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ABSTRACT

This paper describes types of interactive communications technologies relevant to education and discusses their current and potential uses in rural Australia. "Teleconferencing" is a generic term for interactive electronic communications. The four main types of teleconferencing--audio, audiographic, video, and computer (text) teleconferencing--share the following common elements: (1) use of terminal equipment and space-terrestrial communications; (2) linkage of individuals or groups at multiple locations; (3) full interactive communications among all participants; and (4) immediate and dynamic qualities, involving active user participation. Teleconferencing can be applied to education and training ("teletraining"), administration and organization, services, research, and social and entertainment activities. Fifteen examples are offered of uses of teleconferencing in schools and universities in Australia and North America. In the Queensland Open Learning Project, the state government aims to increase access to tertiary education through a cooperative decentralized system of delivery using telecommunications. Major elements of the project include 41 open learning centers, 20 of which will be in rural communities with no previous tertiary education "presence"; a remote area teacher education program; a preparatory and remedial education project to assist people who need a second chance to prepare for postsecondary education; a comprehensive national database on course information; courses for farmers; visual arts education; and postsecondary access for special needs students. The telecottage approach to community development is also discussed. (SV)

COMMUNICATIONS TECHNOLOGY

Roy Lundin

The aim of it all

There are those who believe that the microcomputer is the greatest technological revolution of our age, and that it is having the greatest impact on human behaviour since the development of 'The Pill'. It is my opinion, however, that the microcomputer is only the 'camira' - an aboriginal term for the gust of wind that precedes the storm. The real storm is just on the horizon and it is the whole realm of communication and the associated technology.

It is necessary, therefore, that educators take time to evaluate what is happening. We need to avoid burn out from trying to cope with future shock. There is a temptation for some people to increase their frenzied activity to keep up with the information explosion. Anxiety and stress, once mechanisms for survival, are now becoming killers. Survival now may well be dependent upon our conscious decision to stop and stare, to notice the flowers, to take in the sunset, to take time to visit and communicate and make and keep friends. There must remain a place in the curriculum for music, poetry, literature, art and gardening as well as science and maths. We should pay attention to developing and preserving positive attitudes towards the adventure and enjoyment of the journey of discovery called life. Can we be effective in the development of human compassion for our fellow human beings - especially those who are physically and intellectually challenged.

Technology is the tool; the quality of education and life is the goal. 'We can now choose what we want from technology and not be dominated by it' (Prince Charles).

Communication and information technology in education

The technologies

The array of communication and information technologies is enormous and increasing. Trends indicate both diversity and convergence. Single-function units like printers or facsimiles are becoming smarter and multi-functional. On the other hand, many functions are converging through digital systems based mainly on the microcomputer.

It is not the intention here to give an exhaustive catalogue of these technologies. Rather, it may be useful to talk about types of functions and applications. There are four basic categories - at present - describing the types of interactive technologies that are very relevant to education and to the scope of this paper.

"Teleconferencing" is a generic term for interactive, electronic communications. As a management and training tool it has been around since the 1960s, with some examples overseas dating back to 1935. Large companies and organisations in particular, such as INCITEC, Lend Lease, IBM, Telecom, AAP Reuters, AMP and many others have realised that the efficiency of teleconferencing can increase productivity and profit which, in turn, give them a competitive edge. On the other hand, the main users of teleconferencing in Australia during the past 10 years have been educational institutions using it for distance learning programs.

A Variety of Systems

There are four main types of teleconferencing: audio, audiographic, video, and computer.

Although these differ in terms of the specific technologies employed, they share some common elements:

- They use terminal equipment and space/terrestial telecommunications channels;
- They link individuals and/or groups at multiple locations;
- They permit full interactive communications among all participants;
- They are immediate and dynamic, involving active participation of users.

Each of these types has particular strengths and limitations, and these need to be carefully considered when choices are made regarding the type which will meet particular needs.

Audio Teleconferencing Using the telephone service, this is the most accessible, flexible and economic form of teleconferencing. Individuals can use an ordinary handset, but where groups of people are involved there needs to be loudspeaking telephones or conference terminals.

Multi-point links are made possible by an electronic "bridge". Until 1989 the limit within Telecom's service had been 10 points linked simultaneously. This year Telecom has introduced its new Conferlink service comprising several 60-point bridges so that it is possible to link as many telephone points as are manageable. The new service has a number of special features including "meet-me", where participants simply all ring the same number to be connected, and "pass code" to ensure security when required.

Audio-graphic Teleconferencing. Again, using the telephone system it is possible to enhance audio teleconferencing by combining it with some form of graphics communication such as facsimile, digital scanner, telewriter slow scan (freeze frame) television, computer generated text and graphics, electronic blackboard, etc. Microcomputer-based systems such as Olivetti's Optel system and Apple's Macintosh-based system, for example, combine many of these functions into a communications or learning station.

Video Teleconferencing. The most common form of video conferencing is one-way video transmission with two-way audio (using telephones), like "talk-back television". This may use satellite or terrestial carriers or a combination of both.

Two-way and multi-point interactive video are also possible, but are relatively more expensive and complicated, requiring considerable pre-planning and specialised studio equipment.

New digital technology called "codecs" (coder-decoder) permit video signals to be compressed, thereby reducing the bandwidth needed for transmission - in some cases down to the equivalent of two telephone lines. Indeed there are codecs which now come in the form of boards for the micro-computer, thus enabling all forms of audio, audiographic and video teleconferencing to be conducted as "desk-top teleconferencing".

Major public providers of video conferencing include Telecom, OTC and AAP Reuters; Lend Lease has a private system.

Computer Conferencing. Specialised software can extend the notion of electronic mail and bulletin boards. as in Telecom's Keylink and OTC's Dialcom, to asynchronous text conferencing through a computer-based system. This type of service does not exist to any .extent in Australia but will be introduced in the near future. Overseas this has been a popular communication channel for academics, but business people have found it rather time-consuming.

Choices regarding the type of teleconferencing to use will depend on needs and objectives. Generally speaking, about 90 per cent of meetings and training programs can be conducted very adequately using audio and audiographic system.

Cost may be another factor in the decision. For example, recent publicity indicates that point-to-point video conferencing within Australia costs $250 or $700 per hour. Overseas links can run to $5000 or more per hour. Users are also limited in terms of numbers (about 6 to 10 people per site) and by the need to go to a specialised studio. Advanced booking of studios and transmission bearers is also required.

Audio and audiographic conferencing through Telecom's Conferlink, on the other hand, is readily available wherever a telephone point exists, and costs are much less. For example, one hour audio teleconference with two points in Australia would cost about $40, and for ten it would cost about $400. Overseas links can be included at operator-assisted rates. Furthermore, there may be a group of people at each site, increasing participation significantly.

Applications

There are five major areas to which teleconferencing can be applied:

- Education and training ("teletraining")
- Administration/organisation
- Services
- Research
- Social/entertainment activities

In North America. 80 per cent of the use of teleconferencing is for education/training, in business as well as in education itself. A major user in the USA, for example, is AT&T which has reported that during one year its total cost avoidance was $1.8 million for 3176 staff-students through using teletraining instead of face-to-face instruction.

Music, adult literacy, languages, sales techniques, management skills and literally all subject areas have been effectively taught using various forms of teleconferencing. Evaluations consistently confirm this effectiveness. efficiency, cost-effectiveness and positive student response to this form of training.

Administration/organisation applications including meetings, interviews, briefings, industrial negotiations, trouble-shooting, consultations, new product information, routine work. project planning and implementation, negotiating with suppliers, reporting, and so on. In many cases, companies have recouped the cost of their own in-house system within a year through cost substitution for travel and time/productivty loss. J.C. Penny, a $14 billion company in the USA, has installed its own video condensing network with 1500 sites. Meetings which used to cost $50,000 now cost $12,000.

There are a few occasions when face-to-face or live video interaction may be required, but most of the activities listed above can be very effectively carried out through audio teleconferencing. Users report that meetings.s are usually more to the point and productive. Furthermore, the audio

option permits key individuals or resource people to be brought in at short notice.

Services applications include health services ("telemedicine"), social services, emergency services and other forms of community welfare and support. One of Telecom's earliest demonstrations of audio teleconferencing, for example, was with home-bound people in the Melbourne area being linked regularly for "tele-visits" .

Research has also benefitted significantly from the use of teleconferencing. Scholars nationally and internationally now regularly use multi-point links to work on joint projects and publications.

Finally, there are many social applications. Families which are separated or scattered around the world are discovering the power of teleconferencing to share special occasions such as - Christmas, birthdays and weddings.. Various other common interest groups, including school children are involved with electronic pen pals and playing various simulation games. Sporting groups use teleconferencing to organise tournaments.

Teleconferencing Techniques. In many respects the skills and rules that apply to face-to-face learning activities and meetings also apply to teletraining and tele-meetings. There are, however, various techniques specific to teleconferencing which need to be employed to ensure success with teleconferencing.

Some of these techniques concern the operations of the technology, others involve ways to personalise and humanise the process. The single most important aspect of teleconferencing is for the instructor or chairperson to ensure there is participation and interaction. This is what gives teleconferencing its power compared to other forms of distance communication.

The problems experienced in teleconferencing relate directly to human problems rather than technical ones. There is the need for training in teleconferencing techniques and this has been provided through workshops from the Brisbane College of Advanced Education since 1983. The College has now joined with Telecom to provide training throughout Australia and overseas.

Some examples

There are literally hundreds of examples of how communications and information technologies are being applied to improve education. A few of these are summarised here:

Audio teleconferencing

South Australian schools are all equipped with loudspeaker te' phones which are used for everything from teaching flute-making and flute-playing in primary schools to a school project by gifted and talented children to convert the school dam into a yabbie farm.

The Indonesian language project in North West Tasmania has used audio teleconferencing to teach Year 8 students in several high schools Indonesian by one teacher in a fixed place. One valuable outcome was that supervising teachers at the sites learned the language as well.

In a Queensland high school in North Mackay a teacher-librarian arranged an audio teleconference for students with the author Roald Dahl to discuss his books.

Audiographic Teleconferencing

The Teleclass Project in Hawaii has for the past three years been linking high school students between Japan and Hawaii - as well as other countries on occasion mainly for language studies

using a videotelephone.

The *Telematics* project in Victoria has over 100 schools equipped with loudspeaker telephones, Macintosh microcomputers and facsimile machines so that students can be provided with a full range of subject options. A special device permits the teaching of music keyboard skills on the telephone line.

The Queensland *Telelearning* project links schools by loudspeaker telephones, Macintoshes and facsimiles for German and Japanese language teaching.

In New South Wales, nine *Technology High Schools* are linked by the Olivetti's Optel system for their 'Staying On' (to senior high school) project.

Video Teleconferencing

German by satellite is a project emanating from Oklahoma State University in Stillwater, Oklahoma Dr. Harry Wohlert teaches German to over 2000 high school students using two hours per week of live, talk-back television and three hours per week of computer-based work. He has one marker assisting him. His students are performing better on the average than those taking face-to-face classes.

ACCESS Alberta, A satellite educational television system in Canada. provides a two-hour. live, phone-in homework service for students in prime-time early evening. In collaboration with the teachers' union, 'master teachers' in the four core subjects were selected to provide this extremely popular service.

TI-IN is a Texas-based private company providing high school subjects and professional development programs for teachers to school districts in 23 states. This is a subscription-driven system which uses the best teaching talent that can be found to give live, talk-back television services.

Computer (text) Conferencing

Simon Fraser University in Vancouver, Canada, has supported school use of their electronic mail and computer conferencing system. Gifted and talented children have used it and audio teleconferencing to communicate with children in Israel. The project has grown to where the group from Vancouver will now travel to Israel in 1988 for a visit.

A group of reluctant learners have used the same system for electronic pen pals in other countries, including Australia. Their motivation and writing skills have developed enormously.

McGraw-Hill in Minneapolis, USA provides a computer-based McGraw-Hill Information Exchange (MIX) service within which there is a Students' Information Exchange (STIX) containing a wide range of computer conferences including one called 'Students vs the Flat Earth Society'.

In March 1988, a special conference involving students from about 10 countries, including a group from Brisbane, was held on 'social studies' topics as a demonstration for the Technology in Education conference in Edinburgh.

The *Classroom of the World* project involves the twinning of primary (elementary) school Hawaiian children in Hana on Maui, with Hopi Indian children on a reserve in Arizona using computer-text conferencing.

The Queensland Open Learning Project

Progress to date

The State Government's $4 million pilot project is aimed at increasing access to tertiary education (TAFE and University) through a cooperative, decentralised system of delivery using communication technologies. The major elements of the project, and progress to date, are as follows:

Open Learning Centre Network (Allocation: $1 million)

As of May 1990, 25 Open Learning Centres have been established and a total of 41 are expected to be set up by late 1990. Of these, 20 will be in rural. communities which had no previous tertiary,education 'presence'.

Each Centre will have a Coordinator and a range of communication equipment, including microcomputers for electronic mail, audio teleconference terminals and facsimiles.

A full time manager has been employed for the Network.

Community involvement is extensive, including a local committee in each case.

Tourism, Hospitality and Hotel Management Courseware (Allocation: $1 million)

Course teams across seven institutions (including TAFE) have begun production of about 20 semester units of study, including for example two units of Japanese language and one on Asian Culture. Cooperation from the hotel industry is very encouraging.

Remote Area Teacher Education Program (RATEP) (Allocation: $630,000)

This project will upgrade community teachers through the four Open Learning Centres being set up in the far north - Badu, Yorke, Aurukun, and Hopevale specifically for this project. Cooperation is particularly evident between James Cook University, Cairns TAFE College, Queensland University of Technology, Peninsula Regional Office of the Department of Education (contribution over $120.000 to date) and the Federal Department of Employment, Education and Training (contribution: $100,000 to date).

Innovative courseware is being developed on the Macintosh microcomputers using Authorware for multi-media interaction. Delivery will commence in July 1990.

Preparatory and Remedial Education Project (PREP) (Allocation: $500,000)

Course teams from across all universities and TAFE have begun production of bridging and preparatory units of study in maths, communication, biology, chemistry and physics. These courses will assist people who need a second or third chance to undertake further post secondary education. Special Macintosh-based Computer Assisted and Computer Managed Learning programs are being developed.

Course Information Project (Allocation: $150,000)

Consultants have been engaged to produce, by August, a plan for a comprehensive Queensland-based course information database. This is a cooperative project between DEVETIR, the Schools sector of the Department of Education and the Federal Department of Employment,

Education and Training. Indications are that this project will put Queensland on the forefront of the national moves to produce a comprehensive national data-base on all courses (award and non-award), workshops, conferences, private training programs, etc. as well as employment information.

Contact has also been made with the British Open University to ensure the Queensland/Australian System will be compatible with the one being set up for the International Commonwealth of Learning.

Efficient Use of Farm Equipment by Rural Operators (Allocation: $53,000) has collaboration with industry in the production of Courseware for supervisors of machinery used in agricultural enterprises.

Visual Arts Education (Allocation; $150,000) has produced through the Australian Flying Arts School a satellite video series of four programs on Ceramics ~ with eight more programs and videotapes to be produced.

Access to Post-Secondary Education for Students with Special needs in Queensland (Allocation: $95,000) is producing, in the first stage training packages for distance teaching staff to facilitate distance learning for those tertiary students with hearing impairment, visual impairment, physical disability and learning disabilities.

Prospects

Committee on Open Learning

It is envisaged that the Committee on Open Learning will be representative of all education and training in Queensland: the schools sector, TAFE, Universities, government departments and private industry training. The Committee will be expected to develop a detailed plan for implementation of the State-wide plan on a broader scale.

Funding of future developments will not be dependent solely on grants from the State Department of Education but rather come from a range of sources, including

- other State Government Departments;
- providers of education and training;
- industry investment; and
- Federal Government sources.

The committee will need to make the appropriate approaches by early 1991.

Queensland Open Learning Consortium

The formalisation of the present inter-institutional arrangement into a Consortium and limited company is expected within a year. Major providers of education and training will be the share-holders.

Through the marketing of services and products in Queensland, nationally and overseas, this enterprise will be expected to become largely self-funding by the end of the second phase (1994) when a substantial infrastructure is in place. Some on-going government support will, of course, still be needed.

This Consortium and the project generally, should be able to work closely with the Queensland Tertiary Education Foundation (QTEF).

Prospective Users of the OLCN

Although the three Distance Education Centres (UCCQ UCSQ and QDEC) and other tertiary institutions may be considered the major users of the Open Learning Centre Network, there is an increasing number of groups and government departments expressing interest even before any marketing has been undertaken. Consultation and some preliminary trials for meetings and training are being carried out at present with:

- Queensland Police Department (and the newly established Police Education Advisory Council);
- Queensland Corrective Services Commission;
- Institute of Chartered Accountants;
- Post-Graduate Medical Education Committee;
- Metal Traders Industry Association (MTIA); and
- National Resource Centre for Nurse Inservice.

This Queensland initiative has also been used to support the State's submission for the establishment of an Asian-Pacific Open Learning Agency as part of the Multi function polis.

Socio-economic issues

Remoteness

A key issue is the tension between need and economic viability. Following is a brief illustration for the Torres Strait Islands.

Telecottage

Abstract

The economic, technical, social and cultural development of sparsely populated areas is a long-standing concern of industrialised and developing countries alike. The telecottage approach to community development, based on information technology, began in Vemdalen, Sweden with the opening of Harjedalens Telestuga on 13 September 1985. It was developed through local initiative to train the public at large to operate and use information technology with no prerequisites as barriers to admission, to provide service and assistance to business, and to stimulate entrepreneurial activity in *that* sparsely populated, mountainous area. Telecottages represent a community-based, decentralized approach to development. They are pragmatic and empirical in origin but an analysis of their operating guidelines and procedures shows that they are grounded in tested precepts of education and community development. The core concepts of the telecottages will be discussed in the light of emerging principles of development in the information age.

Introduction

The telecottage approach to community development began as a pragmatic empirical attempt

to solve a practical problem. The first telecottage was Harjedalens Telestuga established in a mountainous area in the north of Sweden where the population density is less than one person per square kilometre. For many years the area lost population because young people were attracted by job opportunities in the large cities to the south Stockholm, Gothenburg, and Malmo. The government at all levels sought in vain to stem the flow by encouraging local development. In April 1985 the University College of Ostersund, the county government and the Nordic Council of ministers held a seminar to examine the problem and seek solutions. One proposal resulting from the seminar called for the development of a telecottage with the following alms:

To provide opportunities for people in the area to use modern technical equipment, thus reducing their fear of the computer and their resistance to it

- To educate and train the public at large in the use of computers, thus making them independent of distance to cultural centres and facilitating their access to the benefits of the information age;
- To foster local participatory democracy; and
- To foster international cooperation.

From its inception the project required cooperation of many individuals and groups - state and local government, Swedish telecommunications industry, business large and small, the university, private citizens from all walks of life. And it attracted considerable attraction from other countries of Scandinavia and beyond.

The telecottage is an unqualified success. It has become what it was envisioned, an electronic town hall. It is open to the public and very much used fourteen hours a day - from eight o'clock in the morning until ten at night. Economically, it receives financial support to cover start-up costs and initial operations, but it quickly attracted sufficient contracts for services to become self-supporting. It is meeting its objectives of stimulating the use of computers in everyday life, supporting and encouraging small-scale businesses, demonstrating the uses of modern information technology, of enriching the cultural and social life of the community.

There have been many cooperative community projects in developing and industrialized countries, in urban, suburban and rural neighborhoods. They have met with varying degrees of success. What accounts for the success of the telecottage? One factor seems to be the timing of its introduction, another the widespread and deep involvement of the potential users and beneficiaries in all phases of its planning, establishment and management . Of paramount importance seems to be its conceptual base and related practices. A study of the first telecottage, Harjedalens Telestuga, its operating principles and practices, its conceptual framework shows that they are based on well-known principles of education and training and that they are in accord with the characteristics and requirements of the information age that thus far have been identified.

Source: *Conceptual Framework of the Telecottage Approach to Community Development*
Inez L. Sperr Brisfjord
Palmer School of Library and Information Science Long Island University Brookville,
NY 11548 USA

Six jobs created at the Vemdalen telecottage

In the premises located above one of the two shops in the village there are 19 computers, one telecopier and a telex machine. The director, Karin, takes care of the management and the drafting of information and publicity texts which will appear on the television screens of the subscribers.

Bjorn, Jane and Kristina, who are natives of the village, teach students of all ages how to use the sophisticated equipment, which is somewhat incongruous in this context: the windows look out on a small wooden church, the forest hugs the houses, and the traffic problem at the entrance to the village is due not to cars but to troops of reindeer.

The first training course for unemployed people has just ended. Thirteen people - including 11 women - sent by the district labour office have attended classes five days a week and eight hours a day for a month: how to use a word processor, a data bank; how to control stock, do book-keeping, organise a time study or prepare a programme. In an enormous room adjoining the computer hall meals are heated, coffee is made and there is chatter and relaxation. In the next few days there will be visits to local firms to assess in what areas the rudiments acquired should he studied in greater depth. One trainee decided to write to industries on the northern coast of Sweden suggesting that they create remote control "telejobs". The idea, which was perhaps too novel, did not initially catch on in the private sector. In contrast, a large administration has decided to give the telecottage text transcription work.

One of the trainees who faced with the closure of the family business, took a part-time job on a local paper, will be able to improve his prospects thanks to the computer training at the telecottage. And the others? What did this course do for them? No doubt a thorough debunking of the computer as a magic box. And then? Two trainees from the next village, aged 20 and 53, dressed alike in jackets and jeans, both attended the classes with interest. The younger did odd jobs, but even these are difficult to find. She said she definitely did not want to leave "her" valley. The other sold her business and has to face a difficult,financial situation; the idea of going to work in the town frightens her. The telecottage gave them back a taste for.study and success. They know now that they can learn, that there are courses in the university 60km away" they must get together to .share a car ... but Karin has suggested that the courses should be transmitted.to the telecottage on video. so perhaps they can follow them at Vemdalen?
Esther Peter-Davis

Summary

Technology can:

- engage learners with people with powerful ideas;
- develop in learners an awareness and appreciation of the whole world through global literacy;
- engage learners with rich arts and cultures - and thereby inspire people to create and share;
- engage learners in cooperative activities with each other, leading to understanding, bonding, multiculturalism, new language/communication skills. and so on:
- give learners access to the best information available for decision-making;
- increase participation and interaction in the process of education to help learners develop ideas and test them against ideas of others;
- encourage learners to formulate personal and group commitments to the future; and
- inspire the leadership and self-reliance so that learners will take the necessary initiatives for on-going education.