way towards achieving successful outcomes on a national scale is to establish an appropriately-resourced body to work closely with the relevant parties to ensure the implementation of the specific recommendations for action from this study.

Overall Recommendation

It is recommended that a 'Deaf Online Taskforce' be established, with the key mission of improving opportunities for Deaf and hard of hearing people to participate in the mainstream of the emerging online economy. The Taskforce should have the following key characteristics:

- Joint industry, government, community and research membership;
- Auspiced by a national Deaf consumer organisation, such as the Australian Association of the Deaf (AAD);
- Current for an initial three-year term;

- Reporting to the Minister for Communications, Information Technology and the Arts;
- Funding for administration of the Taskforce provided by the federal government, with development of detailed plans for funding recommended actions to be the first priority of the Taskforce;
- Links to other bodies through which particular or long-term actions may be conducted, especially ACIF, TEDICORE, CTN, and ATIA; close working liaison with a specialist telecommunications research facility such as CIRCIT at RMIT University;
- Role to facilitate and/or oversee the implementation of the key actions arising from the recommendations of the *Deaf Australia Online II* study, with emphasis on those that cannot be readily incorporated into existing policies or programmes or may be less likely to be addressed by industry development in the near term.

1. Introduction

This project, *Deaf Australia Online II*, takes forward recommended actions of an earlier research project, *Deaf Australia Online*, conducted in 1999. That project identified options to improve online access for Deaf Australians. Most online services at that time could not be used effectively by sign language users, in Australia and indeed across the world, because they are based on sound and/or text: text can be a barrier to many Deaf people because of their limited literacy in spoken and written languages such as English.[4] Starting with the Deaf users' perspective to understand the activities they carry out in their daily lives, focus groups explored how they communicate with friends and family, study, shop, and use government services. An 'ideal model' of desirable online services and actions was identified and reviewed by the project's reference group and at a forum at the *1999 World Federation of the Deaf Congress* in Brisbane. A development path enabling progress towards access and use of these desirable services was identified, and initial investigations were conducted and documented.

Deaf Australia Online II has been funded by a grant from the AccessAbility Program of Australia's Federal Department of Communications, Information Technology and the Arts. The project was conducted by the same organisations that undertook the *Deaf Australia Online* project, with the addition of the Australian Association of the Deaf. These organisations were:

- Australian Association of the Deaf (AAD);
- Australian Communication Exchange (ACE);
- Centre of Excellence for Students who are Deaf and Hard of Hearing at Northern Melbourne Institute of TAFE (NMIT);
- CIRCIT at RMIT (Centre for International Research on Communication and Information Technologies); and
- Victorian Deaf Society (Vicdeaf)

Deaf Australia Online focused on Deaf people who use sign language (Auslan in Australia). The *Deaf Australia Online II* project was broadened to include hard of hearing people where relevant.

[4] The occurrence of limited literacy in spoken languages such as English is not just because English is a second language for sign language users. It is also because of a tradition of oralist education of Deaf children that has pervaded the western world for the past 100 years: oralist education involves teaching the oral production of spoken language, in this case English, whilst sign language is usually forbidden or discouraged. For Deaf people, unable to access the auditory form of the language as hearing learners can, learning to mouth the words and to lip read is a very slow intense process occupying most of the school day, leaving very little time for academic content (Lane, H. 1984; Lane, H., Hoffmeister, R., and Bahan, B. 1996). Bilingual education using sign language as the language of the classroom has been shown to teach subject matter better and impart background knowledge and skills that facilitate learning English (Lane, H., Hoffmeister, R.; and Bahan, B. 1996).

Terminology

This report uses the following terminology, which is important to define from the outset.

Deaf: follows the World Federation of the Deaf norm of capitalisation of the word "deaf" when referring to those with any degree of hearing loss who use fluent sign language, identify with the Deaf community and share common cultural beliefs, values and life experiences (Ozolins and Bridge 1999; Power, 1996; Lane, Hoffmeister, and Bahan, 1996; Carty, 1993). There are approximately 15,400 Deaf people in Australia (Hyde and Power 1992).

Hard of hearing: this group comprises people who have acquired a hearing loss after the development of speech and language, through the ageing process, an accident, noise or any other factor. They usually do not use sign language, and their first language is English. (Ozolins and Bridge 1999; Power, 1996; Lane, Hoffmeister, and Bahan, 1996, Carty, 1993).

Deaf: this group comprises people who have any degree of hearing loss. In Australia this group is often referred to as *"hearing impaired"* especially by the medical and educational establishments.

Oral deaf: this group comprises people with any degree of hearing loss who communicate using speech and lip-reading. They do not identify as Deaf or as hard of hearing and cannot sign fluently, but may have some knowledge of signing in English word order.

Throughout this report the uncapitalised term "deaf" is used when referring to both Deaf and hard of hearing people in general. Where possible, Deaf and hard of hearing people are differentiated into two distinct groups.

For more information on these definitions, see Appendix 1.

For information on Auslan, see Appendix 2.

Aims

The aims of this project are:

- To conduct trials of the following prototype online services identified by the *Deaf Australia Online* project:
  - Multi-function unit
  - Mobile text unit
  - Public videoconferencing
  - Video-relay interpreting
  - Auslan video clips on the Internet
- To better understand the approach to raising awareness and skilling Deaf and hard of hearing people in the use of online services, with a particular focus on e-mail and online chat.

- Continue to build the engagement of the Deaf community, corporates, government and other interested organisations and individuals in the use of online services by the Deaf community.
- Build stronger links with international developments.

Use and usability of these services have been evaluated by analysing interviews, focus groups and observations of Deaf and hard of hearing users. The project identifies ways the services may be improved for these users. Feasible locations for technologies and applications have been determined: in the workplace, public locations such as Vicdeaf, and in the home.

Technical requirements for use in Australian conditions have been determined, for example interworking, standards, and bandwidth required. Terminal specifications have also been determined where possible. The project also examines expected costs for access in various locations: set up and ongoing operation, and consideration of options for government subsidy.

Marketing Strategy

A marketing strategy was developed to ensure that the project profile was enhanced within the community, industry, government policy and academia sectors, both in Australia and internationally. This strategy involved:

- Information exchange via newsletters and magazines of organizations;
- Presentations at relevant state, national and international conferences;
- Direct interaction with targeted organisations, companies and product providers; and
- Distribution of regular updates via the project Reference Group.

Information and advice obtained from stakeholders was incorporated into the design, findings and recommendations of the project.

A detailed breakdown of the resultant marketing initiatives is provided in Appendix 12.

Structure of this Report

The following sections are each devoted to one of the above trials. Each section explains the background of that trial along with more detailed aims, technical considerations and costs for use in Australian conditions, and findings on use and usability with Deaf participants. Recommendations can be found at the end of each section. The concluding section discusses the project's skilling aim.

2. Trial of Multi-function Unit and Videophone

2.1 Background

The *Deaf Australia Online* research of 1999 concluded that a desirable online service for Deaf people would be a multi-function unit allowing choice of a range of communication channels such as videoconferencing, e-mail, fax, TTY and Web access. A multi-function unit, for home and possibly work, was one element of the 'ideal model' of desirable online services identified. Such a unit reflected Deaf peoples' cultural preference for visual communication channels that support sign language use, and their preference for a unit that combines a mix of communication channels. A unit of this nature could be readily used by Deaf and hearing people alike. It was recognised that such a unit, when identified, would need to be trialed to examine its technical requirements for use in Australian conditions, costings, and Deaf people's perceptions of its quality for sign language communication, possible uses, and usability. The project team undertook to secure and trial the *Allan-10* unit that was first demonstrated in Australia at the World Federation of the Deaf Congress in 1999.

Although videophones were not originally proposed for trialling, one model was subsequently incorporated once it became evident that it was also capable of a reasonable quality of video communication using a similar grade of ISDN transmission. Devices of this type were also seen as a possible alternative for Deaf people to use in the home and/or workplace. A 'no-obligation' loan offer of some videophones from a local distributor was therefore accepted and limited trialling undertaken in conjunction with the trial of multi-function units. The indicative findings gleaned from this initial exploration of videophones can then act as a starting point for future research beyond this project.

The trials of multi-function units and videophones focused on participants who are Deaf, though some oral deaf participants were also involved, as discussed in the methodology section below. Technical considerations of the two technologies and their costs are then discussed, followed by examination of the use and usability of the devices by Deaf people. The section concludes with a summary of the findings followed by recommendations.

Aims

The trial of the multi-function unit and videophone sought to answer the following questions:

- How valuable and effective are these technologies for use by Deaf people? In what activities and applications are the technologies an appropriate communication tool, e.g. personal communication from the home, work or for education?
- What kinds of modifications (both technical and behavioural) are required to make the technologies user-friendlier?
- What are ideal (and feasible) locations for the technologies: in the home, workplace, public locations (community centres)?

- What are the technical requirements for use in Australian conditions?
- What are expected costs for set up and ongoing operation in various locations?

2.2 Technical and Cost Considerations of the Multi-function Unit and Videophone

Two different technologies were evaluated to assess their effectiveness.

Multi-function *Allan-10* Unit

The *Allan-10* is a PC-based unit that enables communication via video, text or voice – hence its description as being "multi-function". Developed in Sweden through a project with the Swedish Association of the Deaf, Ericsson Home Communication and Omnitor AB, the unit offers communication between Deaf people, as well as between Deaf and hearing people and between hearing people (Kjellberg and Hellstrom, 1999).

In reality, the "unit" comprises a video card, a text card, a video camera, associated software and other small pieces of equipment connected to a conventional desktop PC as host. When set up, it looks like any other personal computer but with a small camera on top. A picture of the computer set up as a multi-function unit is shown below.

Figure 2.1 - The Allan-10 Unit

The monitor screen contains a picture of the person at the distant unit with menu information on the right hand side. Text is entered via the PC keyboard and messages noted at the bottom of the screen. The following picture shows what the screen looks like:

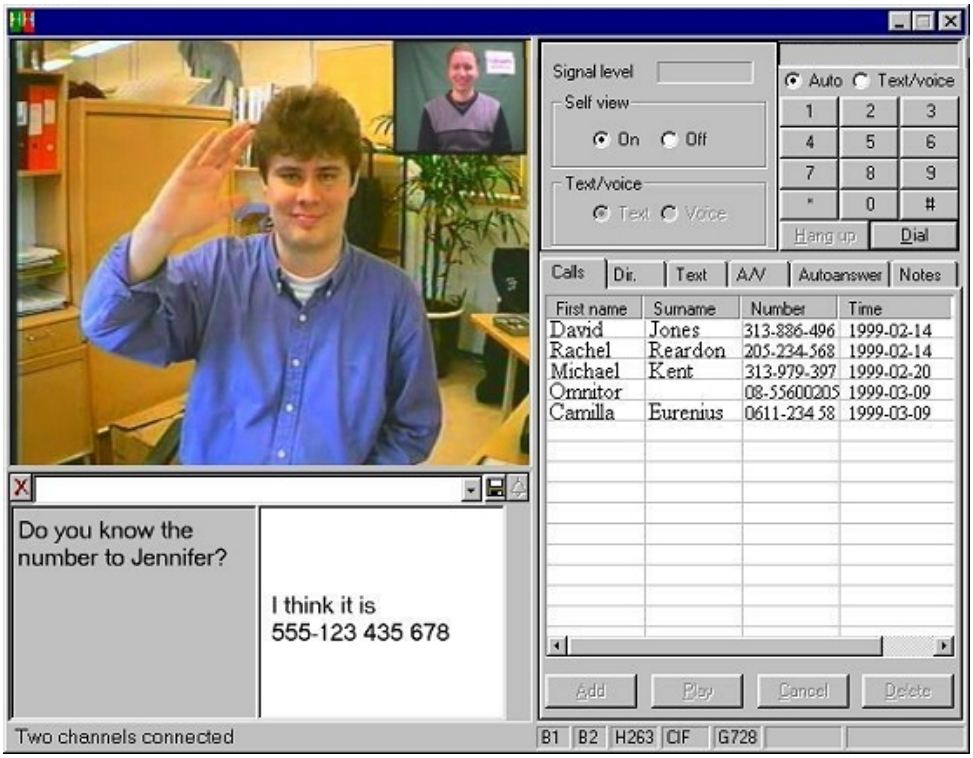


Figure 2.2 – User interface of the Allan-10 Unit

(Source: http://www.omnitor.se/english/products/user-interface.html)

The *Allan-10* unit requires a basic rate ISDN (Integrated Services Digital Network) connection operating at a speed of 128 kbps, rather than the more common analogue modem connection via the PSTN (Public Switched Telephone Network). It is specifically designed to interconnect with text phones such as TTYs. The unit can also be used as a voice phone, and separately for general PC usage, multimedia and Internet access. Importantly, all modes of communication can be undertaken simultaneously. The multi-function capability is well demonstrated by its answering machine function, which enables a message to be left in sign language or text (or voice if necessary) if the called person is absent.

Compared to Internet-based services that typically achieve only "best effort" attempts to provide service quality, ISDN is a fully digital switched service of high reliability. It is currently available to at least 96 per cent of Australians, although more expensive than the PSTN.

By conforming to International Telecommunications Union (ITU) standards, *Allan-10* units interwork with other products also designed to the same standards, though the full functionality and usability may only be available if communicating with a like unit. The applicable ITU standards are:

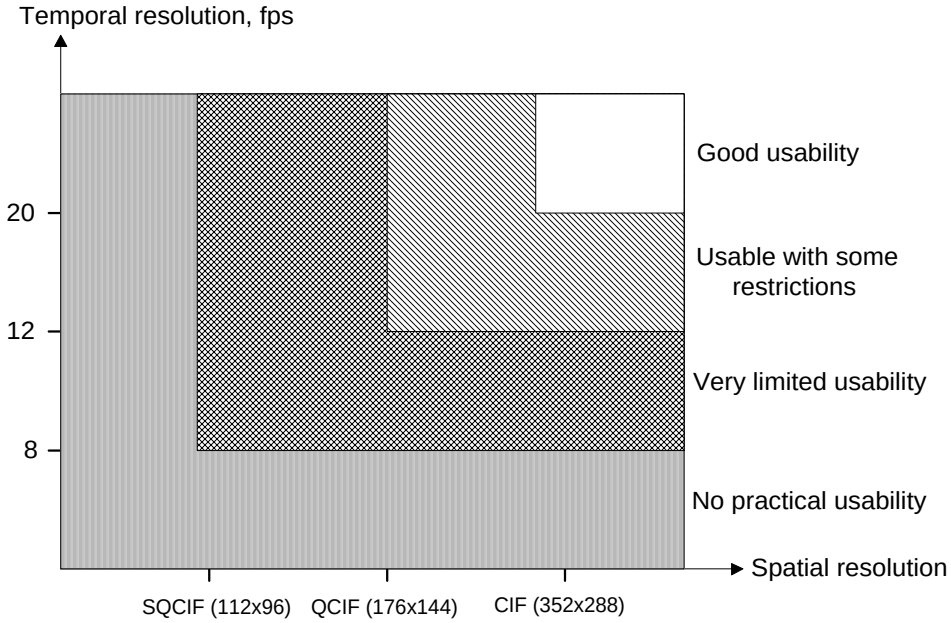
- H.320 (ISDN-based video conferencing);

- H.263 (and H.261 for video coding);
- G.728 (speech coding);
- T.140 (multimedia application text conversation); and
- V.18 (text telephony).

The *Allan-10* is designed to deliver the following performance, which is regarded as being 'usable with some restrictions' for video transmission of sign language and lip-reading:

- A video frame rate of 12 frames per second;
- A picture quality to CIF (Common Interface Format) standard, providing a resolution of 352 x 288 pixels; and
- A picture delay of less than 0.8 seconds.

Subjective tests undertaken overseas have indicated that both a higher frame rate and a lower picture delay are generally desirable. The following diagram provides a more complete appreciation of the resolution tradeoffs involved.



Note: The values must be observed with sign language or lip-reading movements present.

Figure 2.3 - Resolution requirements for sign language and lip-reading in person-to-person conversation

(Source: ITU-T Series H Supplement 1, "Application profile – Sign language and lip-reading real-time conversation using low bit-rate video communication" dated May 1999.)

Videophone (*mm225*)

The Motion Media-developed *mm225* is a desktop videophone designed to facilitate video-telephony and video-conferencing by hearing persons. It is understood to employ an almost identical video card from the same manufacturer as the *Allan-10*

unit, also requires a 128 kbps ISDN connection but enables neither text communication nor TTY interworking. It also offers none of the ancillary features of a PC but is an all-in-one compact unit. With dimensions of 210mm (W) x 250mm (D) x 180mm (H) and a weight of 1.2 kg, it can be readily moved if required. The following picture depicts the telephone-like design of the *mm225.*

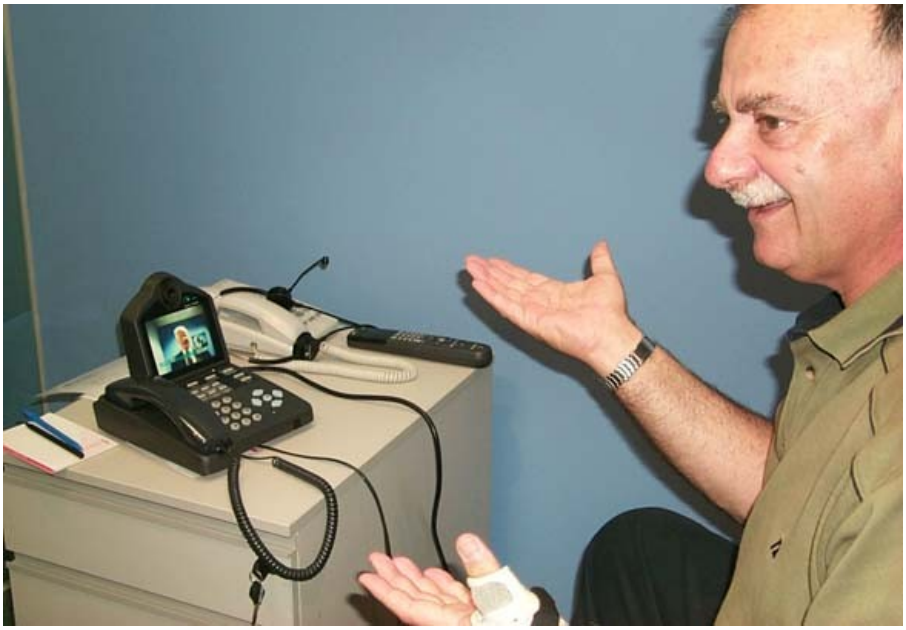


Figure 2.4 - The *mm225* Desktop Videophone

Trial Configuration

As no other *Allan-10* units were operating in Australia, it was first necessary to obtain from Telstra an interim telecommunications type-approval ("A-Cross") to connect the *Allan-10* to the ISDN. A pair of *Allan-10* units were first interconnected via Telstra's "OnRamp 2" ISDN service and operated side by side within the one room so that each could be configured in an identical fashion, cameras properly focussed, all interworking functions tested and video and audio delays observed. Once working satisfactorily, the units were then physically separated by more than five kilometres.

An all-in-one device, the *mm225* was merely removed from its package and plugged into an ISDN connection. Being a commercially available product in Australia, it already had full telecommunications type-approval ("A-Tick").

Ability to Interwork

As a consequence of adherence to common ITU standards, it was demonstrated that video and audio communication could be conducted between any of the *Allan-10*, *mm225* and *Sony PCS 1500* units provided that:

- The transmission speed of the Sony was adjusted down to 128 kbps to suit the *Allan-10* and *mm225*; and
- No text messaging was used, because this function is not offered by the *mm225* videophone and *Sony* videoconferencing.

Costs

The hardware and software for each *Allan-10* unit cost about $6000, although orders in larger quantities would be expected to be cheaper. Each host PC cost about $2,500. The above prices were paid prior to the introduction of the 10 per cent Goods & Services Tax (GST).

The recommended retail price of the Motion Media *mm225* Videophone, as supplied for trial purposes by Global Videoconferencing Technologies Pty Ltd of Melbourne, was quoted as $3,299 excluding GST.

Both the *Allan-10* and *mm225* require a 128 kbps ISDN connection, whose cost from Telstra includes an initial connection fee, a monthly rental and a charge for usage that varies with distance and time of day.

Based upon nominal usage profiles for domestic and small business users, it is then possible to convert the Telstra "OnRamp 2" tariffs to equivalent per-call charges, as shown in Appendix 3 and summarised as follows:

Table 2.1 - Averaged Costs of Personal Video Conferencing, and Voice Communication, for Two Nominal Usage Profiles

Cost Item	Nominal Domestic Usage (cost per call)	Nominal Small Business Usage (cost per call)
128 kbps ISDN plus:		
⇒ *Allan-10* **and** a host PC	$5.10	$3.19
or		
⇒ a *mm225* videophone	$3.44	$2.72
Voice connection PSTN equivalent (for hearing users, with a telephone)	$0.53	$0.46

Compared to hearing people who need only utilise voice telephony to achieve similar overall communication, Deaf people wishing to use sign language over a distance are relatively disadvantaged in cost by a factor between six and ten times, depending on their usage profile and type of personal videoconferencing equipment employed.

2.3 Evaluation of Use and Usability of the Multi-function Unit and Videophone

Methodology

The multi-function units and videophones were placed at two Deaf service organisations in Melbourne (Victorian Deaf Society and VSDC Services for Deaf Children) for the duration of the trial. These locations were chosen because they are frequented by many Deaf people for various services (for example, case management, counselling), information and education support. A sample of 17 interviewees was composed to include a diversity of preferred modes of communication (Auslan users with high and

low levels of English literacy and oral deaf people) and to represent a diversity of gender, age, and ethnicity. The sample was consciously overweighted to those with *some* experience of computers and use of TTYs so that use of this computer technology could be best evaluated. A detailed discussion of the sample composition can be found in Appendix 4. Participants were recruited via a 'snowball sample' using personal and professional networks of the researchers.

The data collection methods of this evaluation are summarised in Table 2.2 below. A mix of methods was used to test and verify findings across the different kinds of data. Each participant was interviewed prior to using the unit, given a brief (15-20 minutes duration) training session on how to use it and then asked to carry out two or three activity scenarios with a Deaf researcher at a second *Allan-10* unit in another location. This approach helped in exploring the applicability of the unit for a wide range of activities, such as workplace communication, personal communication with friends, and interactions with businesses. The participant was then interviewed about his/her views of the value and effectiveness of the unit for various activities, and about transmission of signing, features of the unit, and future use. The usability trial of videophones followed the same methodological approach as the units, but with far fewer participants: only six individual interviews were conducted to evaluate the videophone and compare it with the unit because the videophone was not originally proposed for trialling.

A focus group of some participants was conducted during the following month to capture views emerging after more extensive (and unsupervised) use of the units and videophones.

Table 2.2 - Data collection methods for evaluation of use and usability

Use and Usability evaluation activities	Purpose
Individual interviews prior to use.	Collect demographic data, household access and use of communication technologies, experience with technologies, expectations.
Brief training session.	Teach participant the basics of using the technology so they can evaluate it.
Activity scenarios with observation of use.	Examine what activities and applications are these technologies most appropriate for.
Individual interviews post-use.	Collect data on value and effectiveness of technologies straight after use.
A focus group following further use by some participants (a few weeks after the first series of interviews above).	Collect data after more in-depth use and time to reflect further.

Use and Usability of the Multi-function Unit

Overall Impressions of Value and Effectiveness

Deaf people were very excited by the unit's ability to allow communication using their first language, Auslan, with Deaf friends, family and work colleagues from the home or workplace. The unit's video capability for sign language use was seen as a huge improvement over text communication such as TTY, fax or e-mail, which to date have been the main modes of communication available to Deaf people communicating over distance. Deaf people saw the benefit in being able to express emotion and subtlety through their first language in a similar way to hearing people, who can do this with voice quality and tone on the telephone. As Pamela[5] explained,

> *Auslan is our visual language, and the Allan-10 unit provides a way for us to communicate visually with Auslan…I really like the fact that I could see the other person's face and their expression. With the TTY we have to add exclamation marks and question marks to convey expression, but through the video unit we can see the expression visually.*

And from Cameron, a young Deaf professional,

> *I want one. I'll stamp my feet until I get one… It's easy and it's comfortable. The instructions were easy to follow.*

Quality of Video Communication for Sign Language

Deaf people were able to satisfactorily express and comprehend sign language with the Deaf person at the far-end unit. The quality of video communication offered by the unit, at 12 frames per second, has been perceived as usable with some restrictions. Ideal signed communication at normal speed has been sometimes marred by two problems:

- Slightly stilted image response, mainly during fingerspelling;
- Picture delay of up to one second.

Instances of the first problem were expressed by comments that the signed image was sometimes "a little jerky" or that "you couldn't sign too fast". Participants had to ask the person they were communicating with to repeat their signing a little more slowly or to instead type their message using the text facility. Alternatively, participants were asked to slow down the rate of their own signing.

Instances of picture delay were manifested in comments such as the following from Simona,

> *It took me a while to realise my message got through just a little slower so when Gary didn't respond straight away it made me think that maybe he didn't understand what I said. But, really he was just waiting for my message to transmit totally before he responded.*

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[5] Pseudonyms have been used to preserve the confidentiality of participants.

One participant suggested that problems caused by picture delay could be reduced by using turn-taking protocols such as "GA" or "go ahead" as have been used by TTY users in Australia and the United States. Such behavioural protocols are documented in a handbook (Cagle, 1991). However improvements in frame rate up to 25 frames per second would clearly reduce this picture delay.

The contrast in picture between light and dark was perceived as very satisfactory. The clarity of the video picture has generally been very satisfactory to participants, with blurring only occurring during periods of fast finger spelling.

Interface, Usability and Features of the Unit

Given that most Deaf people already have a wide range of communication technologies (TTY, fax machine, computer) occupying their homes, participants expressed enthusiasm about having different communication modes in the one unit as offered by the multi-function unit. One interviewee commented,

> *The multi-function unit is better than having a long bench with a computer with e-mail, a fax in the corner, and my TTY on my right. I currently have to coordinate the use of these different machines and juggle things somewhat. My fax is a little bit out of reach. If I had everything in the one unit it would all be very accessible.*

Deaf people saw the value of using text to supplement signing for some activities, for example when wanting to distribute a list of names or figures for work or a party, for phone numbers and addresses, or for just clarifying a fingerspelled word that was not understood. Participants also liked the opportunity to keep a record of these kinds of personal text interactions for later reference. They also saw the value of having TTY access embedded in the unit, for communicating with the majority of Deaf people who would not have access to a multi-function unit in the near future. Unfortunately a TTY call made via an *Allan-10* unit requires use of a more expensive ISDN connection.

Having each had only about 15-20 minutes hands-on individual training, participants expressed comfort and confidence with using the PC-type interface of the unit for a variety of interactions. Even those participants who had scarcely used a computer before were comfortable with the computer interface, recognising that an interactive session with the unit requires minimal use of a mouse and keyboard. Most Deaf people required hands-on training in the multi-function capability by another Deaf trainer or someone who was otherwise fluent in sign language. Such training should be best offered by organisations known and trusted by the Deaf community, and those that have been known to successfully provide skilling with new technology in the past. Such organisations in Victoria are: Vicdeaf, various TAFEs (such as Northern Melbourne Institute of TAFE), and VSDC Services for Deaf Children. Nationally such organisations might be Australian Association of the Deaf (AAD), Australian Communication Exchange (ACE), and Deaf Education Network.

Some Deaf people commented they would like to be able to use the multi-function unit through their television screen at home, as this is more comfortable than sitting at a desk.[6]

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[6] Two ready solutions to this problem exist: either purchase a cheap RF converter box (although perhaps providing marginal video quality) or upgrade the video card in the multi-function unit such that it enables direct connection of an RF signal into the television receiver.

Whilst many participants were very satisfied with the existing interface and features, certain aspects were noted as requiring improvement and these are listed below along with possible solutions:

Table 2.3 - Suggested improvements to features of multi-function unit

Suggestion for Improvement	Possible Solution
Replace or augment on-screen menu in text format (eg. to "Hang up") with appropriate graphical icons.	This should be able to be achieved through a modification to the *Allan-10* software.
A movable keyboard and mouse would allow a user to sit at a distance from the unit more comfortably for signing and cause less picture distortion.	Infra-red keyboards and mouse devices are readily available, which require no connecting cables.
Add the capability to simultaneously communicate via facsimile.	Either incorporate through a modification to the *Allan-10* software, or install commonly available fax software?
Enable the near-end (self) picture to be removed or minimised for reduced screen distraction and/or an improved far-end picture.	This should be able to be achieved through a modification to the *Allan-10* software.

A few participants expressed concern about privacy, of not knowing who else could see their interaction on the video screen from the far-end unit. This issue requires further consideration, perhaps through identifying protocols of use that address privacy, as has been done with the TTY in the past (Cagle, 1991).

Participants who are "oral deaf", that is, they communicate mainly through lip-reading and speaking, commented that the video quality of the multi-function unit was good enough for them to lip-read the person at the far-end.

Applications for the Unit and Future Use

To test the unit's applicability across a wide range of activities, participants conducted mock interactions. These included personal communication from the home with Deaf friends and family (such as organising a party, arranging to meet for a football match) workplace communication with Deaf colleagues (setting up meetings, commenting on reports) as well as with Deaf teachers and service providers such as Victorian Council of Deaf People, Vicdeaf, Word of Mouth Technology, and Centrelink. The participants saw particular value in the unit for home-based personal communication with Deaf friends/family and for workplace communication with Deaf colleagues. In addition a number of participants suggested the unit could in future also be used to communicate with hearing people via the interpreting service. For example, home users of the multi-function unit could connect up to ACE's Video Relay Interpreting Service, which is currently being trialed.

It was concluded that the unit's application in educational settings as a tool for teaching and learning required further research: the education scenarios conducted by this project dealt only with student/teacher communication for administration or housekeeping issues.

Not surprisingly, the present cost of the *Allan-10* unit and ISDN transmission was

recognised as a major barrier to future access and use by Deaf people. Depending upon usage, signing over video can cost up to eight times more than for the equivalent conversation between hearing persons. Equipment costs are unlikely to fall without mass production, which may also imply much wider acceptance of videoconferencing within the hearing community. Correspondingly, broadband transmission costs are unlikely to fall without greater competition between service providers coupled with a greater demand from users. Although there is hope that evolving mobile telephony (such as third generation or 3G) and digital subscriber line transmission technologies (such as ADSL) have the potential to offer greater bandwidth at an affordable cost along with lower cost terminal equipment designed for the mass-market, such an outcome may not eventuate for another five years or more – if at all.

A viable alternative would be to take the necessary steps now to promote the creation of a community of Deaf individuals and workplaces using personal videoconferencing with whatever technologies are viable today, for example, the *Allan-10* and ISDN. Such an outcome would clearly develop skilling in signing with video technologies amongst users and encourage further technical developments in videoconferencing plus integration with other online services – not to mention the obvious advantage of enabling Deaf people to more fully participate in the information economy. The wider adoption of such multi-functional personal videoconferencing amongst the Deaf would require the following initiatives to be taken:

- Achievement of technical certification ("A-Tick") of the video card within the *Allan-10* for connection to the ISDN, at a cost of some $2530 initially plus $550 per annum thereafter;
- Sponsorship of importation into Australia of the *Allan-10* followed by the provision of ongoing technical and training support;
- Promotion of the advantages of such technologies and services to Deaf users;
- Lowered cost of procuring the *Allan-10* and using ISDN, which would entail direct involvement of the federal government and telecommunication carriers through:
    - Subsidisation of procurement of the *Allan-10* hardware and software to a more affordable level;
    - Reduced tariffs for ISDN data usage and possibly also service rental.

Regardless of the above, direct support is required for the ongoing development of ITU standards and the next generation technologies within the multi-function or *Total Conversation* category, as these will be of long-term benefit to Deaf users. (Hellstrom, 1999; Kjellberg, 1999)

Use and Usability of Videophones

The following findings on videophones are indicative rather than conclusive due to the small number of Deaf people interviewed about the videophones (six individual interviews and one focus group). Nevertheless, the findings are a useful starting point to future in-depth research outside the confines of this project.

Deaf people were found to be enthusiastic about the opportunity to use sign language through the videophone, as is the case with the multi-function unit. However, Deaf

participants found the quality of video communication for signing offered by the videophone to be somewhat poorer than with the multi-function unit. This was because the smaller video image restricts the amount of space in which one can sign as well as lower perceived video quality. The problems marring ideal signed communication with the multi-function unit (stilted signing and picture delay) were also evident with the videophone. The picture delay was perceived to be greater than with the unit, reaching more than 1.5 seconds at times. The video quality was also insufficient for oral deaf participants to lip-read the image on the screen.

The poorer quality of signed communication with the videophone appeared a bigger problem for some Deaf people than others. Some said they would not want it in their home or workplace with that quality, and a few saying the cheaper cost would mean that they would still buy it for the home or workplace.

The different (non-PC) interface of the videophone was seen to be an advantage by some Deaf people and a disadvantage by other Deaf. Some argued that the relatively easy-to-use interface of the videophone could be an advantage over a computer-like interface for those Deaf people who do not have existing computer skills or access. However, others argued that the multiple communication channels offered by the multi-function unit software in their home computer would avoid a number of communication devices cluttering up their lounge-rooms and kitchens. Moreover, the multi-function unit's text capability to supplement any miscommunication from fingerspelling was seen as an advantage over the videophone. It was also pointed out that younger generations (both Deaf and hearing) are all learning how to use computers at school so a computer interface should not be a problem in the future.

One notable advantage of the videophone is that it is portable, and could feasibly be moved from the workplace to home or vice versa, provided that ISDN access was available.

2.4 Recommendations

Given the general support for the multi-function unit trialed in this project, steps should be taken to support ongoing development and improvement of technologies with these capabilities, and to increase access to and use of the personal video communication services offered. A more comprehensive trial of videophones is also recommended.

Support of Ongoing Development of Video Technologies with Multi-function Capabilities

R2.1 Any further development of the *Allan-10* multi-function unit should address user concerns such as:

- replacement or augmentation of text instruction buttons with icons;
- a fax capability so users can interconnect with fax;
- the provision of a more universal alerting capability.

R2.2 A study should be undertaken to assess prospects for development of new-generation personal video technologies with multi-function capabilities that

would be of value to both Deaf users and the wider community. In particular, such development should include:

- Development of Australian standards and/or codes of practice encouraging manufacturers, distributors and service providers to deploy future technologies and devices observing more universal design principles, particularly in relation to deaf users;
- Research into IP –based (Internet Protocol) devices providing reliable and affordable symmetric delivery of picture rates approaching 25 frames per second;
- Support for the ongoing development of ITU standards of long-term benefit to Deaf users.

Increased Access and Use of Technologies with Multi-Function Capabilities

Steps to lower the cost of using such devices, so Deaf people can purchase them for their homes and businesses for their Deaf employees:

R2.3 Target the multi-function unit to industry for application to the wider community, e.g. for use by small businesses, teleworkers and in education.

R2.4 Explore avenues for government and/or industry subsidisation of:
- purchases of the *Allan-10* by Deaf individuals and organisations
- data usage and service rental tariffs of ISDN as used for video-conferencing.

Steps to explore the prospects available with new-generation high-speed digital transmission:

R2.5 Research should be conducted to assess the prospects for alternative transmission delivery involving more affordable yet symmetric access technologies such as new 'x'DSL variants and high speed G3 mobile networks. (Also see R2.2.)

Steps to promote to the Australian Deaf community the use of personal video technologies with multi-function unit capabilities:

R2.6 Funds should be granted for culturally appropriate awareness-raising activities, organised by Deaf community organisations such as Australian Association of the Deaf, and using visual awareness raising materials and hands-on demonstrations and forums.

R2.7 Training programs should be provided by Deaf community organisations/service providers, with Deaf teachers and training materials that are visual and/or in plain English; such activities should also draw from existing training approaches in use of visual communication technologies targeted at the hearing community.

R2.8 Use of personal video technologies in real-life environments, such as Deaf workplaces and Deaf homes, should be evaluated given the indicative nature of trialling in artificial environments.

Comprehensive Trial of Videophones

R2.9 Videophones require a more comprehensive trial, with support from Industry, than was possible in the scope of the *Deaf Australia Online II* project: such a trial requires thorough evaluation of use and usability by Deaf participants as well as further examination of technical requirements for use in Australian conditions.

R2.10 If videophones are trialed as recommended above, then the earlier recommendations regarding increased development, access and use of technologies with multi-function unit capabilities should also apply to videophones.

3. Trial of Mobile Text Telephony

3.1 Background

The *Deaf Australia Online* research suggested that mobile units with text messaging, e-mail, fax and TTY service capability could be particularly useful for Deaf people. A mobile unit with these functions was one element of the 'ideal model' of online services for Deaf people identified by that project. Such a unit fitted well with participants' desires for mainstream services offering mobility and interconnection to other existing services such as fax, e-mail and TTY. Moreover, anecdotal evidence from the Australian Association of the Deaf[7] and other sources has suggested great interest and demand for the Short Messaging Service (SMS) by Deaf and hard of hearing people alike (Adams, 2000).

Various mobile text units, such as the Nokia 9110 Communicator and the Ericsson Chatboard were given initial exploration as part of the *Deaf Australia Online* project, but it was recognised that these units would need to be trialed with deaf people. Issues such as interoperability with TTYs and the National Relay Service, and general usability by deaf people needed examination. The project team recognised that these investigations could be made by linking to a larger study by the Australian Communication Exchange Ltd (ACE) of mobile text telephony, planned for the period 1999 to late 2001.

The findings presented in this section are one part of this larger ongoing study conducted by ACE Research Manager Dr Thomas McCaul. That research will also include in-depth interviews and consultation with deaf people across Australia. For this reason, the findings presented here are interim and indicative rather than conclusive.

This trial includes both Deaf and hard of hearing participants, henceforth referred to collectively as deaf people in this section.

Aims of this Trial

The trial aims to answer the following questions:

- How valuable or effective is mobile text telephony (MTT) for communication by deaf people? In what activities and applications are the technologies an appropriate communication tool, for example personal communication with friends/family from the home, work and for education?
- What kinds of modifications (both technical and behavioural) are required to make mobile text telephony more user-friendly?
- What are the technical requirements for use in Australian conditions, for example issues of interworking between MTT and TTY, NRS, e-mail and fax?

[7] Australian Association of the Deaf has been lobbying mobile phone providers for better access to services and pricing plans and was instrumental in influencing the text communication cross-networking to start up in April 1999.

- What are the expected costs?

3.2 Technical and Cost Considerations of Mobile Text Telephony

Two different types of mobile telephones were selected: the sophisticated Nokia 9100 Communicator and the Nokia 5100e, 6100 and 8810 units. The 9100 is an integrated mobile phone and personal/business communicator unit, combining the features of a wireless GSM mobile telephone, a messaging device, Internet access terminal and a palmtop organiser. The other models (5110e, 6110 and 8810) either have to be connected to an external device such as a PC to receive and send faxes and/or e-mails, or otherwise via a cable to a palmtop computing device. For this trial, the Nokia 5100e and 6100 users were provided with a Palm Pilot III as the external device. All models of mobile telephone also have the capability of sending and receiving short text messages – a service known by the acronym of SMS.

Twenty-five employees of ACE (15 deaf and 10 hearing participants) were each provided with a mobile text unit from December 1999 until October 2000. The findings on use and usability, presented in the following section, focus on the 15 deaf participants. The various models distributed to deaf participants are shown in Table 3.1 below. Most deaf participants (11 of 15) were given a Nokia 5110e, one a Nokia 6110 and one other a Nokia 8810. Two deaf participants were given a Nokia 9110 Communicator.

Table 3.1 – Models and configurations of mobile text units trialled

Mobile text unit model & configuration	Functionality	No. of deaf participants given model (total 15)
Nokia 5110e	A normal GSM mobile telephony handset (as designed for hearing users), including SMS capability.	1
Nokia 5110e plus a Palm Pilot	When connected to the data port of the 5110e via short cable, the Palm Pilot (itself a type of 'palmtop organiser') provides added e-mail and facsimile capabilities.	10
Nokia 6110 plus a Palm Pilot	Similar to the 5110e but with the added e-mail and facsimile capabilities.	1
Nokia 8810	Similar to the 5110e but with no added e-mail or facsimile capabilities.	1
Nokia 9110 Communicator	Apart from the normal GSM mobile telephony functions (including SMS), this unit is also integrated with a 'palmtop organiser', e-mail and facsimile capabilities; data entry is via a 'Qwerty' keyboard	2

Text mobile phones' own proprietary software does not allow good connectivity to either the NRS or TTYs. Such functionality requires specialised software in the mobile phone and with appropriate equipment at telephone exchanges.

Rental Plans

Telecommunication carriers OneTel, Optus, Primus, Telstra, and Vodafone have pricing plans that vary depending on:

- Type of mobile phone;
- Monthly access fee plan, typically covering a period of 18 to 24 months and usually specific to voice calls;
- Business or residential use.

The typical plan, which may involve an up-front fee, binds the user via a contract to continuing payment of a monthly access fee over a period of up to 18 to 24 months. Alternatively, the user could adopt a pre-paid account plan whereby no connection or access fee is charged.

Table 3.2 illustrates that the Nokia 9110 Communicator is significantly more expensive to buy or rent than the more basic models. Furthermore, the Nokia 9110 is not included in all carrier rental plans.

SMS Calls

Since short messages rather than voice calls would be the main mode of communication for deaf users of mobile telephones, they should not then be disadvantaged by pricing plans conceived for hearing users who predominantly make voice calls. Unlike voice calls, which have different rates depending on the type of plan and also the time the calls were made (i.e peak and off-peak calls), the cost of SMS calls (20 to 22 cents, depending on the carrier) remains the same regardless of the recipient's location, plan or time of call.

Different carrier plans raise anomalies regarding SMS calls and the supporting brochures, fact sheets or Webpages typically do not offer clear information about the use of SMS. One major carrier's plan appears not to include SMS calls in their free call amount, and covers voice calls only. Alternatively it offers a $5 minimum plan for selected models (see Table 3.2) with either no, or a very small up-front fee. SMS calls are still credited to the account.

With another carrier, SMS calls are included in their plans, however voice calls take priority over SMS calls. Any money remaining after deduction of all voice calls for a month is intended to cover the cost of SMS. However, if the phone is used for SMS only, these calls may or may not be covered – depending on the particular pricing plan.

Some carriers offer pre-paid packages which charge for SMS calls at the same rate as for contractual plans.

Table 3.2 – Mobile Phone Packages[8]

Item	Nokia 3210[9]	Nokia 5510e	Nokia 9110
Retail price (approx.)	$360	$340	$1800
Minimum plans available i.e $5, $10	4	4	6
Upfront fee (approx): • *Plan[10] ($5 or $10)*	$125 to $150	*Nil*	6
• *$15 Plan*	*Nil*	*Nil*	6
• *$35 Plan*	*Nil*	*Nil*	$1050
Plans to include free SMS calls	*Depending on carrier*	*Depending on carrier*	*Depending on carrier*
Vibrating battery or vibrator optional with plan	4 *3210 has a vibrator component*	6	6
Vibrating battery accessory	-	4 *Required to pay an additional $100 to carrier.*	6
Vibrating clip or alerter	-	-	4 *Required to pay an additional $60 to independent outlet.*

[8] This table reflects an amalgam of plans from different telecommunication carriers.

[9] Nokia 3210 is included in the table to illustrate the comparison with Nokia 5110e as both models cost the same. Nokia 3210 has a predictive speller, and an integral vibratory component not requiring a vibrating battery.

[10] Plan indicates a monthly fee over a period of two years.

Promotion

Although carriers have from time to time actively promoted additional free call 'specials', such promotions generally only cover voice calls. On one occasion during May 2000, a promotion of SMS calls gave away the first 300 text or SMS messages to newly registered mobile users.

Fax and Data (e-mail) Calls

Fax and data calls are charged separately to both voice or SMS calls. All carriers impose a monthly rate with calls being free up to that amount. As an example from one mobile carrier:

- Data calls are charged at $5.50 per month. Free calls can be made up to a value of $5.50, but outstanding calls are charged at 30 second increments. Local calls cost 20 cents (peak usage) or 11 cents (off peak usage);
- Fax calls are charged at $11.00 per month and calls are free up to a value of $11. Outstanding calls are charged at 30 second increments and otherwise as for data calls.

As shown in Table 3.2, some mobile units have accessories that allow deaf users to use mobile phones more effectively. For example, some models have vibrating batteries to alert the callee of incoming calls. Some vibrating batteries are offered as optional extras whereas others are only accessory items (such as the Nokia 5110e). The batteries listed as accessories have to be purchased separately. As deaf users rely heavily on vibrating devices, it would be advantageous for them to have the option of buying a vibrating battery rather than having to pay additional cost for such an essential item.

Some models, including the Nokia 9110 Communicator, do not have vibrating batteries in their list of accessories. An Internet search was conducted to determine the availability of any other vibrating devices, such as a vibrating clip that could be used with non-vibrating mobile phones. The users of Nokia 9110 would have to bear additional cost for purchasing these vibrating devices. The importance of Nokia 9110 as a textphone has not escaped the attention of overseas service providers. For example, the Royal National Institute for Deaf People (RNID) of Britain has provided a vibrating alerter in conjunction with the textphone (RNID Catalogue Solutions). Also Telesta[11] (a provider of mobile text communication services) offers a package that includes a vibrating device with the textphone.

[11] htttp://www.telesta.com/textphone/packages/3.htm

3.3 Evaluation of Use and Usability of Mobile Text Telephony

Methodology

The findings on use and usability are based on responses from 15 deaf participants who were given mobile text telephones as part of the ACE trial. The small sample size means that the responses cannot be readily generalised to the Australian deaf population. Moreover the sample is composed of ACE employees (professionals) who are therefore relatively better educated than typical deaf community members. The sample would also have better English language competence than an average of the Australian Deaf population for whom English is a second language, with Auslan their first.

Trial participants were informed that formal training or instruction sheets on the use of the mobile text units and Palm Pilots were available on request from ACE's internal training consultants. Seven participants took up the offer of formal training and were also given instruction sheets. An additional five participants opted only to receive the instruction sheets.

The methods of data collection on use and usability of the mobile units are shown in the table below.

Table 3.3 – Methodology for evaluation of use and usability of MTT

Use and usability evaluation activities	Purpose
Questionnaire	Collect standardised data on: • Perceptions of value of experience with technologies; • Expectations; and • Demographic data
Diary	Capture day-to-day problems and issues experienced during the trial which might be missed in questionnaires or interviews.

Use of a questionnaire (in English) as a means of data collection would normally be problematic for Deaf community members given that English is a second language and many have trouble understanding and using English. However this particular sample had relatively good English language skills so the questionnaire should not have created a problem.

The questionnaires were distributed to deaf participants in July 2000.

Use and usability of Mobile Text Telephony

Almost all deaf participants (87 per cent) report that use of the mobile text units has been "better than [they] expected" and that these units have become their most frequently used communication technology since commencement of the trial.

Prior to the trial, in mid 1999, approximately three quarters of the deaf participants

(n=10) had not owned a mobile text unit of any kind. At that time the communication technologies most used by this group were telephone typewriter or TTY (36 per cent used frequently), e-mail (36 per cent) and fax (21 per cent). However mobile text units became the most used communication technology following commencement of the trial, ahead of their use of e-mail, TTY and fax: the technologies used most frequently by deaf participants then become mobile text units (35 per cent), e-mail (33 per cent) and to a lesser extent TTY (23 per cent). Fax was then used frequently by far fewer participants now (5 per cent).

A majority of deaf participants (60 per cent) used their mobile text units every day. The remaining participants reported use of their mobiles on two to four days per week.

Deaf people reported that they found the mobile text units most useful for social communication with family and friends, for work-related communication and for non-work communication with businesses. The units proved particularly useful out in public when a TTY is not available, for example to keep in touch with partners and children about pick-up times after work or school, or to ask a friend to meet for a chat (see Figure 3.1).

Figure 3.1 – A Typical Text Message

The units proved useful for communication with colleagues about work, for example when last minute changes were required for proofreading or materials. The units were also useful for non-work related communication with businesses (for example when buying or selling a car).

Use of SMS, Fax, and E-mail on Mobile Text Units

All deaf participants have been aware that SMS is available on their mobile text units, and SMS has been the text option most used by people. Most participants (80 per cent) reported being very comfortable with using SMS on their mobile phones. Almost all deaf participants (87 per cent) found the SMS very easy to use.

SMS was used everyday by about half the participants (n=7). Six others used it two to four times per week. Since late April 2000 and during the trial, SMS use became possible between the major mobile carriers, ie. Optus, Vodafone and Telstra. Most deaf participants reported that their use of SMS increased thereafter.

It is surmised that the deaf users would use SMS more often than the hearing, that

messages would be longer and that a predictive speller would be extremely handy. The predictive speller, which speeds up typing of messages, is not offered in some models. Although the deaf users would rely on essential features such as vibrating battery and preferably also a predictive speller, the absence of any information of such features on some products' factsheets does not imply that it is unobtainable. Information about these features can only be obtained via the manufacturers' or telecommunication carriers' customer services. The task of determining whether such features are present would be easier if the manufacturers' factsheets contained a small section that lists features for deaf users. It is encouraging that some mobile networks, Vodaphone[12] and Telstra[13] each have a Webpage devoted to people with hearing impairment.[14] However, such Webpages mainly deal with compatibility of hearing aid with mobile phones. Specific information for deaf users not relying on voice communication is limited.

Only two participants (the Nokia 9100 users) have attempted to use the e-mail and fax options. The limited use of these options is partly explained by the fact that some participants were not sure that that they could use fax (27 per cent) or e-mail (33 per cent) on their phones. Those who have tried fax and e-mail on their mobiles generally used these options less than once a month.

Use of Palm Pilot Accessory

Eleven of the 15 deaf participants (all those who had been given a Nokia 5110e or Nokia 6110) were also given a Palm Pilot as an alternative text interface to the mobile phone keypad. The Palm Pilot requires connection via cable to the mobile phone to send a message. Only seven of these 11 participants (64 per cent) actually used the Palm Pilot, and it was used less often than the mobile phone keypad: 82 per cent of those who had a Palm Pilot instead chose to use the keypad of the mobile phone to type in their messages on three quarters of these occasions. Almost half who had Palm Pilots said they did not understand how to use them, despite the offer and provision of training and/or instruction sheets as discussed in the earlier section on methodology.

Six of the 11 participants with Palm Pilots said they felt uncomfortable using them. Reasons given for this were that these devices are too slow and time-consuming to use, and that they are too cumbersome to carry around with the cord and mobile phone. However this area of consumer electronics is undergoing rapid change and it is possible that many of the shortcomings identified could be addressed over the next two years.

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[12] Refer to http://www.vodafone.com.au/about_us/mobile_accessibility.htm

[13] Refer to http://www.telstra.com.au/mobilenet/network/cdma_bro/hearing.htm

[14] Optus has launched a C & W Optus Disability Action Plan (December 1999) http://www.cwo.com.au/newsroom/1,1450,134,00.html The plan aims to remove barriers to access for customers, potential customers, and staff. The plan was developed in consultation with a working group comprising disability representatives of the C & W Optus Consumer Liaison Forum. In their Six Month Progress Report Dec 1999 – May 2000, liaison with the Australian Association of the Deaf has occurred about the implementation of specific strategies for the Deaf. Mobile phone brochures for deaf people are in progress and the use of Auslan video clips on CWO Website is being trialed.

3.4 Recommendations

Usage

R3.1 Mobile phone and 'palm' computing manufacturers, distributors and service providers should be encouraged to add additional information on their fact sheets or brochures describing the features of special benefit to deaf users. These features should include:

- The availability of vibrating devices and predictive spellers;
- Instructions on accessing facsimile messages, e-mail and the Internet (ie. Web-browsing capability).

R3.2 The impact of '3G' mobile technology on deaf users should be evaluated to ensure that the deaf will have future access to easy and fully interactive mobile communication, particularly including video.

Functionality

R3.3 ACE should collaborate with telecommunication carriers and software developers to modify text mobile phone networks so they can access the National Relay Service and communicate directly to TTYs.

R3.4 Manufacturers should be made aware of the benefits to deaf users of inaudible alerting devices (such as sensory vibrators) and be urged to offer such devices as an option rather than an accessory. In particular, manufacturers should be made aware of the need for vibrating devices for purpose-built text phones that do not support vibrating batteries and be urged to offer such batteries as part of a package.

Hearing/deaf Distinction

R3.5 Mobile telephone service providers should be obliged to provide the following services for deaf users who can only access SMS:

- Clear information about the use of SMS in all their plans (contractual and pre-paid);
- Inclusion of SMS calls in any free call allowance;
- Free call discounts for SMS calls in the same manner as for voice calls;
- A pre-paid account option covering SMS calls; and
- Provision of required accessories such as vibrating batteries.

R3.6 Mobile telephone service providers should provide users with detailed maps of the areas that are out-of-range for mobile communication, because deaf users cannot be assumed to have Internet access. Such information could be mailed out with regular mobile phone accounts.

R3.7 Satellite mobile SMS transmission within Australia should be considered as a means of accessing emergency services in out-of-range GSM areas. Further, satellite timed call charges in inaccessible areas should be discounted if no other means of telecommunication access are available there.

4. Extension of Public Videoconferencing Access

4.1 Background

Extension of public videoconferencing facilities was another element of the 'ideal model' of desirable online services identified for Deaf people during the 1999 *Deaf Australia Online* project. It was recognised that access to such services at Deaf service organisations and community centres could be a cost-effective way of facilitating general communication and providing services such as case management, counselling and information, delivered at a distance. Since a number of videoconferencing sites already exist across Australia (in public hospitals, at schools and universities for example), we could document where these sites are to extend access for Deaf people, especially those in rural and regional areas.

It was seen that this goal would link up with that of Victoria's Deaf Technology Alliance, a consortium of service providers and community centres for Deaf and hard of hearing people exploring the use of videoconferencing to assist in the delivery of their services. These organisations provide information, education, social services, interpreting and advocacy to Deaf and hard of hearing adults, children and their families across Victoria. Access and support issues for videoconferencing by Deaf people could thus be examined by linking with the organisations involved, such as Vicdeaf and VSDC Services for Deaf Children. Moreover the project could also link with Australian Communication Exchange to document their experiences with videoconferencing.

This component of the project focused on signing Deaf people.

Aims

These are three-fold:

- To extend access by Deaf people to videoconferencing in public locations;
- To identify problems and processes of access and support for videoconferencing for Deaf people;
- To determine the technical requirements for use in Australian conditions.

4.2 Methodology

The following approach was used to achieve the above aims:

- Identify existing Australian directories of videoconferencing, then
- Identify prospects for access sites that Deaf people could use for relevant activities via links with Deaf service organisations. Assist negotiation of 'in-principle' access.
- Document issues of general access and support by assessing Deaf service organisations via:
    - Interviews with management and some staff of organisations;

- Literature review of trials and/or use of videoconferencing by Deaf and hearing users;
- Analysis of forms completed at the end of each videoconferencing session by the Deaf and hearing staff of the organisations; and
- Analysis of focus group data which covers videoconferencing as well as use of a multi-function unit.

➢ Examine the technical requirements for use in Australian conditions.

4.3 Extension of Videoconferencing Access in Public Locations

To extend access by Deaf people to public videoconferencing sites, it was first necessary to identify directories of videoconferencing sites across Australia. Table 4.1 lists these directories from different sources and the states covered. The Tele-Health directory lists public hospitals and health care centres whilst the Victorian schools directory lists secondary schools. At the time of writing, the Tele-health "national database" was limited to Victorian sites only and was still under development. The Australian Government Videoconferencing Site List points to sites in federal courts and departments of justice across Australia. The South Australia Health Videoconferencing Network lists some sites in the Northern Territory as well as South Australia. The University of Melbourne lists universities across Australia and the world, some Australian TAFEs and schools. The Western Australian government's Department of Commerce and Trade is planning to install videoconferencing facilities at telecentres across the state over the next three years (Cowan, 2001).

Many of these directories include useful details videoconferencing such as equipment type and transmission capability, the local booking officer's name and contact details, as well as the ISDN numbers.

In addition to these public videoconferencing sites, commercial facilities and services are also available at a cost. Integrated Vision, for example, has a private directory of videoconferencing sites across Australia, whereby site addresses are only made available to users upon booking the service.[15] Telstra no longer operates videoconferencing rooms: they now provide a bridging facility only, ie. when more than two conference sites are involved.

[15] Integrated Vision may be contacted by phone on 1800 637 4800 or via the Web at http://www.ivision.com.au

Table 4.1 – Directories of videoconferencing sites throughout Australia

Directory Title	Source	Location and Type of sites	ISDN rates
National Database of Tele-Health Site Locations Victorian Tele-Health Locations Map	http://www.telehealth.com.au/local-cgi/get_detail.pl (last accessed 21/02/00) This glossy leaflet from GVT lists some Victorian Tele-health sites (eg Wodonga) not listed in above Tele-Health directory	Phase 1 of the database initially covers hospitals and regional health centres but only in Victoria.	Mostly 384 kbps, some 128 kbps
SOFWeb Videoconferencing Clusters	http://www.sofweb.vic.edu.au/lt/telemat/videoclu.htm (last accessed 21/02/00)	Victorian schools and certain regional education offices (predominantly regional and rural)	Mostly 128K kbps, some 64 kbps
South Australian Health Videoconferencing Network	http://www.adelaide.net.au/~telemed/network.html (last accessed 21/02/01)	South Australia and Northern Territory hospitals, health centres, universities and TAFE colleges	Mostly 384 kbps, some 128 kbps
Australian Government Videoconferencing Site List	Available from Global Videoconferencing Technologies (GVT).	All Australian states	Information unavailable on directory
Australian & New Zealand Teleconferencing Directory	http://www.tafe.sa.edu.au/video-conf/ata/set.html (then go to 'Directory') (last accessed 21/02/01)	All Australian states and New Zealand, predominantly commercial operations, some universities, some TAFE colleges	Some mention of rates up to 384 kbps.
Queensland Telemedicine Network	http://www.health.qld.gov.au/qtn/sites.htm (last accessed 21/02/01)	Queensland hospitals and health centres throughout the whole state.	Information not explicitly given
University of Melbourne ISDN Bridge	http://www.ists.unimelb.edu.au/asp/vc-centre.asp (last accessed 21/02/01)	Interstate (all states) and overseas universities, colleges and schools (Victoria)	Information unavailable on directory
Integrated Vision Pty Ltd	Contact by phone 1800 637 4800	All Australian states: commercial sites.	Mostly 384 kbps, some 128 kbps

The next steps in extending access by Deaf people to public videoconferencing sites involved linking with Victoria's Deaf Technology Network and to ACE to document the Deaf service providers and community centres in Victoria at which access is *currently* available. These organisations are listed in Table 4.2 below, along with their locations.

Table 4.2 – Deaf community/service organisations with videoconferencing in Victoria

Deaf community/service organisations[16]	ISDN transmission rates
Vicdeaf, East Melbourne	384 kbps
VSDC Services for Deaf Children, City of Melbourne	384 kbps
ACE offices, Box Hill, Melbourne	384 kbps

With this information, it was important to then develop a picture of where Deaf people are located in regional and rural Victoria and map that information against existing videoconferencing sites in the state, so that we could then negotiate 'in-principle' access for Deaf people at some sites. Table 4.3 gives only a rough estimation of numbers of Deaf sign language users, based on information provided by rural information workers at Vicdeaf.

Table 4.3 – Signing Deaf Population in Victoria

Victorian region	Number
Hume region (north-east Victoria)	100
Lodden Mallee region (north-west Victoria)	45 (25 Bendigo, 20 Mildura)
Gippsland (south-east Victoria)	50-70
Grampians region (mid-west Victoria)	40-50
South-west region	100
Metropolitan	Up to 5000

Source: Information provided by Rural Information Workers funded by Department of Human Services, 24/10/00

It was then possible to link with Vicdeaf, ACE, and VSDC Services for Deaf Children to document which other sites (for example in rural and regional Victoria) they would want to link with in future. Various sites were singled out by Vicdeaf and VSDC Services for Deaf Children for accessing as needed by their clients now and in the

[16] Although Chisholm Institute of TAFE in Melbourne have access at 128 kbps, their video quality for sign language is reported to be inadequate so they go to other sites at schools rather than use their own.

near future, and these are listed in Table 4.4 below. Further sites will be added to that list by VSDC and Vicdeaf as the need arises, in locations such as Bairnsdale, Wodonga, Sale and Traralgon using the videoconferencing directories noted above.

Table 4.4 – Rural Videoconferencing sites accessed by Vicdeaf and/or VSDC Services for Deaf Children

Site (town/city)	Site Organisation Name	Site Room Booking Name	Site Room Booking Telephone	ISDN directory listing	ISDN transmission rate	Costs
Currently accessed						
Kerang	Kerang and District Hospital	Margaret Kendrick	03 5450 9210	03 5450 9275x2	384 kbps	Call charges as per billing received
Swan Hill	Swan Hill District Hospital: Rehabilitation Unit	Ron Martin Pat O'Connor	03 5033 9221	03 5032 3686x2	384 kbps	Call charges as per billing received
Sites for future access						
Shepparton	Shepparton Adult Mental Health Service	Angela Murphy	03 5832 2114	03 58331660/1	384 kbps	Room hire $50/hour plus call charges (as per billing received)
Seymour	Seymour Community Mental Health Centre	Frank Hanns	03 5792 3929	03 5735 1040	384 kbps	Room hire $50/hour plus call charges (as per billing received)

4.4 Videoconferencing Access and Support Issues

This section on access and support issues is based on the links with Vicdeaf and VSDC Services for Deaf Children, but the following section on evaluation of use also includes ACE's experiences. Videoconferencing facilities were set up in early 2000. Both organisations installed Sony PCS 1500P TV set-top videoconferencing systems. Neither organisation experienced any problems with the installation of ISDN lines (by Telstra) or the initial set up of the equipment. At the time of installation, the Deaf service organisations recognised the considerable potential of videoconferencing for linking to their rural and regional clients plus clients' families in a more cost-effective manner, and that trialling the services would also yield new unforseen uses. The organisations envisaged they would use it for the following activities:

- Communication using Auslan between the organisation's community workers and their rural and regional clients and their families, for case management (includes advocacy, counselling, and/or mediation);
- Provision of Auslan interpreting services to Deaf clients in rural and regional areas;
- Provision of Auslan tuition to hearing family members of Deaf children, especially those in rural and remote areas.

However both organisations have used videoconferencing, on balance, somewhat less than they expected. Videoconferencing has been used for the following activities:

- Provision of Auslan tuition by a Deaf teacher to hearing family members of Deaf children in rural and remote areas;
- Conducting meetings of the Deaf Technology Alliance, which is a consortium of organisations and services for Deaf and hard of hearing people whose aim is to explore use of videoconferencing;
- Communication between the organisation's community workers and their rural and regional clients and their families, for case management/counselling.

In addition to the above uses, a room with videoconferencing equipment has also been hired out by other agencies to liaise with their own Deaf staff members working in rural regions, and to teach Auslan to remote groups.

Costs

The above applications of videoconferencing indicate that it can be a cost-effective way of communicating with clients across a distance, especially for those in rural areas, although this would require further monitoring over time. Use of videoconferencing has been shown by other studies (Gibson, 1999) to provide economic benefits to service providers and consumers such as reducing or eliminating travel time, travel costs and overnight accommodation. Table 4.5 compares the costs of physical provision of a one-hour session of Auslan tuition delivered in Kerang (Victoria) by a teacher from Melbourne, to the cost of the equivalent service delivered via videoconferencing between Melbourne and Kerang.

Table 4.5 – Cost Comparison of Physical Service Delivery versus Videoconferencing for Auslan Tuition

Item	Physical delivery of Auslan tuition	Service delivery via videoconferencing
Time period/ duration	2 x 5 hrs travel (305 km each way) + 2 hrs tuition (min. charge)	1 hr of ISDN usage @ 384 kbps 1 hr tuition (2 hr min. charge) ISDN line rental of $165/mth, shared across 3 equivalent activities
Cost	Travel: 10 hrs @ $15/hr = $150 Petrol: $75 Accommodation: $100 Tuition: 2 hrs @ $15/hr = $30	ISDN usage: $123.75 Tuition: 2 hr @ $15/hr = $30 ISDN line rental: $14/week Videoconf equip cost contribution: $48
Total Cost:	**$355**	**$216**

Notes: ISDN 384 kbps service costed at day rate, long distance (165 – 745 Kms non-intercapital). For further detail, refer to http://www.telstra.com.au/onramp/pricing.htm. Tuition delivered weekly. Videoconferencing equipment (costing $13,000 each end) shared across 3 equivalent activities each week; its purchase cost amortised via a 5 year loan at 12% interest resulting in a monthly repayment of $289 per v/c unit (or $72/week per v/c unit) ÷ 3 = $24/week per v/c unit apportioned to this activity x 2 = $48 when taking into account the v/c equipment at both ends.

Although not exhaustively conducted, this cost comparison illustrates that a one-hour videoconference between Melbourne and Kerang employing quality equipment offering close to 25 picture frames per second is cheaper than the cost of physically transporting an Auslan tutor over that distance.

Training

The suppliers provided a couple of three-hour training sessions as soon as the equipment had been installed. The training was given to key staff who it was thought would be most likely to use the videoconferencing, such as community workers, management, technical support staff, and interpreters. However it is recognised that further training would be useful, especially now that some people have had experience using the videoconferencing and identified issues and problems they would like addressed. Suggestions for training approaches and awareness-raising strategies for videoconferencing in organisations can be found in Gibson (1999) *Telehealth Project Process Report*. That paper reports on lessons learned from the use of videoconferencing for health and community services in rural and regional South Australia.

Procedures and Policies

As the service organisations are using a trial-and-error approach to their use of videoconferencing, procedures and policies for access and use are being developed

over time. However both organisations have recognised the need to identify one or two staff members who are videoconferencing 'contact officers' for booking procedures, day to day administration of the system (for example keeping log book of use), technical support, and trouble-shooting if the user is unfamiliar with the system.

The service organisations have developed booking forms which detail dates of use, staff requesting booking, site connecting to, and account details for call costs. A one page 'quick reference guide' with instructions on how to turn on and use the videoconferencing is located with the TV equipment. This was provided by the equipment suppliers. However it is recognised that a concise guide to effective use of videoconferencing should be used and modified as necessary. It would cover issues such as the choice and set-up of rooms, lighting arrangements, microphones, alternative locations and positions of participants, and personal presentation. Documents which could be used/modified include Dibbs (1999) *Videoconferencing: An Introduction and Some Handy Hints*, and Telehealth Victoria's publications *Multi-point Videoconferencing: A Guide for Organisers, Presenters and Participants* (1999) and *Orientation Checklist for New Videoconferencing Participants* (2000) available from the TeleHealth Victoria Website. Ideally this information would be collated and maintained by the contact officer(s) at each organisation.

In addition, one of the organisations has composed a single-page guide for agencies using their videoconferencing equipment which covers procedures such as booking the room and equipment, filling out the log book, and security information.

The organisations have also developed a videoconferencing evaluation form to monitor the effectiveness of use. These forms monitor the activities the videoconferencing is used for, the quality of the communication and transmission and any problems encountered. Analysis of responses from a modified version of these forms was used to inform this report.

Barriers to Further Access and Use

The following issues have been identified as barriers to further access and use of videoconferencing by the organisations:

- Lack of awareness of staff of the potential uses of videoconferencing, due to lack of promotion of videoconferencing within the organisations. This lack of promotion is partly explained by busy staff and management with little time and resources to develop a strategy of promotion and training;
- Staff and/or client reluctance to use the new technology (both hearing and Deaf people);
- Lack of space to place the videoconferencing equipment in one organisation means multiple staff compete to use the room, which is also used for meetings;
- The time and effort required to set up access at the remote site, for example much liaison and many telephone calls between the two parties to set up time and access. This can be resolved by establishing regular times and routines for access with the remote end;
- Concerns about how much a typical videoconferencing session might cost;

- Recent increase in demand for services by metropolitan clients and less demand in rural regions.

Interim Evaluation of Use

As the focus of the videoconferencing trials are issues of access and support rather than a dedicated evaluation of use, this section is indicative only. The following findings reflect Deaf and hearing peoples' experiences of using TV-based videoconferencing at ACE, Vicdeaf and VSDC Services for Deaf Children for activities of their organisations. The comments on video quality for signing are from Deaf people only.

Deaf people have found the quality of video for sign language communication at 384 kbps to be very good when using high quality video equipment, such as the Sony PCS 1500P, which delivers picture frame rates approaching 25 fps. Such quality is especially important for groups of people where they tend to be further away from the screen and create greater signing activity. However, zooming in with the camera may assist. Even with 384 kbps, video quality for sign language has not been ideal: signing can on occasions be slightly stilted and fingerspelling can be hard to read and require repetition or zooming in with the camera.

With 256 kbps transmission the video quality for sign language has been of a reasonable quality but only for one-on-one meetings, not groups, and certainly not as a tool to teach Auslan to people unfamiliar with it. Videconferencing at 128 kbps (and hence frame rates closer to 12 fps) has been found to be too poor in quality for lip-reading by oral deaf people.

On occasions involving a mix of Deaf and hearing people at each location, each with an Auslan interpreter, effective communication has been maximised by sitting the interpreter at each location close to the videoconferencing screen and somewhat towards the people at their own end, so they can sign the speech from the far-end hearing people and voice relay the signed data from the near-end people to the other end.

High quality *audio* transmission is important for Auslan interpreters, hearing people communicating from these organisations, in mixed meetings of Deaf and hearing and between groups of people: one organisation found that they needed to purchase a better quality microphone rather than use the one at the videoconferencing terminal.

4.5 Recommendations

Extending Access to Videoconferencing

R4.1 All Deaf organisations (service providers and community centres for Deaf and hard of hearing people) across Australia should be funded to establish on-site access to videoconferencing as an essential service provision to both metropolitan and rural areas. The costs of set-up and ongoing ISDN use, as well as staff resources to promote the service, train other staff, and effectively use videoconferencing within the organisations, should be funded by federal and state governments.

R4.2 The potential for cost-effective videoconferencing to provide services to remote clients and to liaise with other organisations should be promoted to both government and Deaf community/service organisations.

R4.3 Comprehensive directories of Deaf and third-party videoconferencing sites similar in nature to that provided on the *TeleHealth Victoria* Web site should be prepared for all states and made freely available on the Internet.

R4.4 Staff responsible for the operation of third-party videoconferencing sites accessed by Deaf people should be trained in the necessary skills to deal with those Deaf users and the distant-end users who may also be Deaf. The implementation of this recommendation also requires funding from state and federal governments.

R4.5 A model videoconferencing facility should be designed as a benchmark for videoconferencing manufacturers and distributors to consider when making such equipment available in the marketplace.

Facilitating Effective Use of Videoconferencing by Deaf Service and Community Organisations

R4.6 One or two Contact Officers should be trained in each organisation in booking procedures, day to day administration of system (e.g. keeping register of users, log book of use, log of faults), basic-level technical support/trouble-shooting, etiquette of effective videoconferencing use and other necessary skills.

R4.7 The benefits of videoconferencing facilities should be actively promoted by the organisations to their staff and clients through a dedicated awareness-raising strategy, which informs users of the various uses and applications of videoconferencing. This should be supported by a training program that covers:

- In-house training (focused on 2-3 'champions' at each site so they can mentor or assist others having problems);
- Different levels of training for contact officers and for occasional users;
- Follow-up sessions provided *after* the equipment is in place and staff have used the technology once or twice to address questions and problems that

arise after hands-on use; and

- Provision of concise instructions with the equipment for quick reference to how to use.

R4.8 The minimum standard of video transmission for Deaf signing should offer a temporal resolution of 25 frames per second with a picture resolution of 352x288 pixels (CIF) which generally requires a transmission rate of 384 kbps.

5. Trial of Video Relay Interpreting (VRI)

5.1 Background

This trial was undertaken by Australian Communication Exchange Ltd (ACE) during 2000 in Victoria and conducted by its VRI Trial Manager, Ms Renee Spencer. The following represents a summary of the report prepared for ACE by the Trial Manager.

In 1999 ACE undertook the task of developing a pilot Video Relay Interpreting (VRI) service to evaluate the viability of providing a permanent VRI service. The technology used for videoconferencing has been previously assessed in the research study, *Video-Based Telecommunications Technology and the Deaf Community* (McCaul, 1997).

VRI is considered an efficient and effective method of providing improved access to the telecommunications network for people who are Deaf and do not use the National Relay Service (NRS) for a variety of reasons. The NRS enables people who are Deaf or have hearing, speech or communication impairments to make telephone or modem calls between themselves and the wider community: a human relay operator converts the text conversation to voice and visa versa.[17] A study entitled *Deaf People That Choose Not to Use ACE.NRS* (Allen, 1998) has been conducted to gain an insight into why a proportion of people who use Auslan as their preferred method of communication choose not to use NRS. This study found that such people:

- Have a cultural preference for face-to-face communication;
- Prefer to use Auslan when communicating with hearing people; and
- Feel the relay officer would not understand their written English.

The findings from the above report indicated that the current services provided by NRS do not completely meet the needs of all Deaf people and alternative methods of providing a telecommunications services for such people should be found. VRI is one such alternative service.

Aims

The aims of this trial were to:

- Establish a pilot VRI service;
- Evaluate the trial of VRI service and make recommendations; and
- Determine whether VRI is a viable service option.

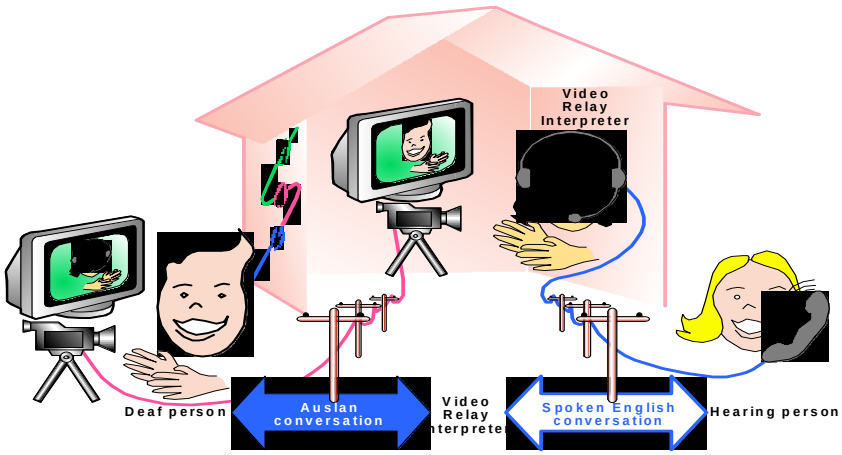
It is important to note that this research project assessed the useability and acceptance of VRI from the perspective of a group of interpreters and potential consumers. Investigation into the most practical and cost effective use of a digital transmission network to deliver a VRI service was outside the scope of this project.

[17] See Appendix 5 for a further description and diagram of how NRS works.

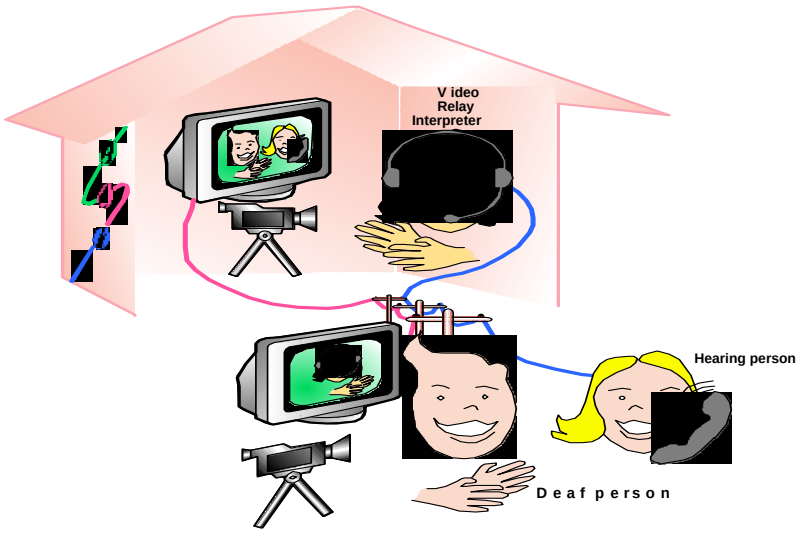
How VRI Works

The diagram below shows the operation of the VRI service. The VRI service operates along a similar principle to the NRS. The relay officer in this instance is a qualified sign language interpreter.

When a Deaf person wishes to contact another person or service, he or she makes a video conferencing call to the interpreter. The Deaf person and the interpreter use sign language to communicate. The interpreter will contact the recipient on a regular telephone and relay by voice what has been signed by the Deaf person. The interpreter then listens to the reply and signs back to the Deaf person.



The diagram below indicates another example of how the VRI service may operate. In this instance, both the Deaf person and the other person can see each other (such as in the situation of a doctor and a patient in a medical office, face-to-face in one location). The sign language interpreter is contacted via the video conferencing. The interpreter provides the link between the two people.



VRI provides an alternative to the NRS. The NRS is voice and text based, whereas VRI uses Auslan to communicate between the Deaf person and the other person via a sign language interpreter. VRI does not replace the NRS; it is simply another form of access to telecommunications and to the general community.

The capability of videoconferencing equipment to deliver communication via the telephone network has been well known for some time. Recent developments in transmission speeds, compression techniques and the introduction of digital networks (ISDN lines) have meant that it is now possible to converse in Auslan using videoconferencing equipment. The advancement of videoconferencing technology has led to the realisation of its enormous potential, such as the delivery of sign language interpreting services through videoconferencing networks. There have been numerous trials overseas to test and develop this technology (McCaul:1997). VRI also provides benefits for Deaf people in remote areas in accessing interpreters.

The bandwidth used for this trial was 384kbps using quality Sony video conferencing equipment, because past experience had indicated that this would give the clearest picture for visual communication.

5.2 Evaluation of Use and Usability of VRI

Methodology

Limitations

This trial has limitations which are important to document from the outset.

- It was difficult to recruit Deaf people from rural areas without face-to-face contact. A person in each area is needed to actively meet with the Deaf people, explain VRI to them and encourage them to be involved;
- In some districts, due to a low number of Deaf people in that area, it was a matter of asking any Deaf people to be involved, rather than ensuring that an appropriate mix of all the sub-groups within the Deaf community were represented, such as younger and older, male and female, etc;
- Some Deaf participants in the trial did not use VRI and it was difficult to meet face-to-face with them to encourage them to try;
- Some Deaf people lacked the confidence to use VRI by themselves; going to a strange locations and actually finding the right room was a daunting task for some participants and affected their involvement; and
- This VRI trial is the first attempted in Australia. Only a few have been attempted overseas and there was little by way of previous experience in how to establish and conduct the trial.

Selection of VRI Sites

Melbourne and three regional cities, Geelong, Bendigo and Bairnsdale were selected as the sites for the VRI trial.

The criteria for selection of a VRI trial site were:

- The site had a videoconferencing facility that could operate at 384kbps;
- The site was available for VRI calls during the peak call times identified by the NRS; and
- The site had a significant population of Deaf people who were centrally located to ensure that the VRI site could be accessed by as many Deaf people as possible to ensure that meaningful data was gathered.

The Melbourne site was added two weeks after commencement of the trial to give a broader range of participants.

Sample of Deaf Participants

A total of 29 Deaf participants agreed to take part in the pilot. They varied on the following three characteristics:

- Auslan register and proficiency;
- Level of involvement in the local Deaf community;
- Experience in working with interpreters.

Training the Deaf Participants

A training session was developed to present VRI to Deaf people from the selected sites and was conducted by an ACE Community Consultant. The Community Consultant was a Deaf native Auslan user who could easily adapt the register and style of presentation to meet the needs of the audience. The Community Consultant has many years experience in training.

The aim of the training was to introduce the idea of the VRI service, its possibilities and uses, and how to access the service. The training also provided an opportunity for participants to experience the service and call someone via VRI. Each training session was approximately two hours long.

Training the Auslan Interpreters

The VRI project manager conducted the training session for Auslan interpreters. Four interpreters attended and the training session provided information on:

- The VRI trial
- The interpreter's role in the trial
- Technical information on how to use the equipment
- How to make calls

Additionally, each Auslan interpreter was given the experience of making a VRI call to practise using the equipment, interpreting in the new modality and to gain the Deaf person's perspective of VRI.

A VRI Policy and Procedure Manual was developed which served as a reference and guide to interpreters involved in the trial. Interpreters were encouraged to comment on the contents, to try different ways of managing VRI, to use the method they felt best suited each interpreting situation and to report on new methods that they

developed.

All interpreters were supervised during their first shift and also during subsequent shifts if requested.

Operating the Service

The VRI service operated on weekdays, 8.30am – 12.00pm and 4.00pm – 7.00pm

The participants had to either book a time to make a VRI call in advance by TTY or fax to the ACE office in Melbourne where the interpreter was located. If immediate or short notice access was required, the participant could ring and confirm that a VRI interpreter was available to interpret the call immediately. If the VRI interpreter was not engaged on another call at the time, immediate access was granted.

There was no minimum or maximum booking time. At the requested time for the call, the interpreter rang the remote VRI site to connect with the participant.

Data Collection

The data collection methods for the evaluation of VRI are summarised in Table 5.1 below. A mix of methods was used to test and verify findings.

Table 5.1 – Methodology for evaluation of use and usability of VRI and response rate

Usability evaluation activities	Purpose	Data analysed
Surveys completed by Deaf participants after each phone call	To collect quantitative information from participants on the success and other factors influencing each call	17* surveys returned after phone calls
Interviews of Deaf participants	To gather qualitative data after completion of trial which may not be captured via the surveys	16 out of 18 interviews conducted were analysed**
Surveys completed by interpreters after each phone call	To collect quantitative information about VRI, as well as feedback from interpreters on the success and other factors influencing each call	97* surveys returned. Auslan interpreters completed one survey per phone call made
A focus group of interpreters	To gather qualitative data after completion of trial which may not be captured via the surveys	Focus group transcript with five participants

* More than one survey was filled in by some Deaf participants and interpreters.

** Two of the 18 interviews were inaudible on tape so unable to be analysed.

All interviews with Deaf people were conducted in Auslan and were voice interpreted and tape recorded and transcribed. Each interview lasted for approximately 45 minutes. The interpreter focus group lasted approximately 90 minutes and was audio taped and transcribed.

Use and Usability of VRI by Deaf Participants

This section discusses use and usability of the service by Deaf participants. The subsequent section discusses use and usability by Auslan interpreters.

Frequency and Use of VRI

A total of 29 Deaf participants were involved in the trial. Ninety six VRI calls were made. Forty five per cent of the Deaf participants (N = thirteen) who registered for the trial used the VRI service and the total number of calls per caller varied from zero to 25. Most of the participants who made phone calls used the service between one and five times (the mean number of calls per person was three).

Thirty per cent (N = 29) of the calls lasted under five minutes and 36 per cent (N = 35) of calls lasted between five and 10 minutes. Nineteen per cent of calls (N = 18) were 10 to 15 minutes and 13 per cent (N = 13) of calls were over 15 minutes in length. Two per cent (N = two) of calls were not recorded by the interpreter.

Fifty one per cent of the calls (N = 53) were of a personal nature such as calling a friend to chat, or calling a family member. Sixteen per cent (N = sixteen) of calls were business-related calls and fourteen per cent (N = fourteen) were job related. Other calls made were for general information, professional services and transportation.

The high percentage of calls of a personal nature may be because participants were more confident using the new technology to contact people they already knew. It is also worth remembering that many Auslan users may not access the telecommunications network as extensively as other Australians do. A number of participants stated that they would not know who to call, as is indicated by the comment by a Deaf participant below.

> *… I can't think of anybody that I would need to talk to on the TV (VRI). (Interviewer probes: "Friends? Family? Who do you phone on the TTY"?) "I phone the pet shop, or if I want some information about the airport, things like that." (Interviewer asks: "Do you think you could do the same over the VRI? Could you ring the pet shop over the VRI?") "I guess so... They're both the same.*

Overall Impressions of the VRI Service

A content analysis was performed on each of the 16 interview transcripts. Eighty one per cent (N = 13) of participants interviewed stated that they would use VRI again. Sixty-nine per cent of participants (N = 11) said that they liked VRI and 50 per cent of participants (N = eight) said that they liked VRI better than TTY. These results show strongly that the Deaf participants viewed the establishment of a VRI service in a positive manner. The majority of participants believed that VRI would enhance their

lifestyle enabling them to gain more in-depth access to the telecommunications network.

Seventeen surveys were returned by Deaf people. Ninety four per cent (N = 16) reported the picture quality was 'good' or 'very good'. Ninety four per cent (N = 16) rated the interpreter's skill level as 'good' or 'very good' and 100 per cent (N = 17) rated their own comfort level in using VRI as 'good' or 'very good'. Eighty eight per cent (N = 15) stated they would use VRI again in preference to other communication devices.

Deaf people reported that communication flowed smoothly. Full understanding of the message was gained because it was relayed in their first language, Auslan, call time was reduced and rapport and connection were developed with the recipient of the call.

For Deaf people rapport was developed through eye contact with the interpreter and the interpreter's use of facial expression. Full understanding of the message via the inclusion of visual and non-verbal elements added to the enjoyment of the VRI experience. This is shown by the comment made by one Deaf participant, below.

> *It's straight through, it's quick, it's direct and it's easy to converse. You can have more complex conversations. I could really understand what was being said. It didn't feel like the conversation was going through a third party. The conversation was interpreted properly. There weren't the communication breakdowns that usually result from the use of English. I understood everything, and that's what I want.*

It is worth noting that many participants placed trust in the VRI service due to the confidence in the operation and privacy of the NRS, the confidence and understanding of the interpreter ethic of confidentiality or a personal trust in the VRI Project Manager. The ability of being able to see a face, during both service delivery and the personal contact of training, bookings, and during any problem resolution provided confidence and assurance to many participants in VRI.

Reasons for Not Using VRI

Fifty-five per cent (N = 16) of Deaf participants did not use the VRI service. The reasons given by participants for not using the VRI service included – attending full time education or employment and did not have time, or transport related issues such as the area in which they lived has no public transport after seven pm.

One important factor that became apparent during participant interviews was that some felt that VRI did not suit them. The opinion was that VRI was only meant for Deaf people who have low literacy in English. The participants who gave this opinion felt that they had good English skills, and therefore did not need VRI as they could use the TTY/NRS with no difficulty. This is evidenced in the following comment made by one Deaf participant.

> *I believe that the VRI really is for people who don't have good English skills, but are fluent in Auslan. Perhaps they can't comprehend English so well but I am fine with that (fine in English literacy).*

Location of VRI

Thirty one per cent (N = nine) of participants said that having to travel to the VRI site was inconvenient. Participants commented that the ideal location for VRI was in the home. It is assumed that videoconferencing equipment, if available, would be used not only for access to VRI services but also for direct communication from Deaf person to Deaf person. Due to the current high costs of equipment, line installation and call costs, home usage of videoconferencing equipment is impractical.

If specific VRI sites are established, it may be preferable to locate them in 'Deaf friendly' locations such as Deaf service organisations/clubs or possibly health centres. A person trained in using videoconferencing equipment should be available to assist as necessary.

If education were delivered to professionals who come into contact with Deaf people regularly in the course of their workday, using videoconferencing facilities set up in the workplace would be ideal. Occasionally some of these places already have the equipment in place but use it for other purposes. Training sessions and awareness of this service would therefore need to be established.

Comparing VRI and Other Communication Devices

The absence of important visual elements of eye contact and facial expression on a TTY screen de-personalises the telephone call, as emotions and inflections are reduced to merely text on a screen. Eighty-eight per cent (N = 15) of the 17 survey returns by Deaf participants stated they would use VRI again in preference to TTY, fax, SMS or having another person make the call on their behalf.

Fully understanding the message via the inclusion of visual and non-verbal elements added to the enjoyment of the VRI experience and participants made comment of this:

> *"It wasn't like using English through the TTY, which is being translated back and forth. That's really difficult. I could chat on and on. I felt really comfortable with expressing myself. It is definitely worthwhile. It's the best thing. I have a TTY, and I have a fax… but I feel so frustrated with them. The TTY is just so hard to understand. I can't be bothered with it so I push it aside. But I could understand everything through the VRI, and I could converse really well."*

Other reasons given by participants for preferring VRI over TTY-based communication were:

- Ease of being able to communicate in Auslan;
- Speed;
- Comfort and control;
- Directness of communication;
- Connectedness with the third person;
- Trust in understanding the message which enables more complex communications to take place.

Use and Usability of VRI by Auslan Interpreters

Overall Impressions of the VRI Service

Interpreters involved in the VRI trial reported that they enjoyed facilitating the full and complete communication access that VRI allowed Deaf people to have. This enjoyment gave the interpreters a feeling of satisfaction to be part of communication at an in-depth level.

Interpreters believed that VRI would be a beneficial service to the community, but believed care would need to be taken in the planning and implementation to ensure that appropriate working conditions are established for VRI interpreters.

Interpreters completed a survey form after the conclusion of each VRI call. Ninety-seven such forms were completed and 74 four per cent (N = 72) of responses rated the environmental conditions as 'good' or 'very good' while 85 per cent (N = 83) rated their comfort level in making a VRI call as 'good' or 'very good'. The surveys indicated a high level of satisfaction with the equipment and interpreting in this modality.

While VRI is a more tiring method of delivering Auslan interpreting, few interpreters indicated that fatigue was a major problem. After each VRI call, 77 per cent of interpreters (N = 74) rated that they felt 'good' or 'very good' after making the call and would be able to make another call. Another 15 per cent (N = 14) reported their feelings after the call as 'fair'. One per cent (N = 9) reported they felt exhausted after the call and would not be able to make another one.

Issues for Interpreters

The interpreters reported that they experienced a certain feeling of being 'out of control' while working in the VRI modality. Usually prior to face-to-face interpreting, the interpreter can be briefed and make a decision about whether he or she has the competency to do the job. In that situation the interpreter has the option to decline. Interpreters in the VRI trial reported that the option to decline work was taken out of their hands as no briefing prior to commencing the call occurred. Some interpreters found it stressful for it to be assumed that that they would have the skill level and psychological strength to cope for every VRI situation they might encounter.

Some interpreters reported a degree of concern about the way in which the recipient (ie, the hearing person) handled the call as the recipients had had no previous knowledge, awareness or training in dealing with VRI calls. As one interpreter said:

> *"Callee repeatedly addressed himself to me, referred to caller in third person. I was unsure about how many times to intervene to explain that the conversation was not with me but with the Deaf caller. I felt very frustrated with the callee."*

Many interpreters reported that they had to step in to manage the communication flow far more than in face-to-face interpreting work. This management role put them in a difficult and delicate situation. Interpreters aim to be unobtrusive whilst interpreting. Therefore, to inform the client about the VRI call, the interpreter must step out of the interpreting role. Doing so stops the interpretation process and affects all

communication between the parties.

A particularly interesting suggestion was that during lengthy calls it would be advisable to have two interpreters working in tandem. Then during a crisis they would be able to prompt each other during the call. They would also be able to swap every 15 to 20 minutes, as needed, as unobtrusively as possible, while still maintaining the flow of communication. Interpreters would be able to debrief together after the call was completed.

Training and Protocol Considerations

As a result of the inadequate number of interpreters in rural areas (Ozolins & Bridge: 1999), very few Deaf people have had the opportunity to develop skills in working with interpreters. This lack of opportunity means that many Deaf people in rural areas lack the knowledge of how to get the most benefit when working with an interpreter.

Some Deaf participants and interpreters noted the need for relaying protocol to be established prior to the call to ensure that they and the recipient of the call understood the whole process of VRI. This would save communication breakdowns and problems occurring.

Community awareness, training, and effective ACE protocols for dealing with clients unfamiliar with VRI and training in the correct use of an interpreter would help to minimising these difficulties.

Technical and Other Related Issues

Some interpreters and participants experienced problems in dealing with answering machines and interactive voice responses. Some sites also occasionally developed technical and environmental problems.

Some Deaf participants noted that some interpreters wore unsuitable clothes as they had difficulty in seeing the fingerspelling and signing clearly. The bandwidth used for VRI was set at 384 kbps to allow the best possible transmission of sign language. However, on one occasion due to a technical fault, VRI was used at a lower bandwidth of 128 kbps. One participant used VRI via his home videophone, which limited the bandwidth to 128 kbps. Most interpreters commented that they had difficulty in interpreting at the lower speed. Interpreters stated that the fatigue which developed from working at the lower speed led to loss of confidence, and affected their ability to work effectively and efficiently.

The Deaf participants felt that the lower frame rate needed a slower rate of signing or distortion became an issue. Further, with a two second delay in transmission, there was some confusion as to who was talking.

Other Situations Where VRI May Be Used

VRI was used in two other situations during this trial. They were:

VRI for group videoconferencing where more than one participant was involved

This was a conference call for a two-hour meeting, involving 12 participants,

conducted via VRI for a Deaf participant. The videoconferencing equipment for the Deaf participant was set up in the room where the meeting was held. Difficulties which arose for the interpreter included working alone for two hours and not having copies of the agenda and documents under discussion. Other difficulties arose due to not having clear sound reception, not being able to see all the participants at the same time and from background noises. The interpreter felt that the quality of the interpreting session was inferior to that of a face-to-face meeting.

The Deaf participant felt that overall the experience was satisfactory except for difficulty in reading finger spelling and only having one interpreter, who required breaks.

VRI used for two people at the same site with the VRI interpreter at a remote location

Both the interpreter and the Deaf participant felt the experience was successful. The Deaf participant noted that the call length was for one hour and breaks for the interpreter would need to be given if the situation arose again. Another issue was noise interference from the speakers.

5.3 Costs of VRI

Most of the participants did not expect that a future VRI service would be provided free of charge. While it is likely that the participants did not have a realistic expectation of the total cost of a VRI call, the majority expected the cost of using VRI to be equal to the costs that other people pay for calls. Many stated that to pay nothing wouldn't be fair.

Videoconferencing as a means of providing interpreting services seems expensive when compared with face-to-face interpreting. However, in comparison to a live interpreter travelling to a regional area to provide interpreting services, the cost of VRI is remarkably cheaper. Table 5.2 outlines comparative costs, based on the following details:

- Time of call: 7.00am – 7.00pm (peak time)
- Distance: Bairnsdale to Melbourne (approximately 281 km)
- Videoconferencing speed: 384kbps (highest quality currently available)
- Interpreter booked via an agency: $50.00/hr

It can be seen from the table below it costs $234.00 to use VRI for two hours to Bairnsdale whereas it costs $500.00 to send an interpreter in person. This represents a saving of $277.00.

Table 5.2 – comparing costs of VRI and regular interpreting services to Bairnsdale

Minimum interpreter booking time: 2 hours	**Regular interpreting services**	**VRI**	**Regular Interpreting Services**	**Cost VRI**
Interpreter Travel Time	8 Hours	N/A	$400.00	N/A
Interpreter Work Time	2 Hours	2 Hours	$100.00	$100.00
VRI Call Costs	N/A	1 Hour	N/A	$123.75
Total	10 Hours	3 Hours	**$500.00**	**$223.75**

5.4 Recommendations

Standards

R5.1 Emerging telecommunications technologies should take into consideration the requirements of Video Relay Interpreting and Deaf community access needs.

Promotion

R5.2 Video Relay Interpreting should be included in the service delivery of the ACE.NRS.

R5.3 Video Relay Interpreting should be recognised as a long term project of the ACE.NRS.

Research

R5.4 Investigations into the establishment of Video Relay Interpreting should continue in order to ensure development of any future service is carefully planned and delivered.

Funding

R5.5 ACE should continue to be funded by government and industry organisations to further trial the VRI facility. There is a need to assess the applicability and cost efficiency of VRI as a viable communication tool for Deaf people, service providers and others throughout Australia.

6. Trial of Auslan Video Clips on the Internet

6.1 Background

Auslan video clips are short video recordings of a person signing in Auslan with some of the content of a Webpage. Deaf people can view the content in Auslan as an alternative to reading the text, as shown in Figure 6.1.

In the *Deaf Australia Online* research study, evidence suggested that a significant number of Deaf people found the content of Web pages difficult to read due to their difficulty with English literacy. Most of the material on the Web is presented in a text based format and at times the standard of the written text is quite high. Deaf people stated that the addition of pictures and plain English would assist them in understanding the content. Further, if the English text is bypassed and instead viewed in Auslan, the Internet would become a more effective medium for the Deaf.

This component of the project focused on signing Deaf people.

Aims

This trial aims to answer the following questions:

- How can Auslan video clips be installed?
- What are the technical and other barriers that need to be considered in the installation of the Auslan video clips?
- How effective are Auslan video clips in the presentation of information on Web pages for Deaf people?

6.2 Other Internet Sites Featuring Video Clips of Signing

There are very few video clips in sign language installed on Web pages throughout the world. Internet sites, both national and international, showing video clips in sign language are listed in Appendix 6. Some of these sites require the use of a proprietary software 'plug in' before the clips can be viewed on a PC.

Installation of the Auslan Video Clips

The installation of video clips is currently complex, and therefore present significant technical barriers. In summary the major difficulties relate to the size of video files and the limitations of transmission capacity (bandwidth) and modem speeds, and hence download speed. These impose limits of the order of one minute for individual clips. Download clips require 'plug-ins' to be viewable. Real-time, or streaming, video may develop to resolve these issues, but currently files are too large for the limited bandwidth and modem speeds. An investigation of these issues is detailed in Appendix 7.

6.3 Evaluation of Use and Usability of the Auslan Video Clips

The Auslan video clips used for the purpose of this evaluation were on the Centre of Excellence for Students who are Deaf and Hard of Hearing at Northern Melbourne Institute of TAFE Webpage. These clips can be viewed at http://online.nmit.vic.edu.au/deaf/.

A transcript of the clips is as follows.

> *"Hello. Welcome to the Centre of Excellence for Students who are Deaf and Hard of Hearing. If you are interested in classes for students who are Deaf and hard of hearing at the Centre of Excellence, please click the button below."*

Methodology

Fourteen Deaf people were selected to view the Auslan video clips. The sample was composed to include a mix of Auslan fluency, gender, literacy levels and age ranges.

Literacy levels were defined as the level studied on the Certificate of General Education for Adults: levels 1 to 4. Level 1 and 2 were deemed to be of low literacy, level 3 and 4 were deemed to be medium and above level 4, high. The sample chosen is shown in Table 6.1.

Table 6.1 – Sample of Deaf people for trial of Auslan video clips

Number of Participants	Gender	Age range	Experience in using the internet	Literacy level	Communication mode
14	M: 7 F: 7	20-30= 4 30-40 = 3 40-50 = 4 50+ = 3	experienced = 3 some experience = 10 little experience = 1	high = 4 medium = 6 low = 4	Auslan = 11 Oral = 3

Deaf people selected for the trial displayed a range of Internet experience from beginner to advanced user. This was to give an indication of the use of the clips by different people with different levels of Internet experience. Participants were recruited from a network of people known by the researcher.

The data was collected via individual interview, conducted in Auslan and voice recorded by an interpreter for later transcription and analysis. Information was also collected on the value and future use of Auslan video clips on the Internet.

Overall Impressions of Value and Effectiveness

Deaf participants were enthusiastic about the Auslan video clips being on the Internet. Participants noted the ease with which they could understand the content of the Auslan video clip, as compared to reading the English text. Many of the Deaf participants with low and medium levels of literacy noted that it was confusing.

There was a great variety of comprehension levels displayed among the participants when reading the English text on the Internet. Some of the participants were able to understand some or all of the content while others understood very little. The most common reason for not understanding the content was the vocabulary used and not being able to decipher the unknown vocabulary from the surrounding text. Lack of understanding of the content led to some participants not using the Internet to any great extent except for activities such as gathering pictures.

When viewing the clip for the first time, participants expressed terms such as 'amazing', 'great', 'brilliant' and 'fantastic' to describe how they felt. A greater feeling of connectivity to the Internet was expressed by some participants because they felt they could understand what was being conveyed and the signing made the Internet interesting.

The Auslan gave the participants face-to-face communication, which is a strong cultural preference in the Deaf community. Some participants noted that they could relax when viewing the Auslan video clip, something they could not do when reading the English text.

Participants with low levels of literacy felt that they would use the Internet a lot more if there were more Auslan video clips installed, because they would feel more confident in understanding the information presented.

One participant with a high level of literacy did not feel there was any value in the Auslan video clips and said that it was tiring and monotonous watching a person sign for any length of time. He would prefer to read the English than to watch the signing.

Length of Auslan Video Clip

Participants expressed disappointment of the short length of the clip and noted that not a lot of information could be given in such a short time period. Participants stated that being able replay the clip several times was an advantage if they missed any of the content in the first viewing or to reconfirm their understanding.

Size of Clip

Most participants felt the size of the clip was satisfactory. Others had reservations about its size, which they felt was too small to effectively view the Auslan, especially the fingerspelling. Some participants had to re-view the clip several times to fully understand it.

Placement of the Clip on the Screen

Most participants wanted to be able to view the clip and read the English text at the same time. They felt that the English text was still important to have on the screen and the Auslan video clip would give them the springboard to be able to better understand the English.[18]

Participants felt that by aligning the English text on one side of the screen with the Auslan video clip down the other would allow the English and Auslan to complement each other.

Navigation

Some participants stated that they would like to see a universal icon developed which showed that signing video clips are available on a particular Webpage. This icon would help in locating the signing clip.

6.4 Installing the Auslan Video Clips on an Actual Website

In endeavouring to encourage the installation of Auslan video clips on Websites, a number of business and government organisations were approached in person, by telephone or by e-mail. The project's aims were explained and a request was made for the organisation to work with the project worker to install a small Auslan video clip on their Web page for research purposes. Most organisations were very interested in the concept of the video clip and were supportive of giving Deaf people equal access to the Web via the Auslan clips, but were reluctant to commit the organisation to the trial for a variety of reasons, listed below. One organisation was keen to support the trial, but by the time this decision was made, it was too late in the project's time line to proceed

The following table lists the barriers encountered in persuading an organisation to install the clips.

Table 6.1 – Barriers encountered in persuading an organisation to install clips

Organisation	Result	Reason Given
Government/Private	Declined assistance	Already had given to other Deaf initiatives and wish to give to other disability groups in 2000 Would prefer to give in-kind support to the project

[18] The Synchronized Multimedia Integration Language (SMIL) has been developed by the W3C. A SMIL presentation can be composed of streaming video and text and may be of future use in aligning the Auslan near the English text. More information can be found at http://www.w3.org/AudioVideo/

Organisation	Result	Reason Given
Disability organisation	Not this year, but possibly next year when their Web page is revamped. Assistance was given on Deaf links to add to their Web page and information about DAO II to add to their Web page	Revamping Website; contract for organisation concludes in 2000 and unsure of funds available; lack of technical knowledge to install the clips
Government	Declined Assistance sought from DAO II project worker to advise in making Web pages of new site useable to Deaf people	Revamping their Web page to make it more accessible for all groups of people
Government project	No response to written request	Project was not dealing with Websites themselves, but to make online banking easier for people with visual impairments
Government	Declined	Site not important enough; too small
Deaf organisation	Interested but have not installed the clips yet	Lack of technical knowledge; funding
Government	No; but later accepted however too late in project's time line to proceed	Communication breakdown between organisation and DAO II project worker

In summary, the main limitations to the installation of Auslan video clips were found to be:

- Technical barriers such as download time and concern of the possible impact on the overall Web page
- Lack of expertise/knowledge of how to install the clips
- Lack of interest and determination to ensure that Web sites are accessible to all people equally: some organisations placed people on a hierarchy of access needs

Installation of Auslan Video Clips on the Cable & Wireless Optus Web Page

Cable and Wireless Optus were approached by the Project Worker as a possible site to install the clips and a face-to-face meeting was held with the Manager, Compliance and Consumer Safeguards. Cable and Wireless Optus was very supportive of installing the clips because they were keen to ensure that Deaf people had equal access to telecommunications and information. The Auslan video clips which were installed on their Webpage discussed the forthcoming TTY program for Deaf people which will be launched in 2001 under the Optus Disability Action Plan. The transcript in English is as follows:

> *"Hello and welcome to Cable and Wireless Optus Web-Site. We at Optus are taking new measures to improve the service we provide to those who are deaf or who have a hearing or speech impairment. These developments are in accordance with our Disability Action Plan.*
>
> *Optus is currently trialling the provision of a TTY service. By early next year it is expected that we will be able to offer TTYs to our customers.*
>
> *Progress updates will be posted on this Web or you can register your interest in being advised of the launch of the TTY service on TTY – 1800 500 002"*

It is not possible to provide an Auslan version of the transcript due to impossibility of conveying Auslan by text.

This transcript was translated into Auslan and a Deaf native signer, who is a teacher of Auslan, was employed to sign the transcript. The clips were installed on the Cable Wireless Optus Web site by Optus. They are 12 frames per second.

The clips can be located at http://202.139.82.19/local/1,1648,2019,00.html A picture of the actual Web page can be seen on the following page.

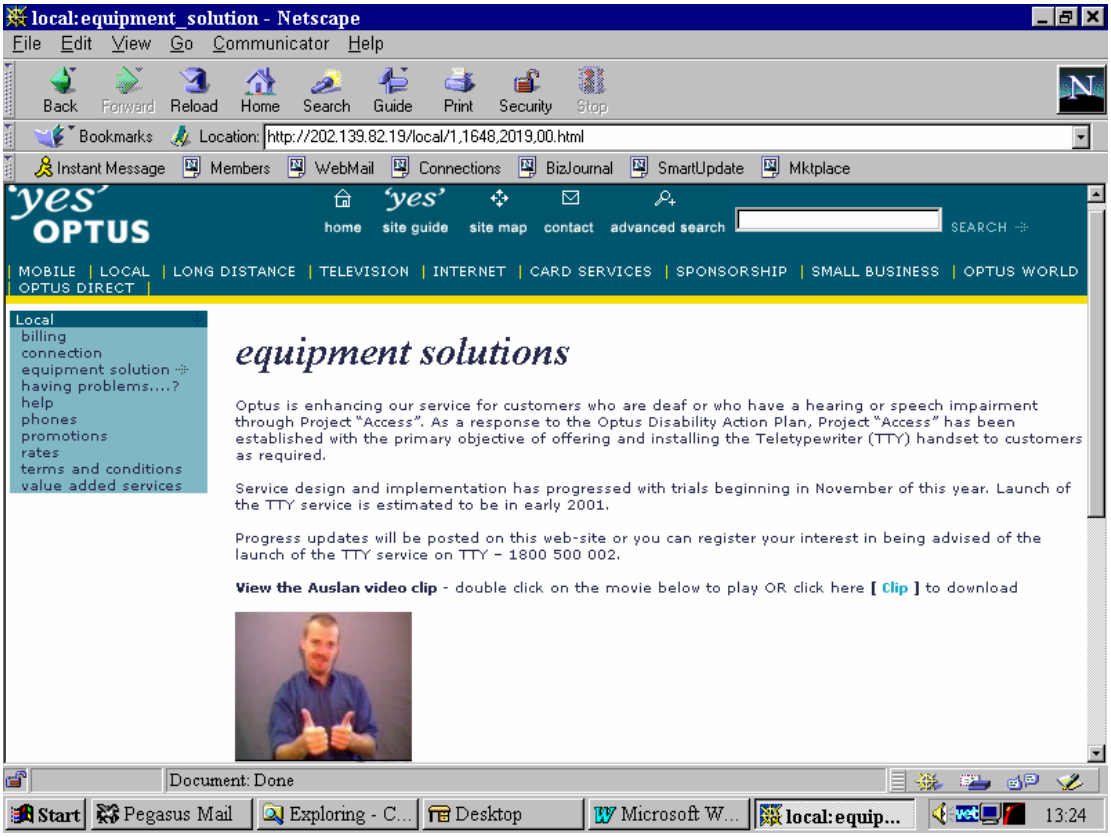


Figure 6.1 – Optus Web page showing Auslan video clip

6.5 Recommendations

With the rapid developments of scalable and streaming technology, it is likely that the production of Auslan video clips will increase and improve in the future. This should be kept in mind when reading the recommendations below.

Standards

R6.1 That Auslan video clips are included in accessibility and universal design guidelines as an additional method of presenting the content of Web pages.

R6.2 That the Deaf Online Taskforce work with government, industry and Web providers to encourage inclusion of Auslan video clips and Deaf accessibility guidelines in Web design.

R6.3 That a universally recognised icon for showing the availability of a sign language video clip on Web sites be developed.

Research

R6.4 That technical specifications are further developed to enable easy production and installation of Auslan videoclips on Websites.

R6.5 That investigations continue into the value and effectiveness of Auslan video clips for Deaf people on Websites.

R6.6 That further investigations be conducted to identify other suitable accessibility

requirements (for example, Web captioning) that contribute to universal design guidelines on web pages for Deaf people

Promotion

R6.7 That the Deaf Online Taskforce link with the Internet Society of Australia to promote Auslan video clips.

7. Understanding Approaches to Awareness Raising and Skilling

7.1 Background

The project report *Deaf Australia Online* discussed in detail the need to further develop awareness and skills of the Deaf community in the use of communication technologies. This aim draws upon research conducted in 1999 and takes further the recommendations by outlining approaches which should be used in training sessions for Deaf and hard of hearing people. Recommendations for methodologies to be used in future training sessions for Deaf and hard of hearing people are made.

Aims

This research aims to answer the following questions:

- What are the best practise strategies for delivering of training for Deaf people and hard of hearing people?
- What teaching strategies should be used with Deaf people and hard of hearing people?
- Where should training be delivered?
- What are the most appropriate ways to increase Deaf people's awareness of training opportunities?

7.2 Methodology

This study has limitations that are important to document from the outset.

Most hard of hearing people are over 50 years of age and it is perceived that older people are more reluctant to use technology than those under this age. Some hard of hearing people may not have followed up using skills taught to them in the training sessions, because they have an aversion to technology itself.

Due to the nature of the study, it was important that Deaf and hard of hearing people chosen had little or no prior skills in technology. These people, once they gain skills and confidence in the use of technology, may require a different training program in the future.

As very few young people with hearing losses identify as hard of hearing it is impossible to have equal numbers of people to represent different age ranges.

The aims were achieved by two methods:

Part A: selection and interview of Deaf participants who had already undertaken some form of training in the use of online services provided through the *Skills.net* project of Victoria.[19]

Part B: conducting training sessions in the use of e-mail and chat, and conducting pre and post interviews for analysis

Part A, participant location, type of class and number of participants are as follows:

Table 7.1 – Training Previously Received

Location	**Type of Class**	**Length of Training Session**	**Number of Participants**
Melbourne	Mixed hearing (some with additional learning problems) and Deaf	5 hours	4
Melbourne	Hearing class with no interpreter	5 hours	1
Melbourne	One-to-one tuition within a Deaf community centre	2 hours and 5 hours for practice	4
Geelong	Deaf only	5 hours	4
Bendigo	One-to-one tuition within a hearing community centre	2 hours and 5 hours for practice	3
Total number			**16**

[19] Skills.net Victoria is a state government initiative to provide training in e-mail and Internet usage to groups of people in the community who would not otherwise have access to training. More information can be found at http://www.skills.net.au/ The Centre of Excellence for Students who are Deaf and Hard of Hearing at NMIT auspices two Skills.net projects for Deaf and hard of hearing people in Victoria.

Trainers of Deaf participants in the Skills.net projects were also involved as can be seen from the table below:

Table 7.2 – Trainers of Deaf People

Location	Number of Trainers	Male/Female	Type
Melbourne	2	F:2	Hearing
Melbourne	2	M:1 F:1	Deaf
Ballarat	1	F: 1	Deaf
Geelong	2	M:1 F:1	Deaf
Total number	**7**	7	

Part B involved training being organised and delivered through the Deaf Australia Online II project. Both Deaf and hard of hearing participants were included. Participants were located with the help of the Tasmanian Council of Deaf People, the South Australian Association of the Deaf and a Deaf Information Worker in Victoria. The criteria for selection was that participants be either Deaf or hard of hearing and have little or no previous experience with e-mail and chat.

The location, number of Deaf and hard of hearing people, age of participant, sex, and length of training session is outlined in the table below.

Table 7.3 – Training Sessions Given

Location	No. of Participants Male/Female	Age of Participants	Male/ Female	Type of Participant	Length of Training Session
Mildura	10	20-30 = 1 30-40 = 4 40-50 = 3 50 + = 2	M: 2 F: 8	2 hard of hearing 8 Deaf	5 hours
Maryborough	10	20-30 = 0 30-40 = 0 40-50= 0 50+ = 10	M: 5 F:5	10 hard of hearing	5 hours
Adelaide	5	20-30 = 1 30-40 = 2 40-50 = 2	M: 2 F: 3	5 Deaf	3 hours
Hobart	8	20-30 = 2 30-40 = 2 40-50 = 2 50+= 2	M: 2 F: 6	8 Deaf	5 hours
Total	**33**	20-30 = 4 30-40 = 8 40-50 = 9 50+ = 14	**M: 11 F: 22**	**12 hard of hearing 21 Deaf**	

Skills Taught

In Part A, participants had been taught the use of Internet and e-mail, including how to use the Internet to find information and how to send and receive messages through e-mail. Due to the short length of some training sessions, more complex tasks were not taught.

In Part B all participants were taught the use of e-mail and chat. The *Hotmail*[20] e-mail system was chosen to be taught as participants who do not have e-mail at home could access their e-mail at external locations after the session was completed. E-mail skills taught included obtaining an e-mail account from *Hotmail*, sending, receiving, carbon copying (cc) and deleting messages. Participants were then shown or told of locations of Internet cafes and libraries in their home communities where e-mail access could be found. Chat skills included logging on to a chat site, obtaining a password and chatting to others. The chat program taught was *Deafchat*[21]. This was chosen because of its simplicity of design and the opportunity to chat with other deaf people. Participants were shown how to enter chat rooms and chat to each other as well as to others logged in.

Data was collected in Part A through individual interviews and in Part B through both individual interviews and focus groups. All interviews were conducted in Auslan by a Deaf researcher and voiced by a qualified interpreter into an audio tape for later transcription and data analysis.

In Part A, interviews were conducted after training was completed. In Part B, focus groups were conducted prior to the beginning and at the end of the training session. Follow up individual interviews were conducted six weeks later to evaluate the take up of online services. Two groups of participants were interviewed via video conferencing.

Table 7.4 – Methodology for evaluation of training

Evaluation method	Purpose
Individual interview	Collect demographic data, current use of online technology, satisfaction with training session
Focus group	Collect data from a group to ascertain effectiveness of training
Post interview six weeks after training delivered	Collect data to ascertain use after a period of time and after time to further reflect

[20] Hotmail is a free e-mail system which can be accessed over the Internet. It is available at http://www.hotmail.com

[21] Deafchat is a group chat program. It is designed in America and is targeted at Deaf people who can chat to each other over the Internet in various chat rooms or privately in designated places. It is located at http://www.deafchat.com

7.3 Findings

How do Deaf and Hard of Hearing People Become Aware of Training?

In the Deaf community, there is a strong cultural tendency to gain information via 'word-of-mouth'. Avenues such as advertising or articles in local newspapers, in shop windows or by posters placed in strategic places tend not to be useful because they may not be read by Deaf people. All Deaf participants in the training sessions were recruited by word-of-mouth by Deaf community organisations.

If flyers were produced, they were placed in venues that would be well attended by Deaf people. Flyer design was visual using pictures and plain English. These were in addition to face-to-face contact and were not intended to take the place of this contact. When flyers were sent out advertising future training, it was often followed up by face-to-face contact. One hearing interviewee at an employment organisation that provided computer classes for Deaf people through the Skills.net project explained,

> *We individually sent each of them a flyer…then when the clients attended here for other appointments, we would reinforce the information and ask if they wanted to attend.*

Some Deaf people may be reluctant to go out and search for information because of uncertainty of communication or reluctance to ring the National Relay Service (Allen, 1998).

One critical aspect for the success of recruitment of Deaf people is that the training be delivered in a well-known community venue and managed by either the Deaf community or an organisation aligned with the Deaf community.

Hard of hearing people in general become aware of training sessions through community newspapers, newsletters or family members. There is not the same need to actively recruit people through face-to-face contact as there is with Deaf people.

For more information regarding raising the awareness of online technologies amongst Deaf and hard of hearing people, see Appendices 8 and 9.

Reasons for Wishing to Learn Use of Online Services

Deaf people chose to attend the training session for the following reasons:

- They wished to communicate with friends and family who lived at a distance
- A dislike of the TTY and the National Relay Service and a desire to learn another communication channel
- No other training session aimed specifically at them had ever been offered in their home community before
- A number of their Deaf friends were already using e-mail

Hard of hearing people chose to attend the training session because:

- They wished to learn the technology

- Their family used e-mail
- They wanted a day out, ie. a social event

Use of E-mail Before and After Training Session

Nine per cent (n=2) of the Deaf participants had used e-mail before, in a class conducted by the local Deaf Society. Forty two per cent (n=5) hard of hearing participants had used e-mail before, learning from family members. All stated they needed more experience in using e-mail.

Directly after the Part B training session, most Deaf participants were enthusiastic about the potential of e-mail. They saw e-mail as being similar to the fax because they could send and receive messages easily without having to worry too much about the English used. E-mail had the added advantage of being much quicker and having the capacity to contact several people at the same time. E-mail was also important as it gave Deaf people an added choice of communication channels, which is important if they or their family/hearing friends do not feel comfortable with the TTY or NRS.

Hard of hearing people generally felt that the use of e-mail was important but only if their family used it, or to give them the ability to keep up-to-date with technology. Because most hard of hearing people could still use the telephone through listening, e-mail was not seen to be as important as it was to the Deaf group as they did not have the same need for an additional communication channel. As one hard of hearing participant explained:

> *Unless you become proficient to some degree you feel as though you're missing out on a lot of information and also a lot of process such as banking. More and more we're being forced to go electronic. By not taking that step, I feel I could in the long run, be disadvantaging myself.*

However, if the hard of hearing person's hearing loss was severe, and they were not comfortable with using the telephone, they, like Deaf people, looked to e-mail to provide an alternative communication channel.

One month after the training session, 52 two per cent (n = 12) of the Deaf participants and 41 per cent (n = 5) of the hard of hearing participants who returned for follow up interview had continued to use e-mail. Nine per cent of the Deaf participants had actually brought computers or were considering upgrading. Thirty per cent (n = 10) of total participants did not turn up for interview so it is not known if they are continuing to use e-mail.

Deaf participants used e-mail to communicate with family and friends living at a distance. Hard of hearing people's use of e-mail included: contacting the editor of the local newspaper and contacting family who lived at a distance.

It was notable that 19 per cent (n = 4) of Deaf participants were using e-mail because they had someone to assist them, such as a friend, a family member or a teacher. Participants who were not using e-mail often had no one to assist them.

One Deaf participant was using e-mail at her local TAFE institute and the other participants were using e-mail either at their home or the local library. The hard of hearing participants were accessing e-mail in their homes, the local library or in

another community venue, such as the Salvation Army Office.

Reasons for the Deaf participants not using e-mail included being uncomfortable with technology, needing more time for training, not being confident to access e-mail in the community or wishing to only use e-mail at home and not being able to afford to do so.

Reasons for the hard of hearing participants not using e-mail included not being confident with the technology, needing additional training, having no need to use it as they could use the phone instead, or not being able to afford the purchase of a computer with Internet connection.

Participants Use of Chat Before and After Training Session

None of the participants had previously heard of chat conducted over the Internet. Some had heard of ICQ but were not sure what it was. Directly after the training session, the enthusiasm for using chat was mixed. Younger Deaf participants in general were more enthusiastic than older hard of hearing participants.

Younger Deaf people were enthusiastic about chat over the Internet because it enabled them to communicate with other Deaf people from all over the world. Reasons given by hard of hearing people and some Deaf people for not being enthusiastic included concern about having the technical skills to use chat, worry about privacy, preference to communicating face-to-face or simply having no use for it.

One month after the training session, none of the hard of hearing people had used chat by themselves. Reasons for this included not being confident in the technology and seeing no value in it. As one participant explained:

> *Perhaps when I have my computer connected to the Internet, but really, I'm not at all interested in chatting.*

Twenty one per cent (n=5) of Deaf participants had used chat and saw it as something they could do by themselves. It was seen to be a fun activity which gave them contact with additional Deaf people around the world.

Length of Training Session

The training session in Part B was five hours in length and 79 per cent (n = 26) of the total number of participants would like to have more training. Twenty per cent (n = 6) did not want additional training and these were hard of hearing people who did not see technology as being important to them. One Deaf person had no confidence in using computers due to literacy and learning difficulties and did not wish to continue. Reasons for additional training being needed was to increase knowledge of e-mail and chat, increase confidence in the use of technology and provide time to learn other computer skills such as the Internet and publishing.

All participants who had been involved in other training sessions, (Part A), stated they would like to have more time to consolidate skills. The Deaf students stated that they needed more time to understand fully what was being taught; more time in which they

could understand the technical terms being used and to practise skills learnt. One Deaf participant explained below:

> *The teacher can't show you too much too fast. They have to show you slowly, step by step so that I develop an understanding. Otherwise I miss things. So it must be done slo*wly *in order for me to achieve.*

Use of Training Materials

Participants were shown an example of training materials used in hearing classes to teach e-mail. All participants, including the hard of hearing, expressed amazement at the content used, the amount of text and lack of visual content such as pictures and diagrams. The Deaf participants were more concerned than the hard of hearing students. Some of these participants were ready to give up even before the training session had begun.

Participants were then given customised notes that had been prepared especially for the training sessions. These notes were in plain English with little technical language and included directions. Participants expressed great relief that they could understand and follow the notes as they relied more on the pictures than English text. Deaf participants in particular noted the importance of visual information and suggested a glossary and larger text size would improve the notes further.

The use of the customised printed training materials was seen to be valuable for most of the participants. However, some Deaf participant saw little value in the notes – generally due to English literacy difficulties. However all participants considered it critical to have pictures and diagrams with plain English in helping them to understand. Some participants took the notes home and read them to revise points not fully understood in the first reading.

Factors Influencing Success of Training

Thirty three per cent (n = 12) of Deaf participants from Parts A and B had been involved in computer training sessions with hearing people in the past. Nine per cent (n = 2) had been involved in sessions run by the local Deaf Society. Fifty eight per cent (n = 22) had never received any form of training. Twenty five per cent (n = 3) of the hard of hearing participants had been involved in a computer training session with hearing people.

The 33 per cent (n = 12) of Deaf participants involved in prior training sessions with hearing people had mixed reactions to the teacher's ability to work with Deaf students. Twenty two per cent (n = 7) of these participants said they would not participate in a class of hearing people again due to a lack of support services. They cited an inability to keep up, lack of teacher awareness of their needs, different learning styles of Deaf and hearing people and a feeling of not being part of the group, because of an inability to communicate with other students.

Other Deaf people felt a hearing class was suitable, if an interpreter was provided and the interpreter had satisfactory skills. It was notable that younger Deaf people were more positive about being in a class with an interpreter than older Deaf people.

Hard of hearing people had fewer misgivings about being involved in a class with

hearing students. With this group it was important that the teacher understood appropriate teaching techniques to use with hard of hearing people and that the class was small. Some hard of hearing people needed a notetaker and this service was seen to be important to allow them to participate in the class.

Deaf participants also expressed a desire for small classes, with four to five students being the ideal size. This was due to the learning styles of Deaf; it takes additional time for them to switch from the teacher and interpreter to the computer, perform the task and then switch back to the teacher. Additional time is needed to fully understand the technical language being used.

Follow up practice depended on having an easily accessible computer at home. Often they did not have the confidence to locate and use a computer elsewhere. They did not feel confident to use the technology in a strange place without ready specialist support. Such participants often spoke of their desire to have extra training time with the trainer.

Reasons for Satisfaction With Training Session

The Deaf participants expressed satisfaction with the training sessions given by the Project Worker and this was due to:

- The teacher being Deaf
- The teacher having the same language as they do, ie. Auslan
- The teacher being skilled in the learning styles of Deaf people
- The teacher understanding Deaf people's learning needs and incorporating them into the session
- A Deaf support worker was available to give extra assistance as needed
- The teacher incorporating pictures and diagrams in the lesson
- The use of a data projector which greatly assisted the use of visual cues in the class
- Being able to communicate freely with other students in the class and to give and receive assistance
- The physical layout of the room was conducive to an easy flow of communication

The hard of hearing students expressed satisfaction with:

- The teacher being aware of their hearing needs
- The teacher being patient
- Having other hard of hearing people in the same class to communicate with

Reasons for Dissatisfaction with Training Sessions

Dissatisfaction with sessions given by the Project Worker, for both Deaf and hard of

hearing students was because of:

- The class being too big
- Not enough individual assistance being given
- The length of the session being insufficient
- The data projector not working correctly
- The physical layout of the room limited an easy flow of communication: Deaf and hard of hearing people could not easily see each other

For information on best practice strategies for delivery of training to Deaf and hard of hearing people, see Appendices 10 and 11.

7.4 Recommendations

R7.1 Niche classes in Internet and e-mail skills should be funded by relevant state government departments where there are a significant number of deaf people in that locality. These classes should:

- Cater for small groups of students;
- Be staffed by qualified people who are skilled in working with deaf people;
- Be adequately funded to cover the costs of support needed, such as interpreters, notetakers, deaf support workers and data projectors;
- Be designed in a way to cater for the visual communication needs of deaf people; and
- Be of an appropriate length.

R7.2 Interpreters and notetakers should be available in all classes where deaf people are enrolled and training organisations should receive adequate funding to enable these support staff to be employed.

R7.3 Funds should be made available by relevant state government departments to allow Registered Training Organisations (RTOs) to implement Certificate IV in Workplace Assessment and Training for those deaf people who have the technical skills and communication, but not the teaching skills, to qualify them to teach niche classes for deaf people.

R7.4 Funds should be provided for professional development of teachers and trainers to skill them in working with deaf people.

R7.5 Funding should be made available to provide training material that is customised, in plain English and includes glossaries. These training materials should also be available on the Internet.

R7.6 Promotional materials for Deaf people advertising forthcoming classes should:

- Be advertised in the Deaf community;
- Be visual in presentation style; and
- Allow time for face-to-face contact and follow up.

R7.7 Promotional materials for hard of hearing people should be advertised in hard of hearing organisations' newsletters.

R7.8 Any online training program targeted at a deaf audience should include proper consultation with the deaf community to ensure that course appropriateness and best practice techniques are considered.

Appendix 1: Definitions of Deaf/deaf/hard of hearing

There are three distinct groups of people in Australia who have hearing impairments. These groups are:

- Deaf people;
- deaf people (or oral deaf);
- hard of hearing people.

In written texts, it is the prescribed norm to use the lower case "d" when speaking of people who have a hearing loss unless specified as Deaf or hard of hearing. In Australia, 'hearing impaired' is commonly used although this term is not accepted by the World Federation of the Deaf.

The most significant difference between the three groups of deaf people is that Deaf people will use Australian Sign Language (Auslan) to communicate whereas hard of hearing and oral deaf people will speak and use residual hearing with amplification devices and/or lip-reading. Deaf people usually use a sign language as their first language whereas hard of hearing and deaf people use a spoken language.

Hard of hearing people generally have lost hearing as adults through any number of causes. Oral deaf and Deaf people are generally those who have been born with a hearing loss or have lost hearing very early in life before the development of speech and language.

Deaf people belong to the Australian Deaf community – a community of Deaf people which are striving to be known as a cultural and linguistic minority. Deaf people have their own values and beliefs and this, combined with Auslan, has led to the development of a specific Deaf culture.

Deaf, hard of hearing and oral deaf people do not mix socially, as their communication preferences and values and culture are very different. Oral deaf people and hard of hearing people have their own organisations, distinct from those within the Deaf community, which provide support and lobbying functions.

Appendix 2: Australian Sign Language (Auslan)

Auslan is the visual sign language as used by members of the Australian Deaf community. It consists of signs and finger spelling, which are used to convey a desired message. Many of the signs used cannot be translated directly into English. Auslan does not follow English grammar; it has a grammar in its own right. Auslan has been recognised as a community language under the Australian Language and Literacy Policy (DEET, 1991).

Auslan uses parameters in the same way that spoken languages follow specific grammatical markers. Auslan uses the parameters of location, orientation, non manual markers, handshape and movement. When these are combined it creates a beautiful flow of language.

There is no written form of Auslan as it is a purely visual language.

Appendix 3: Cost Calculations for Both Domestic and Small Business Usage Profiles

Both the *Allan-10* and *mm225* require a single 128 kbps connection. The cost of a 2 x 64 kbps ISDN service from Telstra ('OnRamp 2') includes an initial connection fee, a monthly rental and a charge for usage that varies with distance and time of day.

Table A3.1 - Telstra Tariff for 128 kbps ISDN Service Connecting Data

Tariff Components (incl. GST)	'OnRamp 2'	'OnRamp-Business Highway'
Connection: - New Service	$324.50	
or – Conversion from PSTN	$190.30	
+ Monthly Rental	$55	$66
+ Data Usage [See Note 1]		
Local, eg. within Melbourne: * Up to 25km	22 cents for first 5 (10) minutes + 3.3 (1.65) cents per minute thereafter	As for that at left, but including $22 of local calls per month
* 25 – 50km	15.4 (7.7) cents per minute + 16.5 cents flagfall	
Melbourne – Mildura (165–745km) Non Intercapital	34.1 (16.5) cents per minute + 16.5 cents flagfall	
Melbourne – Sydney (>745 km) Intercapital	34.1 (20.35) cents per minute + 16.5 cents flagfall	

Note 1: Quoted rates for 1 x 64kbps data usage are for Mondays to Fridays, between 7am and 7pm. Outside that period and at weekends, usage rates are as per figures in brackets. The rates must be doubled for 2 x 64kbps or 128kbps. All rates include GST. This table adopts a different definition for a 'local' call than does the Telstra pricing list: Deaf users in Melbourne more than 25km apart would not appreciate their call being classified as 'long distance'. The rates for voice calls are cheaper than for data but not quoted here. 'OnRamp 2' and 'OnRamp-Business Highway' are specific Telstra pricing products, whose underlying ISDN technologies are identical. For further detail, refer to http://www.telstra.com.au/onramp/pricing.htm. The quoted rates are correct as at 1 July 2000 and were unchanged as at 13 February 2001.

Based upon nominal usage profiles for domestic and small business users, it is then possible to convert the better of these tariffs (OnRamp 2) to an annual charge, as follows:

Table A3.2 - Effective Annual Cost of a 128 kbps Data Connection for Two Usage Profiles

Annual Cost (incl. GST)	Nominal Domestic Usage [See Note 2]	Nominal Small Business Usage [See Note 3]
Connection:	$ 190.30	$ 190.30
Rental:	$ 660.00	$ 792.00

Annual Cost (incl. GST)	Nominal Domestic Usage See Note 2	Nominal Small Business Usage See Note 3
Local usage (<,> 25km):	$3,014.44	$11,625.28
Regional usage:	$ 371.80	$ 1,859.00
Interstate usage:	$ 171.60	$ 1,372.80
Total:	**$4,408.14** *(ie. $2.39 per call on average)*	**$15,839.38** *(ie. $2.42 per call on average)*

Note 2: Assumed basis of domestic data/video call usage: Existing PSTN connection; 4 local calls per day during daytime + 2 per evening (Mon-Fri) + 2 on Saturday + 2 on Sunday (all calls evenly split < 25km, > 25km) + 1 regional call per week during daytime + 2 intercapital calls per month during daytime; each call lasting 10 minutes. (This usage profile amounts to 1,844 calls in the year.)

Note 3: Assumed basis of small business data/video call usage: Existing PSTN connection; 20 local calls per day during daytime + 2 per evening (Mon-Fri), 5 on Saturday, 2 on Sunday (all calls evenly split < 25km, > 25km) + 5 regional calls per week during daytime + 16 intercapital calls per month during daytime; each call lasting 10 minutes. (This usage profile amounts to 6,536 calls in the year.)

To these costs must then be added a component representing the added cost of purchasing an *Allan-10* plus a PC, or a *mm225* unit.

Table A3.3 - Total Annual Cost of ISDN Data Connection plus Video Devices

Cost Item	Nominal Domestic Usage	Nominal Small Business Usage
ISDN Data Connection (annual) **from Table A3.2**	$4,408.14	$15,839.38
Allan-10 and PC annual loan repayment **See Note 4**	$4,991.67	$4,991.67
Total annual cost:	**$9,399.81**	**$20,831.05**
(ISDN plus *Allan-10* plus PC)	*(ie. $5.10 per call on average)*	*(ie. $3.19 per call on average)*
mm225 annual loan repayment **See Note 4**	$1,937.41	$1,937.41
Total annual cost:	**$6,345.55**	**$17,776.79**
(ISDN plus *mm225)*	*(ie. $3.44 per call on average)*	*(ie. $2.72 per call on average)*

Note 4: Assumed costs, as mentioned in Section 2.2, are: *Allan-10* = $6,000 + GST; PC = $2,500 + GST; *mm225* = $3,299 + GST. *Annual repayments are simply monthly repayments times 12, and scaled according to an assumed* nominal $10,000 personal loan at 12% interest over 5 years, which

results in a monthly repayment (principal and interest) of $444.89.

A measure of the degree of disadvantage suffered by Deaf persons wishing to 'video sign' over a distance, compared to hearing persons who only utilise voice telephony to achieve similar overall communication, is gained by comparing the above figures with those of the following table.

Table A3.4 - Effective Annual Cost of a Voice Connection for Two Usage Profiles

Annual Cost (incl. GST)	Nominal Domestic Usage [See Note 5]	Nominal Small Business Usage [See Note 5]
Connection:	$190.30	$190.30
Rental:	$211.20	$330.00
Local usage:	$330.62	$1204.63
Regional usage:	$141.44	$707.20
Interstate usage:	$ 64.80	$518.40
Handset (from Telstra)	$ 39.16	$ 39.16
Total annual cost:	**$977.52** *(ie. $0.53 per call on average)*	**$2989.69** *(ie. $0.46 per call on average)*

Note 5: Based upon similar usage profiles as for the data/video examples. For further detail, refer to the Online Product Catalogue at http://www.telstra.com.au/. Domestic usage assumed Telstra's 'EasySaver Plus' package (rental = $17.60/month; local calls = 18.7 cents) whereas business usage assumed the Basic Access package (rental = $27.50/month; local calls 19.8 cents). For both profiles, STD calls are costed at 25 cents/min (regional, day) and 23 cents/min (intercapital, day), with a handset rented for $2.75/month plus an initial payment of $30.80 spread over 5 years.

The results of Tables A3.3 and 3.4 have been summarized in Table 2.1.

Appendix 4: Sample of participants for evaluation of multi-function unit and videophone

This was a targeted (rather than random) sample – participants were chosen to be roughly representative of the Deaf population in Australia but overweighed with those who have *some* technology experience (otherwise most of the trial time would be spent getting them up to speed on basic typing skills and computer use). Hence the sample is composed of:

- About half who primarily use Auslan but with good English literacy. Most of the remainder are Auslan users with low English literacy, plus some "oral deaf" who prefer to communicate through speech and lip reading;
- Half female and half male;
- Cover three broad age groups: under 30, 31-50, over 50;
- About three quarters who have some experience with technologies (have used a computer in the past month at school, work or home and have a TTY at home).

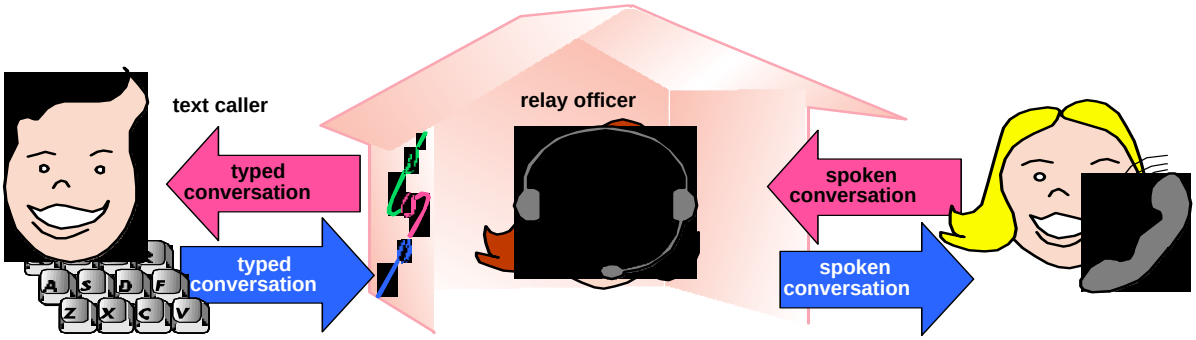
No.	Participant[22]	Primarily use Auslan, with relatively good to excellent English literacy	Primarily use Auslan but limited English literacy	Oral deaf	Gender	Age	Some experience with technologies	Technologies used as part of trial
1	Patrick	✔			Male	31-50	Yes	Multi-function unit
2	Ben	✔			Male	31-50	Yes	Multi-function unit
3	Joan	✔			Female	Over 50	Yes	Multi-function unit
4	Jim	✔			Male	Over 50	Yes	Multi-function unit
5	Sasha		✔		Female	Under 30	Yes	Multi-function unit
6	Pamela	✔			Female	Under 30	Yes	Multi-function unit
7	Renata		✔		Female	31-50	No	Multi-function unit

[22] All names are pseudonyms to preserve confidentiality.

No.	Participant[22]	Primarily use Auslan, with relatively good to excellent English literacy	Primarily use Auslan but limited English literacy	Oral deaf	Gender	Age	Some experience with technologies	Technologies used as part of trial
8	Ferdy		✔		Male	Under 30	No	Multi-function unit
9	Tom	✔			Male	31-50	Yes	Multi-function unit
10	Kathy		✔		Female	Under 30	No	Multi-function unit
11	Alistair			✔	Male	Over 50	Yes	Multi-function unit
12	Geoffrey	✔			Male	Over 50	Yes	Multi-function unit and videophone
13	Lana			✔	Female	Over 50	No	Multi-function unit and videophone
14	Cameron	✔			Male	31-50	Yes	Multi-function unit and videophone
15	Simona			✔	Female	Under 30	Yes	Multi-function unit and videophone
16	Adam			✔	Male	31-50	Yes	Multi-function unit and videophone
17	Ingrid	✔			Female	Under 30	Yes	Multi-function unit and videophone
	Plus focus group of 4	✔			3 males, 1 female	Up to 50 years	Yes	Multi-function unit and videophone

Appendix 5: National Relay Service (NRS)

The NRS provides a voice and text telephone interpreting service for people who are Deaf, or have a hearing or speech impairment. The diagram below shows the operation of the NRS.



A Relay Officer receives a call from a person using a text device (TTY or modem) and then dials the call to whoever the originator of the call wants to contact. Once the call is connected, the Relay Officer reads what is typed. The Relay Officer then listens to the reply from the recipient of the call and types it to the TTY or modem user.

Appendix 6: Sites Where Video Clips of Signing May Be Viewed

Sites where video clips of signing may be viewed:

1. Australian Communication Exchange Ltd (ACE)

   http://www.aceinfo.net.au/auslan/
   Video coding employed: gif file

2. The Centre of Excellence for Students who are Deaf and Hard of Hearing (NMIT), Melbourne

   http://online.nmit.vic.edu.au/deaf/
   Video coding employed: QuickTime

3. The Newfoundland School for the Deaf, Canada

   http://www.k12.nf.ca/nsd/
   Video coding employed: QuickTime

4. Omnitor, Sweden

   http://www.omnitor.se/bredband
   Video coding employed: MPEG (asks for Windows Media Player)

5. Maryland School for the Deaf, United States of America

   http://users.ids.net/~rideaf/awareness/deafculture/deafculture.htm
   Video coding employed: QuickTime

6. Optus Website with Auslan videoclip

Appendix 7: Technical Guide to the Installation of Auslan Video Clips

In using the Internet, the download speed of information should be considered.

This is determined by three factors: the size of the original video file, the transmission links (bandwidth) that connect computers and servers into the Internet and the speed of the modem at the user end.

Video files are generally very large data files. The usual digital format used to store video is 'avi'. For instance, one minute of standard quality video stored in this format is about 200-300 Mbyte in size.

However, the video files are related to three other factors: the richness of the images, the size of the frame (screen size) and the rate of the motion (frames/second).

The bandwidth in Australia is mostly poor. Most services rely on a telephone wire for connection. Some areas are serviced by cable, and ISDN is an expensive option mainly targeted at businesses. ADSL, which is a twisted copper wire solution that will improve the bandwidth, is currently being rolled out.

At the computer end, the modem converts the data at a rate of 14.4 Kb/sec up to 10Mb/sec (cable modems). Most new computers come with modems operating at 56.6kB/sec. In a limited survey conducted by Reece Lamshed (1998) for Arts Victoria, the modem range for most users seems to be currently between 36.6 to 56.6 kB/sec.

A raw video file (200+ Mbyte) coming down a telephone line to a 36.6 kB/sec modem, would take about 700 hours to download (DV @ 25 MBits/sec).

Some technical solutions have been devised to overcome this problem for video Internet distribution.

a) The quality of the initial video footage needs to be Web appropriate. This means having very clean and clear pictures with little background movement and high contrast between foreground and background.

b) The size of the screen is reduced substantially; from a full screen 640 x 480 pixels to a more manageable 128 x 96 pixels.

c) The rate of motion is reduced substantially from 25-30 frames/second to 6-10 frames/second. There is an optimum level here, and the setting will depend on the content. This setting also gives the video a jerky quality if set too low.

d) The raw video file is compressed using a number of software devices (called codecs). MPEG has become the standard. There are three variations: MPEG-1, which provides a data rate of 1.5 Megabits/sec and is used for CD-ROMs; MPEG-2, which is a higher bandwidth version used in DVDs and digital television; and MPEG-4 which is still being developed and has had limited release.

e) It is possible to export a video file into an animated 'gif'. This has the advantage of requiring no user plug-ins. The file sizes can be reasonably

small. The disadvantages of this technique are that the user has no control on the start and stop of the animation.

f) Streaming the video for the Internet – MPEG files are still too large for the limited bandwidth and modem speeds. New solutions are provided where the video data is compressed and streamed in packets of information (rather than having the whole file come down the line, which MPEG requires). *Real Media* and *QuickTime* have become the standards for this process.

The user is normally required to load a 'plug in' which is the additional piece of software enabling the video to be viewed. Fortunately, these software programs are directly downloadable from the Internet, but it does require an additional step to opening the Browser window and viewing the page. The standard procedure is to embed the link to the site that has the plug-in into the Web page code so that when a user wants to view the video and does not already have the plug in, they are automatically linked to the relevant site. The user will still need to download the plug in. These files themselves are reasonably large (4-8 Mb), which may take 10 to 15 minutes on a slow line/modem to download. Once the plug in is installed, viewing is enabled.

Most videos on the Internet run for one minute or less. This ensures that the streaming is effective and doesn't break down mid-stream.

If there is no concern with the user end modem speed and the compression rates are limited, a reasonably high quality of video can be viewed. For example, film sites using QuickTime provide one-minute trailers. They offer a range of options, beginning at 56.6 modems at low 240 x 128 res with a file size of 7.2 MB and at the top end, high 480 x 260 res with a file size of 27 MB. These are huge files, and they don't even countenance modems lower than 56.6K!

Scalable technology is also becoming available. With this technology the server can detect the modem speed and scale upwards to provide the best video image (highest data rate). Scalable technology will enable organisations to place high quality video clips on their sites. However for now, the lower end of the user needs to be aimed at, or otherwise a range of versions for different systems be had on the site.

In all downloading from the Internet, it is important to consider one's arrangements with the Internet Service Provider (ISP). Some ISPs have limits on the amount per month, and charge extra if this level is exceeded. A lower end provider may, for instance, have a 10Mb limit – 20 video downloads could exceed this limit. These service arrangements may be a disincentive for the user to want to select the video option.

From a production point of view, the main limitation will be the technical expertise required to upload quality Auslan video clips onto a Web site. The streaming video option is reasonably new technology, and not all Web masters will have the skills to do this.

However, no matter which technique is used, compression or streaming, the quality of the video will depend on the line connection and the modem speed.

Production standards: integrating Auslan video clips on the Internet

1. The script

   The signed script needs to be written by someone with a native fluency in Auslan to interpret the English text to Auslan sign.

2. The shoot

   The viewer must be able to clearly see the signer and signing. It is best for the signer to wear dark plain clothes against a similar background as it is the hands and face that need high contrast. The subject needs to be well lit and there should be no background movement.

3. The camera

   The camera should be of a reasonable quality, preferably digital, and mounted on a tripod for the shoot to prevent camera shake. The signal from analogue cameras will need to be converted to a digital format. Ensure that the file is in an appropriate format, eg. '.avi'. for PC and *QuickTime* for Mac. It is important not to record any sound as this will increase the 'white noise', which will take up valuable data space. The sound recording needs to be turned OFF.

4. The edit

   It is preferable that the camera data feeds straight into the editing system. Digital editing software can be expensive, although low-end applications utilising 'Firewire' solutions cost less than $500 for both Windows and Mac (the *imac* has a ready installed video editing software – imovie). To avoid this, it is preferable to edit in the shoot phase (on the camera).

5. Conversion to Web format

The option chosen for ease of download, growing industry preference and cross-platform functionality is *QuickTime.*

There are three processes involved in displaying video on the Web:

a. Converting (and compressing) analogue or digital video files into *QuickTime*.

There are some video editing software applications that will export files directly into QuickTime – Premiere, final cut pro, i-movie. Except for i-movie (which is dedicated Macintosh software installed on iMacs and G4s), the other software applications are expensive.

QuickTime Pro is available off the Internet and this application will convert video files into the correct format. This is available from the Apple site for a small fee: $US30 and is purchased at https://apple-order1.apple.com/cgi-bin/WebObjects/qtupgrade

To avoid complications with codecs that envelope digital video files, it is best that the same video processor (computer editing equipment) is used to generate the QuickTime file.

How to Create a QuickTime Video File

Launch QuickTime Player.

Select File > Open movie to open your AVI file - Pressing convert will open the file in QuickTime format

Select File > Export go into file export mode

In the "Export " box select "Movie to Quick Time Movie".

Press Options button

Make sure video is ticked

Press settings button

Select

H.263

-Color

Best Quality

Frames per second 6

Key frame every 100 frames

Limit data rate to 3.5 k/seconds

Press Options and select 128x96 (Sub-QCIF) and press OK and OK again

Press size and select "Use custom size"

Enter Width 128 Height 96 and press OK

If audio isn't required, un-tick the sound box

Press OK

Press save

Your QuickTime movie should now be stored on your hard drive.

b. Embedding the QuickTime movie into the Web page.

HTML code needs to be written to link the QuickTime video file into the Web site. This code is:

```
<embed src="WhatEverYouCalledTheMovie.mov"
width=128
height=110
autoplay=false
controller=true
loop=false
PLUGINSPAGE="http://quicktime.apple.com/download/">
</embed>
If you want auto play, then make autoplay=true
```

```
QuickTime player is included in the quicktime install.
```

If using Dreamweaver, the process to insert a plug-in is different for versions 2 and 3. Insert>Plug-in from the menu bar. Then insert the settings and parameters provided above.

c. Installing the plug-in at the user end.

In the coding provided above, the QuickTime player is included in the install. It will link the user direct to the site where a download of QuickTime (free of charge) can be made.

It's a common practice to note "This page contains video content that requires a QuickTime plug-in. This can be obtained from here".

If QuickTime is already installed, the movie will play.

Technical Trials of Auslan Video Clips Using Clips Placed on the Cable & Wireless Optus Web Site

The intention behind the technical trials was to provide a *readable* Auslan video image on a Web site with *the lowest possible file size.* This is based on the presumption that most Deaf users of the Internet will not have high speed modems and in fact are likely to be at the very low end of the scale.

Using the QuickTime solution, it was found that a simple downloadable file provided a clear Auslan video with a frame rate of 10 frames per second. A higher frame rate was too pixelated to see clearly and a lower frame rate could not adequately slow hand movements. These settings gave about 30 seconds of video in 400Kb file size.

Using the animated gif solution, the size of the Auslan video file was 1.065 Mb which included 12 seconds of compressed colour footage at 18 frames per second. This also provided a reasonable picture quality. However, compared to the QuickTime solution, the equivalent file size of the animated gif is about 3MB, ie. approximately five times the size of the QuickTime solution. The online video quality is marginally better than QuickTime.

Unfortunately, the original video footage was not as clean as it could have been, and this affected the quality of the online video.

The table below shows the relationship between the file size and download speeds and gives comments on the video clips using different connection types.

Table A6.1 - Relationship between file size and download speed to 56.6 kbps.

Image quality versus bandwidth for QuickTime 4 compression settings							
Quick Time default	**Connection type**	**codec**	**framerate**	**K/s**	**dimensions**	**Size for 30sec**	**Comments**
20 kbps high motion	28.8k modem	H.263	3f/s	1.5K/s	128x96	51K	Image blurred and distorted. Fine movements lost. Image small
20 kbps low motion	28.8k modem	Sorenson	3f/s	1.5K/s	128x96	50K	Image blocky and distorted. Fine movements lost. Image small
40 kbps high motion	56k modem	H.263	6f/s	3.5K/s	176x144	116K	Image less blurred. Distorted. Better movement but gestures still lost.
40 kbps high motion	56k modem	Sorenson	6f/s	3.5K/s	176x144	114K	Image less blocky. Still distorted. Better movement but gestures still lost.
100kbps low motion	ISDN/Cable/ADSL	H.263	10f/s	10K/s	176x144	316K	Still blurred but clearer. Hand movements much clearer
100kbps low motion	ISDN/Cable/ADSL	Sorenson	10f/s	10K/s	176x144	308K	Still blocky but sharper than H.263. Hand movements much clearer
Custom setting test							
250kbps	Cable/ADSL/LAN	H.263	15f/s	30K/s	352x288	1.06M	Image quality much improved though still some blockiness. Hand movements very clear

Note: All settings had the audio disabled. This significantly improves quality in the low bandwidth settings as audio bandwidth is almost equal to video bandwidth at these low data rates.

Appendix 8: Raising the Awareness of Online Technologies Amongst Deaf People

When raising awareness of online technologies in deaf community it is important to consider:

- The need to use culturally appropriate materials and methods to raise awareness, such as information in plain English and the use of videos (or another medium such as CD-ROMs) using Deaf actors and subtitles to impart information;
- Having a person from within the Deaf community itself to impart information to Deaf community members;
- The need for trust in the person who is imparting information;
- The strength of Deaf community networks for information dissemination;
- The limited use of regular communication channels for imparting information, such as advertisements in major newspapers and public forums;
- The importance of having qualified Auslan interpreters available at any technology display or expo and promoting the availability of the interpreter(s) to the Deaf community. Funding for the Auslan interpreter(s) will need to be borne by the organisers of the event;
- The low number of Deaf people who attend "disability" conferences, events and displays as compared to the large number of Deaf people who will attend Deaf conferences, events and displays;
- The venue used for any awareness raising event must be culturally appropriate and allow for face-to-face communication;
- The importance of the "Telecommunications Access Sub-Committee" (TASC) in linking between the Deaf community and the major telecommunications carriers;
- The popularity of a "clearing-house" to impart information to the Deaf community on online technology availability. Regular updates on technology should be distributed through the clearing-house. To manage the clearing-house, a centralised taskforce would need to be established.

Appendix 9: Raising the Awareness of Online Technologies Amongst Hard of Hearing People

When raising the awareness of online technologies amongst hard of hearing people it is important to consider:

- The importance of family members in conveying information to hard of hearing members;
- The need to utilise hard of hearing organisations information newsletters and flyers in raising awareness;
- The need to include technology aides, such as auditory loops for hard of hearing people in community events and information sessions;
- The need to promote community events and information visually by advertisements and flyers, etc.;
- The use of hard of hearing organisations events to promote awareness, such as "technology expos" which are held by differing hard of hearing organisations to promote awareness of auditory technology aides;
- Auditory technology aids to hard of hearing people and the possibilities of promoting online technology through the distributors of such technology.

Appendix 10: Best Practice Strategies for the Delivery of Training to Deaf People

Length of Training Session: Deaf people require additional training time

Deaf participants need to have sufficient time to consolidate skills learnt and increase confidence. The pace needs to be slower and additional time given for understanding the language used (particularly technical jargon) and to allow looking from the computer screen, to the training notes, and back again.

Class Size: Deaf people require small class sizes

Small class sizes are a critical factor in the success or otherwise of training sessions. Having less than five students per class was seen to be ideal. Smaller classes are necessary to fully understand concepts and technical language and to allow for questions to be fully answered and understood by all.

Teacher Skills: Effective communication between teacher and students is critical

The ability of the teacher to communicate effectively with the students, in particular the Deaf students, is vital. Having a Deaf teacher fluent in Auslan is the most effective way to teach Deaf people, provided this person has the teaching skills and technical knowledge to do so.

If this is not possible, a qualified Auslan interpreter is essential to allow Deaf people to participate in hearing classes.

Professional development in the learning styles of Deaf people should be available for teachers to enable them to understand and react to, the visual needs of Deaf people, including the cultural characteristics and working with interpreters.

Class Peers: It is important to have other Deaf people in the class if possible

Having like others in the class increases their satisfaction and enjoyment of the class. Being able to communicate easily with each other and share assistance leads to increase confidence in the learning environment.

Training Materials: Customised training materials increase understanding

The use of customised training materials greatly enhanced the Deaf student's ability to learn independently and support them at a later date. The use of less text, less technical jargon, increased pictures and diagrams all enhanced the learning ability of the students.

The use of a data projector is critical in the success of a training session for Deaf people. The data projector allowed information to be shown visually and to allow for students to easily keep track of demonstrations being shown without having to switch from the computer screen to the teacher/interpreter and back again. A laser pointer makes it easier to show Deaf people information on the screen and on the data projection.

Classroom Support: A Deaf support worker makes things easier

The use of a Deaf support worker, who ideally should be a Deaf person fluent in both Auslan and English and with computer skills, makes it easier for those Deaf people who have difficulty understanding the concepts being taught. The support worker can interpret the message into better Auslan if needed.

A support worker is useful to give hands-on assistance when necessary. It is not ideal to use the interpreter as a support worker as the roles are different and can lead to confusion among the Deaf students and the interpreter.

Awareness Raising: Use Deaf community networks to increase awareness of classes

Informing Deaf people of forthcoming training opportunities is difficult as simply placing advertisements in newspapers is not sufficient. Advertising in local deaf community newsletters, sending flyers and providing information face-to-face are better ways to notify Deaf people about events. It is important to advertise well ahead of an event as it takes more time for Deaf people to become aware of these events as they rely on information conveyed face-to-face.

High Cost of Access to Technology: The cost of technology is prohibitive for some Deaf people

Many participants expressed frustration at not being able to have e-mail at home due to high costs involved. This frustration is compounded for Deaf people if they do not have the confidence to use e-mail at their local library or if they are not aware of places they can use e-mail. There was some desire to use e-mail rather than the TTY, but costs in purchasing the hardware and software were a limiting factor in doing so.

Location of Computers for Follow Up Practice: Deaf community venues are important for follow up practise

When it is not possible to locate computers in the home, a computer should be placed in a location, which is easily accessible for Deaf people, and where they can ask for assistance if needed. The local Deaf Society is seen to be an ideal place for this service.

Physical Arrangement of the Room: Computers are ideally located in a U-shape around the room

The communication needs of Deaf are often overlooked in the design of computer training rooms. Deaf people need a clear line of vision between each other and the teacher and interpreter. Computers or any other equipment which impede this line of vision are frustrating. Ideally computers should be in a 'U' shape around the room, with the whiteboard and data projector at the front.

Appendix 11: Best Practice Strategies for the Delivery of Training to Hard of Hearing People

Length of Training Session: Hard of hearing students may need additional training sessions to gain confidence in using technology

Because hard of hearing people are often older, they may not be confident in using computers and may need additional time to gain this confidence. Hard of hearing people, especially if the hearing loss is severe or profound, may also miss out on classroom communications and need extra time to keep up.

Class Sizes: Class sizes should be kept small

Hard of hearing people prefer to have small class sizes to ease communication strains between the students and the teacher. Larger classes makes it difficult to know what is being said by other students in the room due to distance between speakers and background noises. It is easier to understand instructions from the teacher in smaller classes.

Teacher Skills: Teacher understanding of hearing loss and teaching strategies is critical

Hard of hearing people needed a teacher who understands their hearing needs and accommodates these in the class by using effective teaching strategies. The teacher should have patience and be prepared to repeat messages as needed. It is important that the teacher:

- faces the students for all messages
- speaks in a normal tone of voice without exaggerated lip movements
- is willing to rephrase or even write messages as necessary for understanding
- uses the whiteboard as much as possible, especially for unknown technical vocabulary
- keeps background noise to a minimum
- if possible uses a classroom with carpet and curtains to absorb sound
- does not speak with his/her back to a window

Classroom Support: Some hard of hearing people may need additional support

Some severely and profoundly hard of hearing people may need the support of assistive listening devices or a notetaker. Assistive listening devices may be in the form of a loop system or an FM unit. For other hard of hearing people, a notetaker may be needed to record classroom instructions, especially if the hard of hearing person finds it difficult to lipread and is gains little help from hearing aids.

Class Peers: Having other hard of hearing people in the room increases comfort

Having like others in the class increases their satisfaction and enjoyment of the class. Being able to give each other assistance leads to increased confidence in the learning environment.

Use of Training Materials: Training Materials need to be carefully designed

Ensure that training materials given are not overly technical with dense text. Hard of hearing people have the same need for readable training materials as the rest of the community.

The data projector is important for hard of hearing people as it allows information to be shown visually. It also enables them to keep track of demonstrations whilst at the same time keeping the teacher in view.

A laser pointer makes it easier to show information on the screen and on the data projector to hard of hearing people.

Awareness Raising: Advertise possible classes in the community newspapers and newsletters

Hard of hearing people in general are aware of classes in their home communities where they can access training; Hard of hearing organisation newsletters can also be used for promotion of classes.

Location of Computers for Follow Up Practice: Hard of hearing people can access computers in their local libraries

Hard of hearing people prefer the computers to be in their local community for follow up practise if they did not have a computer at home.

The communication needs of hard of hearing people are often overlooked in the design of computer training rooms. Hard of hearing people need a clear line of vision between each other and the teacher and interpreter. Computers or any other equipment which impede this line of vision are frustrating. Ideally computers should be in a 'U' shape around the room, with the whiteboard and data projector at the front.

Appendix 12: Marketing Initiatives

Publications

Information about Deaf Australia Online II was published in the following newsletters and journals.

Publication	Type	Audience Type	Audience Number
Deaf Association Northern Rivers Inc (Lismore NSW)	Newsletter	Consumer	
World Federation of the Deaf News Magazine, Volume 13 Number 3 December 2000	Magazine	Consumer	10,000+
Central West Deaf Community, NSW	Newsletter	Consumer	
NSW Association of the Deaf	Newsletter	Consumer	130
Queensland Association of the Deaf	Newsletter	Consumer	70
South Australian Deaf Society	Newsletter	Consumer	460
Tasmanian Deaf Society/ Tasmanian Council of Deaf People	Newsletter	Consumer	300
Victorian Council of Deaf People	Newsletter	Consumer	450
Western Australian Deaf Society	Newsletter	Consumer	200
Australian Association of the Deaf	Magazine	Consumer	450
John Pierce Centre, Melbourne	Newsletter	Consumer	1000
Sydney Deaf Club	Newsletter	Consumer	
Albury Wodonga District Deaf Support Club	Newsletter	Consumer	120
Canberra Deaf Club	Newsletter	Consumer	120
Deafness Association of NT	Newsletter	Consumer	
Literacy Link, Victoria, Volume 19, No 2, April 2000	Magazine	Education	

Centre of Excellence for Students who are Deaf and Hard of Hearing	Newsletter	Education	130
Centre for International Research on Communication and Information Technologies at RMIT University	Newsletter/ Monitor	Research/ Government/ Industry	CIRCIT Newsletter: 2000 CIRCIT Monitor: 60
Vicdeaf News	Newsletter	Consumer	2500
Telstra Consumer Affairs E-News	E-mail	Consumer	250+

Conferences

Deaf Australia Online II was presented at the following state, national and international conferences.

Conference	Audience Type	Audience Size	Response
State			
Web Accessibility Group Meeting, Melbourne, August 2000	Industry/Academia	6 members present	Invitation to present at W3C International Web Accessibility Summit Better understanding by Committee Members of issues facing Deaf people with technology which may lead to incorporation of deaf and hard of hearing needs on W3C guidelines
WA State Deaf Conference, May 2001	Consumer/service organisations Australia wide	150 expected	Abstract sent February 2001
National			Conference cancelled
National Deaf Conference, May 2000			
MultiLingual Conference: The Open	Industry/ Government/	125 people with 40 at	Information was well received. One person

Road, Melbourne, October 2000	Education/	concurrent information presentation	was sent additional information on technical information to install Auslan clips. Information about Auslan video clips was requested at a later date by two additional people.
Communication Research Forum, Canberra, October 2000	Industry/ Government/ Research/Education	200 people, with 15 at concurrent information presentation	Information well received with several participants from other research projects commenting on the possible use of the MFU with other groups of people in society.
Deaf Australia Online II Technology Display, Melbourne, December 2000	Industry/ Government/ Education/Deaf Service Organisations	35 people	This session show-cased the technology used in the project. Participants shown how the technology worked. A positive response was obtained.
Deaf Australia Online II Technology Display, Melbourne, December 2000	Consumer	25 people	Although the number attending was small, the response was very positive.
Accessibility Conference, Canberra, May 2001	Industry/Academia/ Government		Abstract sent February 2001
International			
International Congress of Educators of the Deaf, Sydney, July 2000	Education	1,000 people at conference from many countries around the world; 30 attended the concurrent information presentation	Presentation was well received with copies of the Deaf Australia Online report sent to two participants.
International Web Accessibility Summit,	Industry, Web designers	150 people, many from	Information was well received with many

Melbourne, November 2000		overseas countries	questions afterwards. Information requested on Auslan video clips to four people Two people sent responses of appreciation for increasing their awareness of the barriers Deaf people face in using technology. Copies of the paper were distributed via the conference's CD Rom
PTC 2001. Pacific Telecommunications Conference. Hawaii, January 2001	Industry/Government/Research/Academia	1800 people from Asia Pacific region, America and Europe; 60 attended the concurrent information presentation	The presentation and paper were very well received and had particular interest from representatives of FCC (the US Federal Communications Commission) and others. Copies of the paper were distributed via the conference's CD-ROM.
Telecommunication for the Deaf Inc Conference. South Dakota, USA, July 2001	Consumers/State and Federal Regulators, Academia/Relay Providers/Deafness technology manufacturers and distributors	Approxi-mately 450 America, Europe and Australia as well a small number from other countries	To be presented in July 2001

Presentation and discussion of the project with industry and other stakeholders

Organisation	Reason
Telstra	Presentation of project aims and approach Information exchange Provision of ISDN lines
Optus	Presentation of project aims and approach Information Exchange Installation of Auslan video clips
Literacy Online Research Project: An Accessibility Project funded by the Dept of Communications, Information Technology and the Arts.	Related links between projects Representation of DAO II on steering committee Informal discussions
Chisholm Institute of TAFE	Learnscope Project Video conferencing of Auslan
Global Vision Technologies	Use of Video Phones for trialing
Disability Information Victoria	Including DAO II information on Web page Information exchange
CentreLink, Canberra	Information exchange Website accessibility
Accessibility Project	Information exchange
Tasmanian Deaf Society/Tasmanian Council of Deaf People	Specific aspects of the project
Adelaide Institute of TAFE, SA	Specific aspects of the project Video conferencing
Ballarat Deaf Social Club, Victoria	Specific aspects of the project
Geelong Deaf Club, Victoria	Specific aspects of the project
Lodden Mallee Deaf Link, Victoria	Specific aspects of the project
RecruitNet Inc. Victoria	Specific aspects of the project
John Pierce Centre, Victoria	Specific aspects of the project
Maryborough Better Hearing	Specific aspects of the project

Deaf people of Mildura, Victoria	Specific aspects of the project
Skills.net, Vic. various projects	Specific aspects of the project
VSDC, Victoria	Support for MFU/video phone trials Consultation re videoconferencing access and use
HREOC, NSW	Information exchange
TEDICORE (Australia)	Information exchange
Seetel, Australia	Videophone information/access
Motion Media (UK)	Videophone information and trials
Finnish Association of the Deaf	Videophone trialing in Finland
Victoria Council of Deaf People	Information exchange
Paralympic Games, Sydney, NSW	Informal discussion Information exchange
Omitor, Sweden	Multi function unit
Dr Ungsuh Kenneth Park, formerly Executive Vice President of Samsung Electronics	Information Exchange
Representatives of the Korea Association for the Hearing Impaired, including a group of ninety Deaf people.	Information Exchange

Build Stronger Links with National and International Developments

The Reference Group, which included international members as shown below, gave comments on the design, findings and recommendations of the project via an e-mail list. For further reference to national and international links, please see the tables on conferences and on presentations and discussions of the project with industry/organisations.

Name	Organisation
National	
Ms Gunela Astbrink	Telecommunications and Disability Consumer Representation Project
Ms Breda Carty	Griffith University

Mr Brett Casey	Australian Association of the Deaf
Ms Kim Curtis Newton	Deaf Aboriginal Community
Prof Gitte Lindgaard	Gitte Lindgaard and Associates Pty Ltd
Ms Robyn Logan	One to One Education Consulting, Victoria
Mr John Lovett	Deaf Independent, Victoria
Mr Charles McCathie-Nevile	W3C
Ms Rosa McKenna	Adult Literacy and Basic Education
Mr Timothy Morgan	Deaf Independent, SA
Mr Brent Phillips	Victorian Council of Deaf People
Dr Kirsty Williamson	Information and Telecommunications Needs Research Group, Monash University
Mr Glenn Welldon	NSW Association of the Deaf
Mr Anthony Young	Australian Communication Exchange Ltd
International	
Ms Alexy Dury	Deaf Studies Trust, University of Bristol, England
Mr Gunnar Hellstrom	Omnitor AB, Sweden
Mr Norman Williams	Telecommunications Access Program, Department of Communication Arts, Gallaudet University, Washington DC 20002- 3695

Internet dissemination of information

Information was placed on the following Websites:

- Disability Victoria at http://www.disabilityinfo.org.au
- Vicdeaf at http://www.vicdeaf.com.au/whatsnews/deafonline2/DeafAustralia Online2.htm
- CIRCIT at RMIT at http://www.circit.rmit.edu.au/projects/deaf_ao2.html

Once DAO II is completed, information will be placed on the Websites of the following organisations as well as the organisations listed above:

- Australian Association of the Deaf
- Australian Communication Exchange Ltd
- Centre of Excellence for Students who are Deaf and Hard of Hearing

Glossary

Australian Communication Exchange Ltd (ACE) provided much of the information on technical terms for this guide. The guide is divided into the following sections:

Section One: Terms relating to deafness and the Deaf Community

Section Two: Internet and other online services

Section Three: Videoconferencing

Section Four: Generic ACE terminology

Section Five: Company and department names

Section One: Terms relating to deafness and the Deaf community

Jargon	Meaning/Explanation
Deaf	A person who has a hearing loss, identifies with the Deaf community and is fluent in Auslan. Can have any degree of hearing loss from mild to profound.
Oral deaf	A person born with a hearing loss but who does not identify with the Deaf community nor is fluent in Auslan. Will use speech and lip-reading to communicate.
deaf	A term used to describe all people with a hearing loss. Can also refer to oral deaf and hard of hearing in some contexts
hard of hearing	A person who uses speech and lip-reading to communicate and may identify with other hard of hearing people, but not with the Deaf Community. Often, hearing has been lost at a later age due to noise, accident or the aging process, etc.
hearing impaired	A medical/educational term used to describe all people with a hearing loss. This term is not accepted by the World Federation of the Deaf.
Deaf Community	A community of Deaf people who share common life experiences, cultural beliefs and language mode, commonly a sign language.
Sign Language	A non verbal form of communication used by Deaf people throughout the world consisting of hand signs, fingerspelling (letters of the alphabet shown on the hands) and other grammatical features such as role shifts and classifiers. It does not follow the grammar of a spoken language and there is no written form of this language. Sign languages are recognised as true and complete languages in many countries of the world.
Auslan	Australian Sign Language as used by Deaf people in Australia
Interpreter	A person who is fluent in Auslan and spoken language and who interprets a spoken language to a sign language and vice versa.

Section Two: Internet and other online services

Jargon	Meaning/Explanation
Address	A code that identifies you so that others can send you electronic mail.
E-mail	Electronic mail. Messages sent over the Internet to a particular individual's address.
Home page	A Web site's 'front door', the first page. This is the page that the user arrives at when the Web site's address is opened.
Hotmail	An Internet free e-mail system
Internet	A network of computer Web servers around the world. Often referred to as The Net or the Information Superhighway.
Internet Relay Chat/ IRC/Deaf chat	IRC is like e-mail, but allows someone at a PC to type messages that instantly appear on another's screen and thereby facilitating two-way communication. **Deafchat** is an internet based chat system established for Deaf people around the world to type messages to each other over their own PC.
IVR	Interactive Voice Response – An recorded voice, under computer control, which instructs in the various steps necessary to undertake a transaction, such as paying a bill, using only the keypad of a telephone.
Screen phone (text)	In addition to all the usual functions of a standard telephone handset, this also features (1) small screen that displays text in dot-matrix form (similar to that of a hand-held calculator or electronic game), and (2) possibly also a smart-card reader and/or a small dot-matrix printer.
Server	A computer which provides a service to other computers on a network.
URL	Uniform Resource Locator – a way of naming network resources, originally for linking pages together in the World Wide Web. If someone wants the URL of your Web site they want to know its 'address'. (pronounced U-R-L). For example the URL of the Australian Association of the Deaf is http://www.aad.org.au
Web site	A collection of Web pages for a person/organisation.
WWW	World Wide Web – a system that allows you to browse through information using a browser. Now the preferred method of presenting and accessing information on the Internet.

Section Three: Videoconferencing terminology

Jargon	Meaning/Explanation
ACTS	**A**dvanced **C**ommunications **T**echnologies and **S**ervices – a European project funded by the European Union Commission.
Algorithm	A step-by-step problem-solving procedure in compressing video transmission over a communications network. Algorithms have sets of numbers and letters to represent standards of video compression. Those most commonly used are H320 and H324.
H320	A widely used video compression standard that allows a variety of videoconferencing systems to communicate.
H324	Another video compression standard.

Jargon	Meaning/Explanation
Analogue	Analogue signals are of varying frequency or amplitude – analogous to the fluctuations of the human voice.
Bandwidth	The amount of information that can be transmitted down the line (or a tube), ie. the higher the bandwidth, the better the picture quality for videoconferencing.
Broadband	A high-capacity communications path. (It usually implies a speed greater than 1.544 Mbps – see below for definition of Mbps.)
Narrowband	A low-capacity communications path. (It usually implies a speed of 56 kbps or less – see below for definition of kbps.)
Wideband	A medium-capacity communications path. (It usually implies a speed from 64 kbps to 1.544 Mbps.)
bps	Bits per second – amount of information that can be passed down the line.
kbps	kilo bits per second – amount of information in 'thousands' bits per second that can be passed down the line.
Mbps	million bits per second – amount of information in 'millions' bits per second that can be passed down the line.
Digital	A type of signal involving a sequence of discrete states or symbols from a finite set – most commonly this means binary data represented using electronic or electromagnetic signals.
Frame Rate	Frequency in which video frames are displayed on a monitor, typically described in frames per second (see below).
FPS	Frames per second – frequency in which video frames are displayed on a monitor.
ISDN	Integrated Services Digital Network – a set of communications standards allowing a single wire or optical fibre to carry voice, digital network services and video in an all-digital manner across interconnected PSTNs.
ITU	International Telecommunications Union, an international organisation within which governments and the private sector coordinate global telecom networks and services
PSTN	Public Switched Telephone Network – the collection of interconnected systems operated by the various telephone companies for the switching of telephone calls.
Videoconferencing	Two-way video and audio communication that allows two or more people at different locations to see and hear each other at the same time.
Videoconferencing (Desktop)	Videoconferencing on a personal computer – the most common form of videoconferencing system.
Videotelephone (videotelephony)	Desktop videoconferencing primarily based on telephonic communication.
Video Interpreting	A generic term referring to the delivery of sign language interpreting for any purpose through the use of video telephony.
VRI, Video Relay Interpreting	Video Relay Interpreting – a specific application of video interpreting referring to the use of video telephone specifically for the purpose of telecommunications relay services.

Jargon	Meaning/Explanation
Video Relay Interpreter	A Relay Officer who acts as a sign language interpreter via video telephony
Remote Interpreting	A specific application of video interpreting referring to the use of video telephony specifically for the purpose of interpreting between two persons who can see each other, ie. hearing and Deaf persons are together in one room and the video relay interpreter via video will see both persons.
Northern Telecom	USA company, specialising in communication and digital networks, provides desktop videoconferencing.
PictureTel	A major manufacturer of videophones and videoconferencing systems.
Tandberg	A major manufacturer of videophones and videoconferencing systems.

Section Four: Generic ACE Terminology

Jargon	Meaning/Explanation
ASCII	An international standard used to transfer data between computers and modems.
Baud	The unit of measurement of data transfer speed. For example a TTY communicates at 50 baud, whilst computers typically communicate at speeds between 1200 baud and 28,800 baud.
Baudot	The standard used by TTYs to communicate.
NRS	National Relay Service – the telephone relay service also known as ACE•NRS, for Deaf, hearing impaired and speech impaired people.
RO	Relay Officer – an employee of ACE who works in the National Relay Service and who relays, or interprets, telephone calls between a text caller and a hearing caller.
Telstra Disability Equipment Program	Telstra administers the program that provides TTYs, modems, and other equipment to Deaf, hearing impaired and speech impaired people and those with a disability, to assist them in using the telephone network.
TTY	Teletypewriter – consists of a keyboard, a visual display and a modem. By dialling the required number, another TTY can be contacted, and by typing on the keyboard and reading the visual display, communication can take place via the normal PSTN.
VCO	Voice Carry Over – the capacity for hearing impaired people to use spoken voice rather than typing to communicate through the ACE•NRS, and to receive responses in typed form.

Section Five: Company/ Dept names

Jargon	Meaning/Explanation
AAD	Australian Association of the Deaf **–** a national consumer organisation advocating for the rights of Deaf people.
ACE	Australian Communication Exchange Ltd – a consumer-led, not-for-profit, national community-based organisation which administers the National Relay Service (NRS).
Australian Communications Authority (ACA)	The result of the amalgamation in July 1997 of Austel and Spectrum Management Agency. ACA is Australia's telecommunications regulatory body – sets the standards for telecommunications carriers such as Telstra, Optus & Vodafone.
DCITA	The Commonwealth Department of Communication, Information Technology and the Arts
HREOC	The Human Rights and Equal Opportunity Commission
TAFE	Technical and Further Education – Training institutes in Australia providing vocational education and training.
TASC	Telecommunications Access Sub-committee **–** a group originally set up under the Australian Deafness Council, later under AAD. It has successfully lobbied for the provision of TTYs, the establishment of the NRS and for telephone access for Deaf people.

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