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Developing Computer Communications for Professional Collaboration

Bernard Holkner

Dip.T., B.A., M.Ed.St.

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Abstract

This research tells many stories about the ways in which several educators made use of computer communications systems in their professional work. It is as much the report of a series of telecommunications initiatives either instigated or supported by the author but ultimately for the benefit of the teacher participants, their colleagues and students.

Fifteen teachers from school and tertiary education settings were selected to be a part of this work. It was understood that the work would involve experimenting with and developing educational telecommunications initiatives. Generally speaking, each initiative was to explore the potential and problems of using various techniques and systems to improve the professional practice of education colleagues. The author was known to the initial group, and generally recognised as an active supporter of educational uses of computers and of communications systems in particular.

Three b es of literature were considered relevant to this work. These were: issues of implementing technology; concerns about communication using computers; and, significant prior research into professional development using telecommunications. The literature was found to be useful in all of the planning, implementation, and evaluation phases of the research. Much of the literature was communicated to the participants in various forms to assist with their reflection and articulation of the research. It was also of considerable benefit to the researcher in helping to develop understandings and values of the work.

This work is the author's narrative rather than an action research process. While it hinged completely upon the work, reflection, refinement, and writings of the teacher participants, the rigour of formal meetings was discarded in favour of a dynamic and conversational relationship.

Seven specific initiatives are reported in this document. Each of these suffered the scrutiny of public gaze since the entire work was largely visible to the education community online. Two of these projects were large, involving hundreds of educators and offering educational services for several years. The first of these, the *City Limits* project was located with a network of computer bulletin boards constructed by the author and supported by most teacher participants. The second, the Mag-Net project was a parallel initiative. Mag-Net was a network of educators which included some from the research group. Parts of the Mag-Net project that involved the author have been included. Other projects in this research ranged in scope and duration although all were technically speaking "ground breaking" in educational circles. These included television broadcasting, database integration, a version of virtual reality, and several discussion systems.

It is not possible to generate absolute conclusions from this research since much of its interest resides in the telling of stories. Nevertheless, these stories attempt to pursue some consistent themes that were part of the initial agreement. We were interested in exploring the technologies themselves; their potentials, implementation requirements and maintenance needs. We were also interested in the ways in which the humans changed and were changed by these initiatives. The work has given us some valuable outcomes including:

- documented experience of all aspects of the technology, including the reflections of the group, and reference to the relevant literature;
- useful understandings of the relationships and concerns that arise with computer communications;
- working versions of complex and new educational technology applications; and,
- recommendations to assist with the implementation, support, and evaluation of communication technologies in educational settings.

This thesis comprises a methodological discussion, a broad ranging review of the literature, and a series of stories which the researcher retells from his own experiences and those of the teacher participants.

Declaration

This thesis contains no material which has been accepted for the award of any other degree or diploma in any university and, to the best of the candidate's knowledge and belief, the thesis contains no material previously published or written by another person except where due reference is made in the text of the thesis.

This project (E7.55/95) was approved by Monash University's Standing Committee on Ethics in Research on Humans on 16 August 1995

Signed

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It seems like there is a sea of helpful faces that made this work possible and enjoyable. My involvement with teachers in the state of Victoria in the course of this work has shown there to be a splendid collection of individuals and groups who encouraged, criticised, supported, and investigated to selflessly improve the level of professionalism and the quality of teaching.

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1 Introduction

1.1 Background to this study

1.1.1 Overview

This study attempted to bring together a number of educators and a highly resourced range of communication technologies in order to explore the potential and direct and indirect outcomes that might be realised. There was an opportunity in this study to capitalise upon the sudden and rapid development of communication systems that were appearing in commercial, industrial, hobby, and education sectors by creating small communities that could work within, explore, discuss, and adapt these technologies. This study was conducted with a view of improving opportunities for teacher professional development through the application of communication technologies, and improving the skills and understandings of a group of educators who might then be able to further model and initiate good practice for their colleagues.

The author, having been active in educational computing since the early 1980s, saw a role for himself in identifying communication systems supporting the research participants in a variety of ways, and in modifying or developing new technical solutions as a result of the group's work.

1.1.2 Technology, the researcher, and the education community: The need for a study of this kind.

At the core of this study is the researcher's struggle with the difficult notion of "technical skill". The author perceives that he is regarded variously by his peers as a technical expert and technical facilitator, but at least as having a high order of skill with computer hardware and software used in educational settings. People with this background find useful employment in assisting educators with computing problems, but in this study those skills are directed to educational research activities using telecommunications and multimedia techniques and are instigated or even directed by technology opportunities. The study allows technology to be pursued and explored for educational benefit. One can argue that without the technology that enables computer communication, no such projects would exist, so at least they must be to a certain extent technology-driven. This research introduces technologies to educators in a way that requires their involvement in the development and refining of the technology itself. The literature reveals many successful attempts to employ communications technology in learning activities, all of which provide enabling technology in a completed and some would say "stable" form. At the very outset, this research differs in that all of the projects undertaken were in some sense breaking new ground in their use of technology, and involved the teacher participants in a co-development of the technology itself with the assistance of the researcher and certain others who were called in to from time to time.

This research responds to the questions:

- what potentials can educators make of communications technologies;
- how are these people changed by their uses of these technologies; and,

- what social concerns are raised directly and indirectly by these people?

These matters are framed within an environment where the participants worked as instigators, proponents, and critics of the work, and where the researcher fulfilled and analysed his various roles as facilitator, technician, and advocate.

1.1.3 Process

The study itself documents work which began in 1988 although the formal commencement of the research began in July 1994. Parts of the author's work, which informed the major components of the research began with a series of experiments and small projects based in Victorian schools from 1988 to 1994. This early work, conducted while the researcher worked as a teacher and computer education consultant is fully explored in chapter 6. The research group, comprising teachers, trainers, and education consultants, was brought together in 1995, and it is the work of this group which informs the major parts of the research activity from that time. A complete discussion of the research method is provided in chapter 5.3. It is important to note at this stage that the intention of this work has always been to place the research group at the locus of directing the project's outcomes, and it will be seen that the extent and kinds of developments which have since taken place came under the influence of the whole group, sub-groups, and individuals, and for the benefit of individuals and the group as well as others outside the project.

1.2 Communication

The process of communication is central to this work. When the project was conceived, it was as a result of the author's excitement in viewing the educational possibilities for teachers and students afforded by networking

computers by any means. Networked computers meant that the author could work on the university mainframe from a remote country school in 1984, and could set up a useful messaging system for a busy colleague at the school in the next township in 1985. While the scope of some of the technical undertakings in this research extended well beyond messaging and remote computing, the concerns of leaving digital (i.e. electronic) messages and manipulating documents from a distance remain at the core of the activities. Interest in communication with technology is not new. Research into mass communication began in 1930s when concerns about the possible harmful effects of radio, and of film on children were explored. (Williams, Rice et al., 1988:17) Pioneering work in the 1930s by Lazarsfeld (1971) remains valuable from the point of view of attitudes and media, and interest in the possibilities of interactive new media appears in the work of Wiener in the guise of early cybernetic theory (Wiener, 1948:48) and these serve as useful references that confirm that concerns about the applications of technology in human communications are not new. The expression "Computer mediated communication" (CMC) describes human communication via computer. Humans can use computers in their communications as a method of transferring messages and as a method of storing messages, although it is important to include a wide range of media artefacts in the understanding of "message" so that documents, graphics, and sounds become an expected part of the transactions.

Traditionally most discussion and research about CMC refers to text messaging, and this is the first departure for the author's research; while the author's project began at a time when CMC transactions were limited to text, the emerging fields

of digital graphics and sound suggested that communications enhanced with digital artefacts was a logical outcome of technological development in this area. The second departure begins with an appreciation of computer technology; that the author argues would elevate the roles of the machines in their relationships with humans. Computer-mediated communication might not be an adequate description of the kinds of things that occur with the convergence of communications and computing technologies: this recognises the abilities of computers to perform tasks beyond simple instructions; and, the enhanced "multi-layer" communications that can take place between humans when computers act on behalf of humans. An example of this is the effect on humans of a computer application working in conjunction with other computers to resolve problems, search for information, or process data, and then report results. The author would argue that these activities are not adequately served by the expression "computer mediated communication".

The author's research pursued a wide range of computer communications methods which explored both the levels of communication and the available media. Williams et al (1988) describe levels of communication as:

- intrapersonal (notes to self, memos, photos);
- interpersonal (mail, phone, copying machines;
- group (telephone conferences);
- large group (microphone, movies, OHP);
- organisational (memos, phone, intercom); and,
- mass (newspaper, radio, television, magazines, books, billboards).

While the technology examples available to these researchers might have dated, the human levels of communication have not changed apart from the recognition

of a role for technology in selecting or modifying the content of communications. In contrast to these human levels, Williams et al., considered the role of computers in communication as (mere) "switches". Examples of technology being used beyond this view are presented in this research. Williams et al., (1988:25) further note that "Media are not benign in their impacts, nor separate from their social context". The current study exposes a number of communication levels in education which would see the computer enter the communication stage as another actor in a social network.

1.3 The organisation of this work

This document is organised into this introduction, eleven chapters, a conclusion and several appendices.

After the introduction, the author provides three chapters which overview the major fields of research which informed the study. These chapters deal with; Technological Systems and Change; Issues of Communication; and, Educators and Networks. The literature which has been included is a selection of works and projects which highlight either technical, social, or educational innovations and research. Each of these is highly relevant to the author's research. The author's work involves the initial developmental and adoption of technologies and requires understandings of social structure that accompanies them. It explores emergent methods of communication and requires an understanding of the language and concerns in that body of literature. The last of these chapters (chapter 4) reviews significant telecommunications projects in order to position

the author's work within the range of similar activities which have taken place around the world.

Chapter five describes the framework of the study, the author's and teacher-participants' roles and development. The framework is taken from an overview of established research methods drawing upon aspects of those which informed the process. Chapters six through to thirteen focus upon particular projects within this research. Essentially, these dwell upon an application of technology, and describe the concerns of the research group, the outcomes of the processes, and broader findings. The conclusion of this document attempts to reflect upon the processes of the research and to provide a framework for similar collaborative endeavours which is informed both by this research, and by the literature.

Sample data are included in the body of the writing where particular issues are to be illustrated. These are taken from various sources not limited to the journal entries and interviews which were to be the principal tools described at the commencement of the research. Larger samples of data are included as appendices. The appendices also contain relevant technical documentation which describes software developed within the project, and various support documents developed to enable the project at various stages.

Tables are used to illustrate processes and summary data, and figures include graphical illustration of processes and printed screen images of data.

1.4 Special Terminology

The following explanations are provided for systems and applications which are discussed in this research. Many will be known to the reader.

Bulletin Board (BBS)	A computer which houses messages and files and is connected to the telephone network for a group of users to access. Users can be expected to communicate with one another by leaving typed messages or files (computer generated documents).
Listserv	An internet service which allows individuals to become members of a list which automatically distributes copies of messages to all members, as well as managing their "subscriptions".
Internet Relay Chat (IRC)	An Internet service where users may communicate in *real time* by typing messages and waiting for response.
Multiple User Dungeon or Multiple User Domain (MUD)	A service which allows users to play role playing games with other people connected at the time. Each MUD tends to have its own rules and "gameplay". Roles may be assigned by the game or developed by the player in some cases.
MUD Object Oriented (MOO)	A service similar to MUD in that role playing and simulation are outcomes, however the environment provides for players to create their

	own environment by describing it in narrative. Similarly, players may prog am virtual objects and behaviours of objects in an effort to enrich the simulations. MOOs have been referred to as "Text based Virtual Reality" (Curtis, 1997)

1.5 Research and other Real Work

Participants of this research were all educational professionals and not surprisingly saw their involvement in the project as likely to have benefit for their day to day work with colleagues and students. The researcher was similarly placed in that his job was closely associated with parts of the research. A relationship, almost like a musical 'canon' in which the theme moves between instruments, perhaps changing key and developing in complexity seemed to develop. The researcher's academic teaching and other research gained considerably from what was learned in both the technological and methodological areas. Equally, the research gained from the researcher's professional need to engage certain technology systems and a will to inform and empower academic colleagues where possible.

In writing this section, it has been important to clarify the purpose of the work and the way in which certain problems developed. This research gathered a group of people who were known to be interested in communications technology, and posed several questions for them. It was expected that the research and the participants' day-to-day work would be almost inseparable at times. The

realisation that one's own professional; development could be managed in this way was in itself significant. For the main part, however, this research set about to initiate and document the development of new technologies being introduced to the profession and the participants' activities, reactions, and reflections at all stages. This was an important concern for the researcher, who recognised a long tradition of "good work" being ignored or undervalued through inadequate documentation, and significant individuals becoming disenchanted as well as forgotten as their contributions ceased to be "new" or were overshadowed by more publicised activities.

The work of the research participants in this project was to be visible, clearly articulated, and framed within the relevant bodies of literature. The projects undertaken were to be integrated into their daily work as far as possible. The following chapter begins the three themes of the literature with a review of technology systems and change, and their relationships to social structure.

2 Technology Systems and Change

This chapter explores the work of researchers who have contributed to the literature of humans working with technology, particularly with respect to the issues of the relationships that exist and are created or changed, as well as the ways in which systems are introduced to people and thereafter managed and promoted. The development work to be taken up by the research group was always designed to recognise the work of educators in their own settings. This included their styles of professional work, as well as the "places" where work takes is done. The research into how technologies are adopted, and how we might interpret changes in organisational structures are particularly helpful to this work. A third "theme" in this review attempts to understand the roles and consequent issues for women with information technology innovations.

2.1 Relevance of broader enquiry

Perhaps of greatest benefit to this study has been the process of uncovering, or more precisely introducing bodies of literature from the field of business research into the context of technological change in education. Studies of the appropriation or adoption of technology "solutions" in business or industrial contexts have been particularly useful in the interpretation of data, and in extending the language of this thesis. Research into educational environments, technologies, and even the working relationships of teachers is not usually informed by business and industry practice. This may be as a result of educators' preconceptions that educational contexts, particularly school education, ought to be shielded from industry and business, but for whatever reason, the appearance of business systems and techniques in curriculum aspects of education is not

common. This chapter considers a range of important contributions by researchers who are not typically aligned with educational developments, but which the author feels make important contributions to educational contexts. Consequently, there is an interest in systems; social, technological, and interdependent 'socio-technical' that include Group Decision Support Systems, Management Information Systems, other Expert Systems, and Artificial Intelligence. This chapter will not dwell upon the distinction of these, but will try to extract elements and practices known to these which can assist the interpretation of the study.

2.2 Acceptance and appropriation of technology

The author is interested in the processes and outcomes of educators making use of technology for professional purposes. In their investigations of Group Decision Support Systems (GDSS), Poole and DeSanctis (1990) make use of a technologically rich language that educational circles might find uncomfortable. GDSS are technologies common to business environments which provide integrated tools for workers to help manage decision making processes and arrive at consensus. GDSS are known in the administrative world of school and college teachers, but not significantly as structures for teacher professional activities of teaching and peer support. More importantly, the view that one's professional life might be tightly aligned with a piece of technology is particularly interesting. The author's thesis argues that systems can contain people, that technologies are inseparable from their human users, and that appropriating a technology implies bringing the new system to bear upon all of the human and non-human participants. Poole and DeSanctis describe appropriation as, "The mode or

fashion in which a group uses, adapts, and reproduces a structure." (1990:184) In this context, "structures" are the rules and resources needed to maintain a system. For the purposes of this study, it is understood that the resources must include people working individually as well as in groups.

When humans adopt a system, their appropriations can be either "faithful" or "ironic" (Poole and DeSanctis, 1990:184) . This means that the adoption of the GDSS may or may not be supportive of the spirit of s ucture, and may or may not support the operations of the structures. The attitudes of users to a communication system may change over time, or may remain fixed. They may change depending upon the nature of the message as well as the relationship with the person or group they are addressing. By faithfully adopting a system, a user would adhere to the conventions, social protocols and technical requirements in their communications. An ironic appropriation might prove a more energetic or experimental use of the system, but by the same argument, the results could be both damaging to the integrity of the system through diminishing others' confidence, and result in communications failure at worst. Understanding the ways in which individuals and groups embraced and adapted technology systems, is a fundamental concern of this research.

2.3 Diffusion of Innovations

> *Diffusion is the process by which an innovation is communicated through certain channels over time among members of a social system. It is a special type of communication, in that the messages are concerned with new ideas. Communication is a process in which participants create and share information with one another in order to reach a mutual understanding. (Rogers, 1995:5)*

2.3.1 Innovation , information, uncertainty

A difficulty in all work with computer technologies in education has been in the definition and interpretation of 'success'. Describing a project as 'successful' assumes that a methodology for evaluation accompanied the project. Sadly these methodologies are often forgotten. Naturally, the successes of a project do not depend upon the existence of evaluation methodologies. Different and highly flexible measures will arise during, and following the process, and while these are openly and fully explained, innovation and diffusion successes can be properly celebrated.

This research demonstrated a range of successes and failures with telecommunications technologies, but it is equally important to examine the various measures that this research and other similar ones have employed. Typical confusions appear between effectiveness and longevity, or between breadth of target group and network traffic. Projects which have 'run' for years

might have achieved high levels of acceptance and recognition, but very little effective impact. Innovations which brought together diverse participants, or generated volumes of mail and file traffic might still be trivial. In the worst cases, telecommunications projects (to use one example) are celebrated when students or teachers succeed in establishing contact with the most distant or unlikely collaborators. When one of the projects featuring in this study caused the installation of a computer Bulletin Board System Point (BBS Point) at Fourth Primary School (see Chapter 6.3.7), Reg, who was later to become instrumental in dramatic changes at two other sites, celebrated the contact between his students and staff and schools in other parts of the world. Although the message 'turn-around' time was typically in excess of five days, the school created annotated maps of the world with pins indicating teacher or student contact from that part of the globe. The measure of success for this project became the novelty of overseas communication, and in 1995, a five day wait for electronic mail was phenomenally faster than airmail postage. Other successes of this project included Reg's ability to demonstrate to other educators that significant outcomes were achievable with this technology.

The diffusion of the BBS point systems as a useful educational innovation began with Reg announcing the successful contacts within the school and local community through community notices and short newspaper articles. Indeed other schools in the area expressed interest in the system being used after reading these publications.

Rogers (1995:14) suggests that diffusion processes two kinds of information:

1. Software information (How does it work?) This kind of information, according to Rogers, reduces uncertainty about the cause-effect relationship in achieving a desired outcome; and,
2. Innovation-evaluation information (What will its advantages be?) Information of this kind reduces uncertainty about consequences.

These interpretations pose problems in an education professional development context, since much of the body of diffusion research is concerned with "adopters" of innovations (viz. technology) in business organisations. Many of the findings of diffusion research will usefully inform studies such as this one, particularly with respect to the characteristics of adopters, socialisation and politics. On the other hand, fundamental differences in the imperatives of likely adopters (teachers) leave room for further consideration.

2.3.2 Organisations and Change Agents

Some observations about the roles and personalities of those people charged with supporting the diffusion process need to be made. The author's research was concerned with people initiating and managing professional development using telecommunications technologies. Those people, and the author, were at various times the instigators or agents of change for certain projects, while at the same time being part of a community that became the "crowd" to be encouraged, convinced, and supported in several new initiatives. For the purposes of this discussion, the examination of change agents needs to include those people directly and indirectly charged with implementing systems, those people who for various reasons *choose* to become involved in an implementation, and also any technology systems, software and hardware artefacts which are required to make

up a working system. At the earliest stages of the author's research, an understanding of the processes of change and of the types of people and their roles in implementing change became necessary.

Markus and Benjamin (1996) identify three models of change agentry;

- traditional, in which the technology is viewed as the agent for change;
- facilitator, in which the organisation is the agent for change, but the agents are experts in the change process; and,
- advocate, in which the agent's role is perceived as one of influencing others' behaviour.

(Markus and Benjamin, 1996)

It is interesting that these researchers note that information systems specialists, for various reasons, are not necessarily appropriate change agents for the introduction of systems. Although they refer to industry settings, the history of introducing technology systems to educational settings shows that it is almost always conducted by "the most skilled".

Rogers (1995) discusses change agents as belonging to one of two types: *homophilous* and *heterophilous*, and states that these might well be human or technological in character. As well as referring to the aides or change agents themselves, this terminology is useful in describing other resources. The first defines people and resources which are familiar and professionally close to the target individual. The second group are those people or resources which differ substantially, or are from divergent backgrounds. An homophilous aide is perceived as a near peer, and gains credibility since their motives are not likely to be suspected, and they are regarded as safe allies. Heterophilous resources and

aides are advantaged by having a higher competence credibility. Ideally, Rogers states, change agents will combine the features of both, providing high levels of technical competence and credibility, as well as an advantaged social profile with the adopters. (Rogers, 1995:352) One might expect then, that these features are combined in the profile of any individual change agent, or by the same token, multiple change agents displaying different features could be introduced into the adoption process.

From a general point of view, Fullan (1993) identifies vision building, the ongoing "quest" and an ethos of collaboration to be the strongest features of change agents. He asserts that every person (in an organisation undergoing reform) is a change agent, and that "change is too important to leave to the experts." (Fullan, 1993:22) A useful development of this approach reinforces the role of collaboration in implementing change, and Fullan in later work (1999) develops valuable understandings of what collaboration might mean in a dynamic organisation. Fullan asserts a "chaotic" or at least dynamic nature of organisations that is built on the work of Stacey (1996) In this picture, organisations are non-linear, unstable and paradoxical. For the researcher's project, continuous clarification and description of the roles and status of all participants and their organisational structures became an essential point of reflection. These will be identified later in this work when the individual initiatives are fully described.

2.3.3 Adoption and the social system

The decisions of 'if' and 'when' to employ or 'adopt' a system can be understood in terms of a threshold. Not surprisingly, individual early adopters, have a low adoption threshold, "attributable to their venturesomeness" (Rogers, 1995:322) We expect to encounter the same or similar people involved in new innovations, since they are more interested in new applications or techniques. We might also venture to suggest that these people are less likely to be deterred by technical failure, lack of documentation and support, or even limitations of a being a member of a small pioneer group. On the other hand, even the most ardent 'early adopter' must have her limits of tolerance! Participants of this research can be regarded as 'early adopters' of technology, and their experiences are documented herein, particularly in chapters 6.3, 7, 9, 10.7.3, and 11.5.

Threshold models are determined by social influence as well as any perceived personal gains. A study needs to take place in the context of where in the social system the adopters are located. Granovetter's (1978) studies of rioting behaviour suggest that social context ought not to be overlooked in studies concerned with adoption and diffusion. These studies propose mathematical models which could be used to predict or explain the ways in which individuals' adoption thresholds can relate and influence the behaviour of others (1978:1429) While Granovetter's research is explained in terms of explaining individual and group propensities to engage in a riot, he indicates that the process is as valuable in describing the adoption of an innovation, migration, strikes, in fact a "catalog of binary choice situations" (1978:1423)

The first members of a group to adopt do so because of need or perceived need. Thereafter, an innovation spreads when others observe benefits or wish to communicate with early adopters, and thus there will be a distribution of individual thresholds in the number of others engaged in an activity before a particular individual joins in.

Notwithstanding the characteristics of early adopters and their social networks, Rogers reminds us that the fastest rate of adoption is with, "..authority induced innovations via power, status or technological expertise" (Rogers, 1995:29) While mandated adoption of technology need not be as overt as to insist that non-participants might lose their jobs, there are clearly degrees of influence that authority figures and enthusiasts bring to bear while people are being encouraged to adopt a system. These influences are subtle, and could be categorised as:

- both change agent and potential adopter are aware of the influence (and may indeed articulate this);
- change agent is aware of influence, but potential adopter is not;
- both change agent and potential adopter are unaware of the influence; or,
- change agent is unaware of influence (or pressure) being employed, but potential adopter perceives the influence (or pressure).

Fullan's (1993; 1999) work is at odds with the "binary" nature of adoption which Rogers describes, but does not detract from the value of understanding change agents and their tasks. It is helpful that Fullan recognises the complexity of educational organisations and the change processes that are becoming part of their cultures. (Fullan, 1993:23) Furthermore he builds on the work of Stacey (1996) with the recognition that all participants need to become agents of change

in an environment which cannot be understood in simple terms nor changed with predetermined steps (Fullan, 1999)

2.4 Reinvention

Reinvention, or the need for individuals and groups to discover for themselves, to work through issues, or to create subsystems, is a feature of adoption. These activities serve to make an innovation more acceptable, or to allow people their own construction of ownership of a system. (Rice, 1992:135) Two specific concerns about reinvention are its likely impact upon others' adoption of a system, and the likely direct effects of the activities themselves. In the first case, new users may become disenchanted when they learn that certain processes and activities are already known, and are not as innovative as was first believed. In the second case, the process of reinvention may distort a system to reduce its usefulness. A more common concern, however, is the likely interference by informed moderators or high status users who deride the reinvention process as a waste of time, therefore cutting short the necessary processes of familiarisation and "ownership development", Rogers (1995:177) reflects that change agents and planners may discourage reinvention activities since it might suggest lack of success of the system, or affect the quality of work taking place.

2.5 Structuration

The body of research into organisations' uses of technology includes work which was remarkably helpful in defining and describing this study. According to adaptive structuration theory, designers incorporate some of existing social structures into new technologies. Some of these structures are transformed by the technology and are instantiated in social life. There are structures in

technology and structures in action (Poole and DeSanctis, 1990). Here we need to distinguish between systems and structures: systems are social entities, while structures are the, "rules and resources that actors use to generate and sustain this system" (Poole and DeSanctis, 1990:179). Essentially, structures are both the medium and outcome. Structuration is the, "process by which systems and resources are produced and reproduced through members' use of rules and resources." (Poole and DeSanctis, 1990:179). To give an example, structures may develop that would mean that older members are deferred to and get a louder voice in some system, or that technically skilled members of a group gain privileges.

In their analysis, Poole and DeSanctis refer to Group Decision Support Systems (GDSS), as having "spirit" (focus, reason goals and attitude) and "structural features" which are the specific rules or resources (1990:121). These researchers make a strong connection between adaptive structuration and Computer Mediated Communication, and it could reasonably be argued thence to other technology innovations in a structured or even virtually structured workplace. For the present study, it is understood that use of structures reinforces the rules. Use, re-use, and modification of structures (rules) are for present and future applications. In fact the continuous process of structuration would oversee any structure. We might ask then, "How does the structuring process take place, and what would constrain it?"

Orlikowski and Robey (1991) proposed a "structurational model" of organisations (Figure 2-1) which seeks to explain the simultaneous relationships

which exist between technology and organisations. Their work acknowledges the theories of Giddens, (1979:69) who explores the relationship between structure and action in social systems, and owes much to Poole and DeSanctis (1990) and Contractor and Eisenberg (1990) In their view, Information Technology is a product of human action as well as a medium for human action (Orlikowski and Robey, 1991) Social reality, according to Giddens (1979) and Orlikowski and Robey(1991) needs to be viewed both objectively and subjectively. Structuration is a theoretical perspective accommodating both approaches. Subjectivist theories stress the importance of subjective human experience in the interpretation, creation, and modification of the social world. In the words of Orlikowski and Robey , "..(humans) understand phenomena by explaining how ...individuals create and re-create their social worlds through deliberate action and enactment." (Orlikowski and Robey, 1991:4) They further state that an objectivist theory of social reality "...defines the elements of the objective world and analyses the relationships and regularities between them." (1991:4)

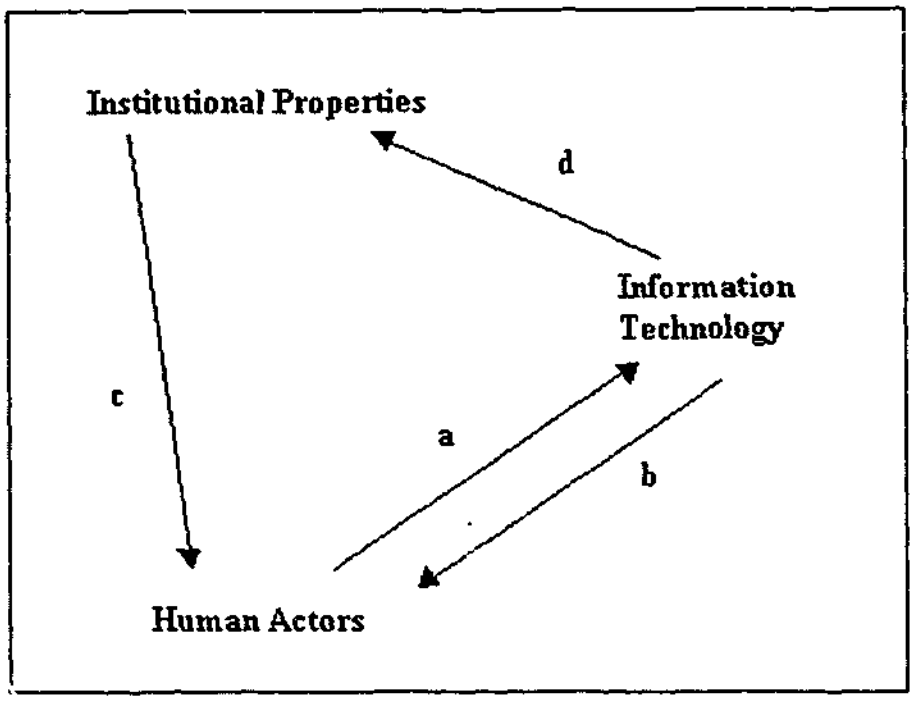

Figure 2-1 Structurational Model (Orlikowski and Robey, 1991)

Figure 2-1 illustrates Orlikowski and Robey's model.

In brief, the arrows identify:

a) information technology is an outcome of human action;

b) information technology both "facilitates and constrains human action";

c) institutional properties or social contexts influence the way in which humans interact with Information technology; and,

d) information technology use influences the social contexts.

There are several factors that need to be considered in relation to the dynamic nature of the structuring process. The degree to which such a system can respond to the structural influences is limited by:

1. Context (time, place, type of work).

2. Complexity of the social systems.

3. Skills and self awareness of the technology.

The author's research instantiates these limitations and documents various outcomes which ranged from resigned failure of some aspect of a project to highly successful resolution.

Sproull and Kiesler (1991:8) used the expression "second level effects" to describe people's changes in attention, contacts and dependences as a result of the dynamic shaping of technology and its contexts. While their work did not extend into analysing the social aspects of the technologies, this is a consistent view. The second level effects upon the people involved in technology adoption and structuration became a particular point of interest for the author's research.

An example might be the gradual increased usage of a system leading to new understandings of how workers (teachers) are seen to best use their time. In the past concerns about 'time wasting on the computer' would have been enough of a disincentive to immobilise a project. More recent appreciations of 'what constitutes work' might in fact be responsible for better acceptance of structural change.

Both technology and context affect group outcomes through their influence on the structuring process. The technology effects can be best understood through the nature of the technology, the context and structures supplied by the technology, and the nature of the interactive structuring process taking place within itself.

2.6 Oversimplification through Critical Mass Theory

2.6.1 Overview

Critical Mass is a popular theory used to explain the adoption of innovations, and particularly people's voluntary use of technology systems. (Oliver, Marwell et al., 1985; Markus, 1990; Rice, 1992; Orlikowski, 1996)

Rogers states:

> *The critical mass occurs at the point at which enough individuals have adopted an innovation so that the innovation's further rate of adoption becomes self-sustaining.*
>
> (Rogers, 1995:313)

This is a problematic stance. We might ask then, if this is completely relevant to our concerns about the success of a short-lived project. Perhaps the critical mass occurs at the point when some measure of success of the innovation e.g. a stated target group, or an attitude, or a particularly empowering series of reinventions has taken place? Or does Rogers mean that the further rate is one about the consistency of use of the adopted innovation? It is possible to argue that over time, although the number of adopters of an innovations declines, the number of effective uses of the innovation might grow, or a deeper effective use might develop. Even without using a structurational model, it is clear that users of the innovation (as the research team found) make substantial changes to the system, often to positive effect. This might mean a later increase in the number of users, a change in the type of users, or a change in the type of use. Rogers reminds us of the French *Minitel* Communications system which rapidly reached critical mass according to the standard interpretations, in the early 1980s. Sadly, the

'success' was due to the newly available sex related messaging services, which soon accounted for, "8 percent of all calls, 19 percent of time spent using Minitel, 22 percent of total sales, and half of Minitel's profits." (1995:329)

Markus (1990) provides useful reflection about the various influences acting upon users of interactive media that would affect critical mass. Markus confirms the relevance of threshold and diffusion theories and asserts that initially a "universal access" to the technology is required before adopters can properly ascertain their interest. In developing this theory, the author describes the importance of "sequence" and "interdependence" (Markus, 1990:197) to give a better appreciation of the influences of early and late adopters upon one another. Markus asserts a number of propositions which identify factors influencing universal access. According to these, the following factors would reduce the likelihood of universal access:

- high resource requirements;
- high skill requirements;
- high levels of communication discipline; and,
- high cost.

Factors which would contribute to universal access would include:

- more collective action through broader interests;
- greater interdependence of tasks;
- centralisation of resources; and,

- geographic dispersion.

(Markus, 1990:204-208)

Two matters raised by Markus deserve clarification. First, the goal of "universal access" appears to be at odds with situations other than mandated technology uses that would appear in a business organisation. There are many situations where universal access is neither required nor desirable. Proponents of innovations when their use will be voluntary are still interested in the diffusion and possibly critical mass analyses that might inform them. The *potential* for universal access may be more important in these cases. Second, Markus avoids any analysis of system content, messaging style, management imperatives, gender, and "cyber-social" (my quotes) context. Accordingly they are most useful in conjunction with the findings of others in related areas.

Critical Mass theory relies on time. It must assert that sufficient time has passed for diffusion processes to take place, however long that might take. Regardless of the interdependence of early and late adopters influencing others' adoption or rejection of a system, there are clearly moments in the history of the process when decisions are made to terminate a system which has apparently failed, or to introduce incentives of various kinds to avoid failure.

It might be suggested that the most successful strategy to implement an innovation is to start everyone at same time and to mandate its use. Negative inducements (Markus, 1990:212) can provide a powerful strategy for ensuring that people will use the technology. Similarly, removing an existing system and replacing it with a new one on the surface appears a constructive move, but is

clearly an exercise of power which denies any need for process, ownership, or even quality of content. An example of this might be the software upgrade which an organisation provides for its staff and subsequent confusion and frustration that occurs in workers who were unaware of the impending change.

Another process is to provide some "incentive by association", so that use of a new system is seen as a way to gain access to resources or more particularly people who have otherwise been not in a direct communication channel. In a business environment this would be exemplified as a manager on the corporate email who is publicly known to be agreeable to communication from lower status workers, or individuals from other parts of the organisation. In the case of teacher development networks, this could be seen as incentive in being able to contact technical, academic, or industry based people as new collaborators. There is a possible "flow on" effect to greater group adoption of the system when information of this kind is promulgated.

Markus notes other successful strategies including the acceptance of "play value" of high tech (Feldman, 1987; Sproull and Kiesler, 1991) so that office clubs or interest groups' activities are supported in the same system. Naturally there are concerns about the type of materials to be supported, and the extent of management or other high status influence over these groups. The "Women's Professional Improvement Conference" (Chapter 2.8), and "Computer Coffee Break" experiences remind us of how these can be misused by management. In both examples, management intervened and closed the activities which were deemed to be distracting from work. But the situations are more realistically

understood as management concern about creating undesirable opportunities for groups (usually women).

2.7 Social perspective

A persistent issue of concern amongst business applications and computer-mediated communications researchers is the need to consider social structures in any interpretations of diffusion patterns or analysis of use. Adaptive structuration theory, (Giddens, 1979; Poole and DeSanctis, 1990; Orlikowski and Robey, 1991) provides an essential background view that the social system is inseparable from and interdependent with the technology.

Actor Network theory could be regarded as continuing the theme of social structure and technology interdependence. Bijker (1987) described the technological frame of a social group which explains the interactions within and between social groups that shape technological artefacts. Thus the development of the technologies themselves must be considered in the same light. Bijker further observes that the (social) technology frames, "shape and are shaped by these (working) interactions from the perspective of technology development or invention". To this extent, the technology becomes yet, (or just) another actor in the social relationships. It is interesting to consider Carlson's (1992) interpretation of a *failed invention* in this light. He writes of Edison's inability to succeed with the motion picture business as a failure to notice the cultural values "embedded in the technology" (Carlson, 1992:193) when a new frame of meaning or cultural space was necessary. The inventor's competent technology was in fact unable to succeed due to an ignorance of social context.

Researchers concerned with specific educational communications projects have reached similar conclusions but not perhaps with complete interest in the details of how that relationship might operate. Sproull and Kiesler (1991) make several observations about the changing nature of organisations, particularly the nature of management and the ways in which relationships are affected. Hesse et al., (1988) positioning social context as inseparable from psychological and temporal considerations, Merseth (1990) comparing face-to-face interactions with online environments. In Rice's (1992) valuable work in analysing CMC reviews he describes a particular bipolar meta-theory of computing attributed to Kling. (Rice, 1992:114) This theory describes two broad theoretical perspectives: a systems rationalism, which is the familiar view of the design and use of systems; and, a dialectical approach called "segmented institutionalism" which presumes social conflict over the control and interpretation of computing.

Feenberg and Bellman (1990) discuss the (then) poor state of research into social factors of computer-mediated environments in business and education, and propose a model for providing systematic research into the adaptation of systems and assessing the needs of users. They suggest appraisal of the social fields and activities of the groups under consideration, methods of classifying the "types" of users and their social situations, and the various functions and features of CMC which then come under focus. Systematising social factor research, and to a greater extent, providing a framework and language for this work are valuable provisions, however, the more expansive and socially grounded 'dialectical' view of Kling are at least more likely to respond to social situations not understood or

indeed not possible in Feenberg and Bellman's overview. On a more specific note however, Feenberg and Bellman articulate the responsibilities of software designers, CMC leaders and moderators in responding to the, "real world demands of users" (Feenberg and Bellman, 1990:69) In the design and conduct of this research project, the participants would argue that the software developer, moderators and technicians need to be considered a part of the social fabric of the project(s). To separate the technicians and designers as mere respondents and functionaries is to misunderstand the potential of the group.

2.8 Gender

Gender issues are highly relevant to the study of computer communications in educational settings at the outset, and particularly relevant to this research. Of the fifteen participants in the present study, nine are women. A useful and growing body of research which encompasses feminist interpretations of technology in general, (Haraway, 1991; Wajcman, 1991; Sofoulis, 1994; Turkle, 1995; Morritt, 1997) and the experiences and reflections of women working with Computer-Mediated Communications, (Zuboff, 1988; Sproull and Kiesler, 1991; Matheson, 1992; Spender, 1995; Grundy, 1996) are of particular value.

Spender argues in the context of improving girls' attitudes to computers, that it is important that women are involved in the design of technology systems to make the platform more "friendly" (1995:171) . It is equally important, as the present study attempted to demonstrate, that women are established in various controlling, moderating, and administrative functions of technology systems.

This gives the participants considerable exercises of power which are possible from those locations. Women need to be employed in "...designing infrastructure which matches people's ways of working (as distinct from forms which have to be imposed)" (*ibid.*). Accordingly, particular attention was given to involving the women in the design phases of projects where possible, and their management roles reinforced and made public (Chapters 7.2., 9, and 11).

While it was rarely discussed amongst the members of the research group in this study, the women recognised their own skills development as having as much a "role model for women" outcome as a personal one. Similarly, the positions of controlling networks are usually not given to women, and so the accommodation of women's networks are subject to men's priorities (Grundy, 1996) Initiatives of this research were expected to publicisc as well as support the network infrastructure created by the women.

Matheson warns that the resource accessibility is known to be a problem for women wishing or needing to join networks. It is more alarming that the result is "eliminating women of lower socio-economic status and rural women who have less access to public facilities" (Matheson, 1992:71) It should be noted that shared computers, computers in staff rooms and classrooms must be regarded as "public". It was the researcher's view that any person needed their own technology so that they could "make their mistakes in private". This phrase was coined while the researcher worked in school-based professional development, and refers to a belief that much of the confidence that is needed to work with technology comes from a familiarity of ownership. This ownership involves

"tinkering", "adjusting", "customising" or as some would have it "futzing"[1] your own computer. For this study, the women involved either had, or quickly obtained personal computers and network connections that they could access at will and without the need to share. It is interesting to observe that of all participants, the women with their "own" technology gained skills quickly, and were readily enthusiastic to try new initiatives. Similar concerns should be explored in future work for women who might benefit from the development work which has taken place in this study. These concerns must include:

- our questioning of the nature and potential of the developments and their underlying technologies: which must be in the context of the needs of women. (Matheson, 1992:71) ;
- the development processes, support mechanisms, must be informed by the literature of women and technology and with particular concern for the language; and,
- understanding that general empowerment, and particularly the ownership, design and control of technology which should "envelop" the processes.

This study also needed to take account of any "second level effects" of technology. Sproull and Kiesler (1991:4) used this expression specifically to illustrate that the typewriter as technology had a second level effect in providing employment for women, and yet the actual social impact for women typists was not understood until some time later (Wajcman, 1991; Spender, 1995) In the

[1] Futzing or "futzing around" is unstructured, playful, often experimental interaction between a human being and a computer, product, or any technology, sometimes but not always with a

same way, Zuboff's (1988) description of the "Women's Professional Improvement conference" (Zuboff, 1988:382) indicates that this potentially useful and highly valued women's network and its activities were actually highly visible, whereas the traditional "old-boys" networks were not. Eventually, management's surveillance and intervention caused the women to use the system less often and with less effectiveness until it was abandoned. Although this event has particular relevance to women's use of the technology, it is equally important to recognise that the "interference" was as a result of management disquiet over redefined power influences. (Zuboff, 1988:382)

2.8.1 Skills, Tools and Machines

Finally, researchers describe the notion of "soft mastery" with respect to the ways in which women solve problems with computers (Turkle, 1984) Turkle observed that boys using computers achieve a "hard mastery" by adopting a planned and wilful control over the machine. Girls, on the other hand solved problems through a "soft mastery" of interaction, negotiation which is described as "bricolage" or "tinkering" with concrete elements rather than abstractions. These observations might not be generalisable in explaining cognitive differences, (Wajcman, 1991; Sofoulis, 1994) but warn that the "tinkering" or bricolage" approach of soft mastery isn't valued in the same way, indeed can be regarded as "getting the right results by the wrong method" (Wajcman, 1991:57)

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productive purpose in mind. Futzing can be pure play, learning by trying, or an attempt to achieve breakthrough insights. (http://whatis.com)

Wajcman rejects Turkle's psychological-analytical approach, returning to the position that technology must be viewed within a social and historical context. The metaphor and language used to describe computer technology, hardware and systems has a bearing upon their ultimate use by women. Turkle (1984) and Grundy refer to the word "tool" (Grundy, 1996:21) and claim that "tools are extensions of their users". There is a common description of "computer as (just) a tool", particularly in government publications and educators or commentators. Often this is done to make the device or system seem less threatening, or perhaps to encourage teachers to overcome setbacks caused by technical failure or (more frequently) lack of adequate training. Jonassen (1996) makes use of the word "mindtools" in a comprehensive and effective discussion about effective student computer uses, but the expression itself is still problematic. Examples of this kind of language appear in the form of "tool for teaching", "problem solving tool", "tools to improve student learning". These expressions were drawn from an overview of computer education conference proceedings. A query of the Alta Vista search engine on 1 June 1999 for the expressions "computer as a tool" or "computer is a tool" revealed 6065 hits. The word "tool" is obviously charged. It carries connotations of men's work, weight, noise, and hardness. (Grundy, 1996) notes the use of the word "tool" with its connotations of engineering, workbenches and other masculine activities. Describing the technology, hardware and software as "just a tool", is not helpful in itself, particularly when someone's unwillingness or inability to engage with a system or process is seen as a failure to "work the tools". In this research, particular efforts have been made to attend to the language used to describe machines and systems in a way

that is less likely to receive immediate rejection by association with particular styles of work or attitudes to machinery.

There are more useful positions. Turkle (1984:172) states that "machines impose their own rhythm, their rules on the people who work with them...". Which is not at odds with the belief that women ought to own and control their technology.

Another view is that the computer can be almost "an extension of oneself" (my quotes). In particular Sofoulis, (1995) describes a woman-technology relationship which shows the potential for powerful and personal connections between (say) women artists and their computers. Sofoulis suggests that women still ought to treat the new media and information technology with "ambivalence". This is a markedly more relaxed view than that of Haraway (1991) who describes technologies (biological and communications) as "crucial tools recrafting our bodies" and furthermore that, "These tools embody and enforce new social relations for women world-wide." (Haraway, 1991:164) It is important to note that Haraway's context explains the human as a cyborg entity now that various technologies have so completely become a necessary part of the human experience.

2.8.2 Violence

Direct communication over networks can be either synchronous or asynchronous, or as this research will argue, a causal mixture of both. A complete discussion of the temporal issues appears in Chapter 3.3. The nature of the communication,

attendant artefacts such as signatures, salutations, and other declaratives have been shown to be frequently charged with violent imagery as well as direct acts and threats of violence towards women (Spender, 1995; Grundy, 1996; Hall, 1996; Herring, 1996) . The most serious of these is exemplified in the notorious *Rape in Cyberspace* case (Dibbell, 1993) where the combination of synchronous chat, asynchronous programming of an object (a doll), and the combination of anonymity and constructed personae all mitigated to allow a person to perform a confusing and awful new horror. Typically, acts of violence are easier to identify and explain. These include the direct flaming of women, discouraging their use of systems, harassment in chat systems, and other exercises of power which employ technology in acts of discouragement and violence.

Quite apart from the occurrences of deliberate violence, there are issues in the use of language, and the development and use of systems where violent imagery, and apparently unwitting aggression or destruction are inbuilt. It is also clear that there are evident violence and rape metaphors based in the language of computing "abort a program", "kill a process" , "system violation", "master/slave disks" and such (Sofoulis, 1994; Morritt, 1997) .

2.8.3 Some considerations

Seemingly trivial expressions which are used in computer communication circles are similarly not without power or other implications. 'Hacking' is often used by males to describe any kind of computer use, not just the aggressive acts of breaking into others' systems. 'Lurking'; the practice of reading online messages in any mode without contributing or announcing one's presence might be a

suitable way to learn the etiquette of a group or system, but the expression clearly comes from an antisocial, even misogynist context.

2.8.4 Communication style

Herring (1996) developed a Macrosegment analysis of messages posted in specified discussions on two mailing lists with a view to assessing the value of descriptive gender stereotypes. This work considered a stereotype of the, "informative male and the interactive female" (p. 81) that would suggest that women use CMC with social and networking intentions, whereas males use these for passing information. While she found that in general all users were more inclined to exchange views than exchange information, women's messages actually were more interactional, and more informative. Furthermore she observed that any minority gender on a mailing list will, "shift their style in the direction of majority gender norms." (Herring, 1996:82) This of course, has particular implications for the selection and training of list moderators.

Herring found that the male and female stereotypes were not supported, but did find a tendency for women's postings to be more aligned to the conversations, "...while men's messages tend to oppose and criticize others" that male postings more often declared as "fact" but were, "...actually exchanging opinions and evaluations." (Herring, 1996:104)

The trenchant stereotypes glorify men's role in the information age. It is argued that the word "information" is positively charged, as something of value which is exchanged. A provider of information is unlikely to have their motives

challenged, and in describing the transaction as information, it is considered factual and immutable. Herring suggests that this situation explains the reluctance of some women to go online. In the same way, communications which are disagreed with might be discredited as being subjective or otherwise less informative. The stereotypes then, serve to further unbalance an appreciation of people's communications since the dominant writers are male, both by their numbers and their loudness, their communications are understood as informative, and apparently their words are more likely to be interpreted as informative (Wajcman, 1991; Herring, 1996:105)

Considering the available means to resolve these problems, Spender (1995) asks "Where do you go to complain about a breach of the rules (netiquette) or bad behaviour?" (p. 200) The author's project established its own community and himself as possible avenues for complaint, but in most online situations, neither informal nor formal legislation is of much value when a person believes that they have been harmed. Possible exceptions or future directions appear in the discussion of users' management and democratisation of virtual reality in Chapter 10.5.

2.8.5 Socio-economic background

There is a body of literature concerning the lack of equity of technology resources in education and of the consequent effects upon students and teachers. The author's project encountered this matter if only in the sense of the cost of hardware and software and networking for the group to engage with each other and the systems. Some of these matters are discussed in Chapter 6.3 where the

online charges for teachers connecting to early Bulletin Board systems was seen as obstructing their use of the system. The cost of connecting and remaining online remained a problem for teachers and students in spite of better networking to schools even at the end of this research. Nevertheless, problems arising from the actual social or financial situation of the research group were not considered relevant. Katz (1997:64) notes a "new elite" of people empowered by digital culture, elsewhere described as the digital "haves and have-nots", (Katzman, 1974:50) and there is a likely consequence of a broadening gap between people with skills in digital and communications technologies and those without.

Katzman, (1974:50) using the earlier work of Rogers, proposes explanations for this widening gap:

1. Early adopters are different. They have more education, higher status, more exposure to mass media, better use of interpersonal channels, more social participation, more cosmopolite nature, and higher literacy.
2. The same message presents more information than to people with lower initial levels of information.
3. There is an uneven distribution of financial resources, leading to better technology in the hands of some.
4. There is an uneven distribution in people's ability to make use of information.
5. There seems to be a correlation between initial information levels and people's motivation to use new communication techniques.

Katzman's observations about early adopters are informed by Rogers and Shoemaker, (1971:107) and confirmed by Rogers. (1995:166) They suggest that

a more useful interpretation of project success is timely, and certainly that projects introducing technologies might even make use of a template or checklist or other formal means of identifying project participants and their situation.

This has particularly worrying implications for the eventual financial and political power of people who miss out on these skills. Katz suggests that a new elite is created from the digital culture, and that a moral question exists in establishing inexpensive digital technologies to "wire the nation" for all (Americans). "Forget the fake - if popular- "moral" issues like decency, sexual orientation, violence on TV, and pornography." (Katz, 1997:65)

2.9 Summary

Three principal themes have been explored in this chapter from the point of view of helping implement and analyse the research.

These are :

- adoption and Implementation of technologies;
- technology and Social structure; and,
- issues and struggles of power in technology mediated environments.

The first of these reveals a literature that is well established in the domain of business and industry, but less understood in education circles. The importance of understanding the roles and of selecting individuals and group members to be involved in technology adoption is well established, and useful in setting up the project and in the interpretation of this research. While it was not feasible under the circumstances to select individuals to suit the various innovations that this

research undertook, (a complete explanation of the research methodology is given in chapter 5) specific understandings of the characteristics of change agents and their methods of communication were used to support the individuals concerned. Understanding the actual impacts of individuals "reinventing" technologies, and observing the various methods by which our innovations were communicated and diffused was as much a issue of confidence building. Specifically, the works of major theorists like Rogers(1971; 1995) , Markus (1990; 1996) and Fullan (1993; 1999) provide a useful reference for these processes. A complete understanding of our notions of "success" took time to develop. The project did not aim to produce wide or "critical mass" adoptions, as the literature particularly from the non-education sectors might have directed. Instead, an evolving and ongoing discourse of evaluation accompanied the entire research. This was to be expected since the technological initiatives were themselves so influenced by changing dynamics of the research group.

An understanding and articulation of structure was important to the researcher, particularly as the literature shows a strong body of work which relates technology to group of humans. While it is attractive to regard a kind of evolution or development in thinking that leads us through structuration to network theory, the works of Poole and DeSanctis (1990) , Orlikowski(1991; 1994; 1996; 1997) and their later counterparts Akrich (1992) Carlson (1992) and Bijker (1987) do not really differ dramatically. The view is a very useful one, regarding humans and their technology adoptions within one system which is expected to change, to change the humans, and to be changed by the humans, and where the technologies can reasonably be explained in those systems as if they

were active agents if not self aware ones! More importantly, the recognition of dramatic technology impacts on humans such as those described by Haraway (1991) and Wajcman (1991) provide powerful images of the connections between humans and their technological dependencies. These views provided a most useful reference point in the analysis of the initiatives and events which made up this research.

The literature of gender issues in technology is critical to this research since it informed the means by which various projects were begun, supported, and understood. Most of the research participants were women, and while their own interest in the gender and technology research may not have been often articulated, my own growing awareness of these issues was one of the most rewarding part of the study. In seeking to initiate, or to support a technology initiative, constant reflection of the power relations that were appearing and changing became a feature of the dialogue around the research group. Similarly, our constant reference to technology requirements and assumptions of end-user skills was able to be balanced using the knowledge of the various advantages that people have or are able to take. My thesis argues that systems can contain people, that technologies are inseparable from their human users, and that appropriating a technology implies bringing the new system to bear upon all of the human and non-human participants. Ultimately, the humans change as a result of their dependencies. It might be useful to describe these people as "cyborg" in Haraway's terms (1991) since the technology "part" of the human, while perhaps not embedded in our flesh, make us still less "ourselves" when separated from the system. The research group rejects the notion of computer as

a tool. This expression had some favour at a time when there was a particular agenda of demystifying computers into non-threatening, harmless and benign objects. In education circles this tool was to be non problematic, and so teachers reluctant to use computers might be persuaded or indeed dismissed as worrying needlessly. This view also implies that the computer should be considered as intrinsically useful. There is enough evidence now to state categorically that computers themselves cannot be considered without their social contexts, their usefulness is to be continuously measured, and ultimate effects are neither benign nor harmless.

The research in this thesis gained significantly from the above literature in:

- Setting a framework for discussion of social issues;
- Providing a background of gender concerns that the group would use throughout the development and reflective processes; and,
- Alerting the researcher to specific processes of technology adoption.

Chapter three considers the second theme of literature important to this thesis, identifying matters of human communication with technology and some important work by previous researchers.

3 Issues of Communication

3.1 Introduction

This chapter puts forward the language for describing various communications phenomena, and provides a framework for the discussion of temporal concerns. The research participants were able to alert one another to interesting, challenging, and worrying events that are best discussed in terms of their communication structures. When humans are introduced to communications technology, it is often with little training or discussion about either the impacts on, or changes to known methods. In picking up a video telephone, it is expected (from science fiction perhaps) that the recipient might be always available, interested in being called, technologically equipped, and even presentable. At the time of writing, portable video conferencing devices were not available, although technologically equipped people were probably able to give a feasible technical and social example of how these might be used. As with most other public "essential" communications tools: telephones, post, telegram, experience soon reveals the rules and expectations that each brings. To give an example, since lengthy telegrams are expensive a recipient would not be surprised to receive terse messages by that medium. Equally, one does not expect to have a private conversation by telephoning a person whose location might be public. On the other hand, more sophisticated concerns that require stronger understandings of technology and social structures are left to training. A good example of this is the way that a file attached to an email message can be regarded with suspicion: It might contain a virus. In the course of this research, events and understandings were communicated to the group and to myself often

with important consequences or valuable reflections. Some of the language and issues raised in this section are useful to provide structure for the work.

3.2 Metacommunication

I shall use "metacommunication" to describe the communicative events or structures which direct or influence others' ways of communicating. Sometimes unwittingly, users of systems can influence the style of responses, the intensity of a discussion, or even others' willingness to participate by their postings or other activities. Feenberg (1989:32-36) indicates the powerful metacommunicative message which occurs when a top manager is one of the first to adopt and use a system. Deliberate metacommunicative acts by moderators and skilled participants of a communication system can have positive and lasting effects upon a system. These activities can assist by bringing common problems to public attention, or by "weaving" (Feenberg, 1989:36) finding unified threads in a discussion or by summarising. We are warned of the dangers of summarising or "intellectualising" messages and the negative impact this might have, particularly upon women's messages (Herring, Johnson et al., 1992:194,225) .

Into this domain we should also include that technological assistance through "robots" or "agents" or other functions are a feature of telecommunications software. These programs, often described as "intelligent" and in some cases "capable of learning", automated deletion, forwarding, archiving, threading, and labelling of messages are managed without human intervention. While these devices might assist with various moderator tasks, a human moderator will of course have a better respect for group politics, and strategic uses of information

(Sproull and Kiesler, 1991:76) Essentially, a thorough understanding of the metacommunicative effects of human and technology actors in a system needs to be built into the planning and implementation of many aspects of this research.

3.3 Temporality

There are distinct temporal qualities of the communication which takes place in a networked environment. Hesse *et al.* (1988) describe a transactional approach to computer-mediated communication with an holistic view. These transactions regard the processes, and social and psychological environments. and temporal qualities as "inseparable and mutually defining."(p.148) In their transactional world view, they warn that the temporal elements can not be isolated, but paying due regard to social, technical and other factors, their analysis is most useful. The examples and relevance of the analysis by Hesse *et al.* suffers slightly in that the examples used demonstrate technological systems with dated and rather simple interpretations of synchronicity.

Before reviewing the temporal issues of networked communication, it should be noted that in any conference or meeting of this kind, our understanding of a networked interaction must recognise the constantly changing context and background. To use an example, a group engaged in a discussion about computer hardware is distracted to anger when someone arrives late in the proceedings and insists upon rejuvenating a past issue, or a well meaning contributor inadvertently insults another member. The dynamics of such a conversation will obviously change to the extent, I would argue, that we might as

well consider new discussions taking place all of the time. This is an important matter to consider while reviewing or analysing conversations over time.

Hesse et al., explain the two "overarching dimensions" of temporality in communication attributed to Werner, Altman and Oxley (Hesse, Werner et al., 1988) a linear dimension- describing a continuum of past/present/future, and a cyclical or spiralling dimension of recurrent events (which may change with each interaction). A closer analysis is more usefully described by four "subordinate temporal qualities". These provide a framework for assessing the impact of technology which is temporally affected, and for explaining communication behaviours influenced by temporal issues.

3.3.1 Four subordinate temporal qualities:

3.3.1.1 Temporal Scale

The scope, duration, or length of a behaviour, action, or relationship defines its scale. Temporal scale seems to gain advantage in an asynchronous environment, since the scale is limited in a synchronous system. Hesse et al (1988) note problems when members underestimate or overestimate response times. (p. 151) Typically, people worry when responses don't arrive when expected, or are surprised when responses are sudden. Moreover, the limitations or extension of time (scale) can easily determine the content and quality of interactive material. Given time, a respondent might send copies of letters, research gained from other sources like CDROM, Web, or direct consultation with a third party.

The work of Hesse *et al.* returned two important findings:

1. Synchronous interactions temporal scale is of course limited and hence language and content are modified to compensate for typing speed and turnaround time. This might also partially explain the "shorthand" of synchronous chat and email.
2. We might expect a similarity in the duration of interactions by members of online groups. As the authors point out: "If scale is not or cannot be expanded sufficiently, then content and [illegible] reduced and homogenized to fit shorter time periods" (Hiltz, Wellman et al., 1988:151)

These findings should probably be tempered in the light of the tendency by people in these environments to conform to various (cyber) cultural norms. These include diminishing concern about grammar rules and other communication formalities.

3.3.1.2 Temporal Sequencing

There are two areas of temporal sequencing relevant to networked communication.

The first considers systemic operational tasks such as logging on and performing technical operations. The second considers the construction of a conversation. There are obvious problems with apparent synchronicity in "Chat"/IRC in that delays can lead to more or less tolerable interruptions to a conversation, or in many cases permit conversations to become intertwined. This is particularly interesting when secondary and tertiary discussions develop and participants may be more or less involved in a number of (often unrelated) discussions. (Werry, 1996) Once again, traditional expectations of order and etiquette in a conversation are stretched when participants enter or interject or conclude

without suitable cues. The language of automated entry and departure messages which are system generated are particularly noteworthy. A standard system message like; "Felix has arrived" can be customised by a skilled individual to, "A burst of light announces the materialisation of Felix." There are advantages for people working in communication systems who have mastered methods of dealing with temporal sequence, by overcoming sequence problems, or by manipulating the sequence. This manipulation might take the form of a writer insisting that a topic has not been properly closed if that had occurred while they were absent. In the case of customising a system announcement, this can affect both the sequence and the temporal pace expected by participants online at that time.

In an asynchronous system, there is little 'regularity' in sequence since the participants are less likely to know when others in the group might be online. The communication about a topic might run rapidly over several hours, and then wait for days until others respond.

In the same way, sequence is disturbed when new or returned members of a group seek or offer information about some topic which the group has already and recently discharged. This kind of problem in busy discussion groups often leads to the development of 'Frequently Asked Questions' (FAQ) texts or other more organised 'knowledgebases' so that valuable material is not lost, and is in fact easily locatable.

3.3.1.3 Temporal Pace

Temporal pace has two dimensions: objective and subjective. The rate at which messages or documents or other transactions take place can be efficient and productive and yet be regarded differently by the participants. An obvious example would be the person who complains that it takes too long to get materials from another site, despite the fact that many megabytes of data being transferred in the one day equates to transactions which would be quite impossible without digital communications. Hesse, Werner and Altman (1988:157) and somewhat later Rice (1992) regarded these concerns about pace and the quantity of information which can be communicated in a computer mediated environment. Both research groups were more interested in the temporal pace occurring in messaging environments, and considering the available technology of the time, it is not surprising that their work paid a close regard to typing, and real-time typed communications in particular. In their work, Hesse, Werner and Altman noted that participants in these systems apparently seek communication with others who speak at a similar pace. (p.157) This might not explain the associations of particular groups and their speed of work or response, or sense of urgency any more than their comparative typing or other technical skills! The same situation arises for groups where members are connected to networks with vastly different communication speeds. In this case distance and network connectivity, hardware, and skills, would combine to a measure of "technical response time", which may or may not be known to others in the group.

3.3.1.4 Temporal Salience

Temporal salience is described by as "..the degree to which an individual's thoughts, feelings and actions are past-, present-, or future-oriented." (Hesse, Werner et al., 1988:157) Future salience explains an important feature of communication, particularly where the communication is somehow outcome based and has an interest in developing relationship, products or procedures. The past and present salience components of a conversation can serve to position the discourse, make participants feel comfortable, or otherwise locate the intentions of the speaker (Figure 3-1).

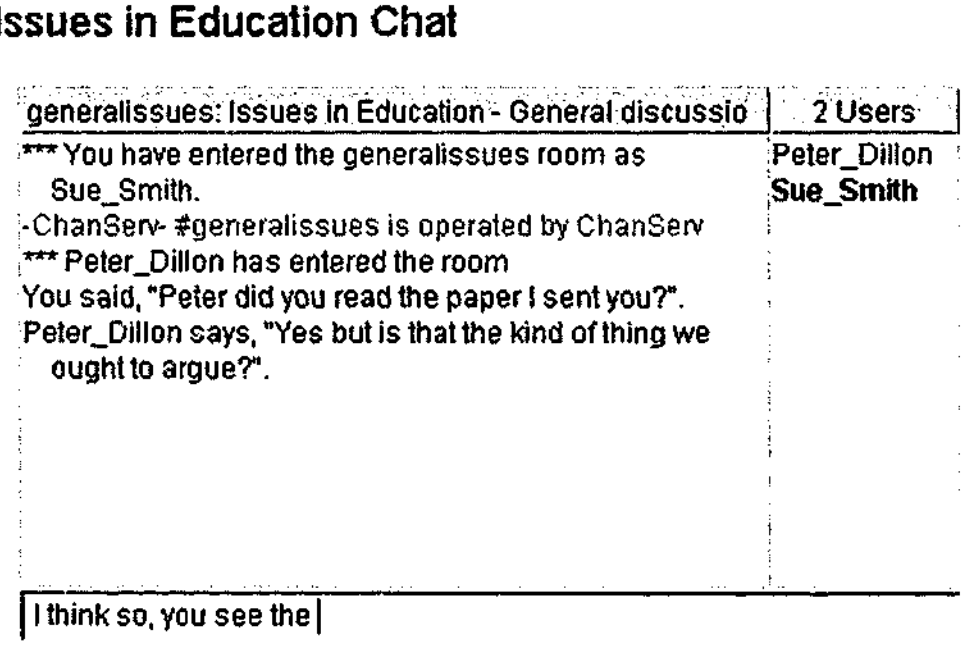


Figure 3-1 Orientation of messages in synchronous Chat

Problem solving may have present salience considering that there is a task at hand, nevertheless all parties may wish to indicate further possibilities for interaction and other future outcomes as a means of "completeness". Herring's description of messaging conventions, although directed to an analysis of gender issues (discussed in Chapter 2.8.4) identifies components of a message in terms of the epistolary conventions in salutations and closing comments, as well as the

introductory "metacomment" which typically contain the temporal salience which might be adjusted to create impact. Figure 3-2 shows an interesting example of a message sent to the author which, as well as its content, contains an example of future salience in establishing relationship, as well as indicating the potential of the work.

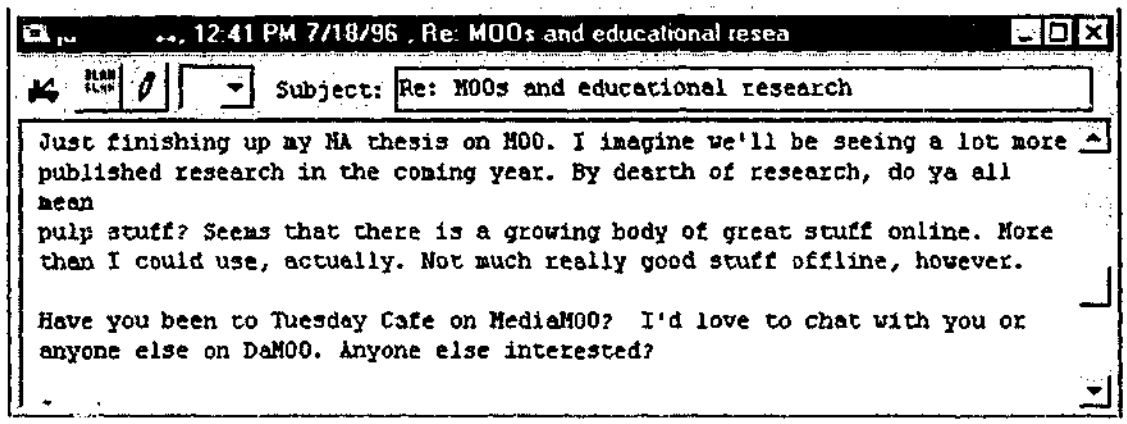


Figure 3-2 Email displaying future salience in body and postscript

The temporal salience visible in a messaging system, while of greatest concern to Hesse et al, should be extended to regard other communications artefacts. If we consider messaging to be merely a component of some larger system such as a Group Decision Support System (GDSS) or Computer Supported Co-operative Work (CSCW) environment, then the temporal salience of technical devices such as calendars, reminders, and robot agents ought to be included in our view. To give an example, a discussion or series of messages describing some past problem common to the group might inspire one participant to offer to send a useful file. The conversation taking place would change in anticipation of that file being received (and useful), and one might expect that the course of that conversation to change to a future orientation.

3.3.2 Synchronous interactions

Synchronicity in educational telecommunications refers to the sense of place and time. In assessing the value of synchronous communications, research by Hiltz and Turoff asserted that in their work most of the "real" work was done asynchronously. (Hiltz and Turoff, 1978:89) The types of synchronous communications possible were at the time little different to practice twenty years later in Internet Relay Chat (IRC). While synchronous communications were not completely ignored, these modes were passed over for the (apparently) more exciting possibilities of asynchronous messaging in bulletin boards and forums. Hiltz and Turoff state; "Of all the communication forms and conditions permitted by computerized conferencing, the synchronous discussion seems to cause the most difficulty and feelings of confusion". (Hiltz and Turoff, 1978:90) The evidence provided by these researchers is rather slim. They relate the experiences of people in one real-time "party" where poor technology meant that messages were very slow to be delivered. There was little organisation, and Higgins notes that there was a refusal by Roxanne Hiltz, who initiated the "party", to take a leadership or moderating role (Higgins, 1998)

Subsequent research by Kiesler (1984) noted higher levels of uninhibited verbal behaviour in "Computer Conferencing", but the levels for email (an asynchronous mode) are more comparable to the lower levels found in face-to-face interaction. It is interesting to note that Kiesler et al didn't actually identify the "Computer Conferencing" as a synchronous Computer Mediated Communication system.

Studies of students and educators using synchronous computer mediated systems can be considered as belonging to one of two types. The first of these uses the synchronous system to communicate learning material, provide opportunities for discussion, collaborative work and is characterised by technologies like Internet Relay Chat (IRC). Work by Simpson, (1999) Werry, (1996) and Marjanovic (1999) provides useful accounts of the issues faced by online learners who use these systems. The second type of study deals with the synchronous systems which provide a constructivist learning space, typified by Multiple User Domains (MUDs), Multiple User Object Oriented Domains (MOOs). A complete discussion of the latter group is given in Chapter 10.

Synchronous (real time) transactions in networked work and learning environments can display certain positive features:

- meetings can be effective for problem solving;
- responses to queries can be rapid;
- it is closer to an "oral culture"; and,
- users report an excitement of working in these environments.

Werry's thorough discussion of the nature of Internet Relay Chat (IRC) provides a strong framework for understanding the processes which take place in synchronous systems (Werry, 1996) Of particular interest is his identification of matters which concern effective IRC communication, such as : dependence of typing speed, response times, competition for attention, and the pace of communications (Werry, 1996:53) . These matters appear in all synchronous environments to some degree, and are important to the researcher's project in

that they provide a framework for understanding the interactions and secondary effects of technologies explored in the life of the research.

There are also, Werry explains, user behaviours in IRC, and are less common in asynchronous systems, but likely to develop. The researchers' experience with synchronous messaging in the EdMOO project (Chapter 10) reflects many of these:

- Addressivity: The use of people's names within a message to indicate that the message is directed (more) to one member, and the use of typed affirmations to indicate attention.
- Abbreviation: Werry points to the typical omission of pronouns, and the use of acronyms. We should also add, particularly in the transition of these modes to email and other asynchronous forms, the use of emoticons like ":-)"
- Paralinguistic and prosodic cues: There are frequent occurrences of creative capitalisation and spelling, and deliberate grammatical errors, designed to provide emphasis or attention. Werry notes that IRC participants "play with language" (p. 58). These are behaviours largely developed as strategies to deal with problems of pace, scale, and salience, but have developed almost to a level of cyber cultural expectation.
- Actions and gestures: Users may type messages which indicate some virtual action that is designed to give additional information about their opinion, or perhaps even to 'colour' the conversation. This technique is similar to the "emote" command in MOO.

Unless there has a been a prior arrangement for a 'meeting time', the quality of communication can be severely affected by the non-specific nature of the group in a synchronous setting. While members of a chat space, IRC or MUD/MOO might congregate in such a way that the 'space' defines their area of current interest, the interests and experiences of the members at any given time will vary. Even so, Harasim points out that synchronous meetings are in fact a more effective environment for group problem solving. (Harasim, 1990:61)

As can be expected, congestion of synchronous systems is a common problem. When rapid transactions, or wordy messages, or the sheer number of participants becomes excessive, a person interested in debating or even soliciting a simple response can be easily overwhelmed.

3.3.3 Asynchronous interactions

There are a large number of communicative processes and technologies which are asynchronous in nature. Researchers have successively found advantages that delayed time transactions in networked systems provide to their users which can be summarised as :

1. Improved opportunities for reflection.
2. The consequent archiving of communications.

In the following sections, these will be discussed in detail.

3.3.3.1 Improved opportunities for reflection

The advantages of asynchronicity to assist reflective behaviours have been noted by many researchers, (Feenberg, 1989; Hiltz, 1992; Harasim, 1995; Hawkes,

1997:12) efficiency and convenience (Sproull and Kiesler, 1991) In simple terms, users can delay their responses to a convenient time when they can compose a more thoughtful message, or a better informed message after conducting some other research. Furthermore asynchronicity allows more voices (Hawkes, 1997) to join a discussion since replies are considered less urgent, and more people are expected to view the discussion when it is convenient for them.

Even so, there are limits to the amount of time which would be regarded as acceptable as a contributor adds their thoughts to a conversation. Where the discursive contributions have been 'threaded' into a topic sensitive sequential system such as a Web Forum or automatic list archive, contributions are easier for readers to place into context. A Web Forum can be described as a web or html environment which allows semi-public postings of messages to an online community. These are asynchronous in nature, and resemble traditional "Bulletin Board" systems.

An asynchronous system which merely places contributions into a continuous sequence, as most mailing lists provide, will show multiple discussions interwoven. Following a multiple voice discussion thread in this environment is more difficult. Email from lists normally generates quick responses, partially one suspects as a result of enthusiastic participants. More deliberative discourse is a feature of systems supported by moderators who take some control over a thread rather than leave a discussion to "run its course".

3.3.3.2 Consequent archiving of communications

Once copied to some systemic database, a range of further techniques, usually managed automatically, provide extended usefulness to group members. Powerful systems can create useful indices which allow keyword, Boolean, or full text searching of the contents of the resulting archives. Some technologies permit automatic generation of Frequently Asked Questions and Answers documents (FAQs). This is the feature Feenberg ascribes to asynchronous communications, being able to provide of a kind of "group memory" (1989:25) a concept further explored by Sproull and Kiesler (1991:70) Poole and DeSanctis (1990:183) note certain advantages of asynchronicity in Group Decision Support Systems, however their context is a little broader, encompassing asynchronous elements of a system beyond message passing. This would include calendars, notebooks and databases. In a less structured environment typical of a mailing list or web forum, members inevitably contribute useful documents and software. There are limitations to the kinds of documents which various asynchronous services will support. In fact some won't support attached documents of any form.

The important temporal issue then, is in keeping the document or software (or indeed any other digital artefact) connected with the discourse that inspired its contribution, so that the full context will be known to future users of the 'archive'. Some means of encapsulating the dialogue so that the product retains its value is required. We should note also that some attachments may never have any value beyond the discourse, and to attempt to 'breathe life' back into one would show a poor understanding of the nature of electronic asynchronous engagement.

3.4 Summary

This chapter has dealt with developing a language for discussing events and situations that occur in a highly communicative environment.

The first theme pursued was that of metacommunication, to the effect that this research became able to recognise influences upon the communications and patterns of communication produced during the study. This of course included the observations of participants and their initiatives as well as their casual observations of others' uses of communications technology. This effort was particularly valuable in recognising the influences of technologies themselves in which limitations, advantages, and specific idiosyncrasies encouraged or discouraged use. It is my view that these constitute metacommunicative messages as strong as those issued by the researchers.

The second theme reviewed the literature of temporality in network enabled communication. While there has not been a substantial amount of work in this area, the dominant theorists: Hesse, Werner and Altman are well supported by the observations of other researchers and provides a most valuable structure. In the development and reflective parts of our research, this language and structure was immensely helpful in the discussions and deconstructions of events that took place.

Our work with Bulletin Board systems (Chapter 6) can be clearly viewed in terms of attempts to resolve issues of temporal pace in particular. Similarly, our analyses of messaging systems discussed in Chapter 12, while predominantly asynchronous, extracted considerable new material to inform the effects of sequence in particular.

The final theme of this chapter introduced some of the concerns about message archiving and group wisdom. This is in the context of seeing permanence or other value in networked communication that might otherwise be lost or undervalued. The ultimate extension of this work would clearly be the online database methods of this research which are reported in Chapter 9. Even so, the task of maximising the distribution and the value of teachers' communications in networks was seen as an ongoing concern of the researchers. Readers are referred specifically to Chapters 6.3.3, 6.5 , 7.2 and 12.2. The following chapter addresses the third and final aspect of the relevant literature for this thesis, being a review of some of the important developments and projects conducted by educators who have worked in fields related to this research.

4 Educators' uses of networks

4.1 Introduction

This chapter provides a review of professional development activities of teachers which gained from the use of computer networks. As far as the author's research was concerned, two areas of investigation were pursued. In the first instance, a number of significant research and development projects undertaken in Australia and overseas provided valuable background and particular pedagogical stance to teachers' professional development. The author considers that staff professional development can quite rightly be considered as having its own pedagogy, and that perhaps more consideration could be given to the particular learning needs of the profession. Second, the history of teacher professional development using computer networks as well as non-computer based organisational frameworks, particularly in the state of Victoria provides a framework in which the author's work appears as both contributory and responsive.

4.2 Teacher professional development and networks in Victoria

Teacher professional development in Victoria has, since the late 1970s, relied upon a notion of "networks" where nominated individuals were charged with supporting the activities of teachers on the basis of curriculum or pedagogical interest. Similar structures existed in Technical and Further Education (TAFE) sector where *ad hoc* Special Interest Groups (SIGs) of teachers met to discuss teaching or curriculum, matters. At the time of commencement of this research, this model was commonplace. There was clearly a kind of "distributed system"

at work with these meetings, where might enjoy materials and experiences of the combined group, and opportunities for collaboration were available, if somewhat difficult to support except with face-to-face meetings. Computer communications was not a feature of these arrangements.

Interview data with the Principal of Second Primary School and the participants of both First and Second Primary schools revealed some dissatisfaction with these professional development "networks", particularly with respect to the practicalities of travelling large distances to meetings and to the ways in which these groups were largely unsupported by resources or specialised staff.

> *They have no sense of direction and no resources. What you are looking at is a top-down model and what you feed in doesn't go back upstairs, so no matter what you think, no one wants to know about it.*
>
> (Principal of Second Primary School, personal interview, 7 February 1996)

The Principal's second concern about the meetings network model was that the structure of these groups made it unlikely that they could influence policy makers "upstairs". By contrast, an earlier interview with the teacher participants from the same school revealed a strong interest in those network meetings where "really practical" teaching activities were demonstrated. While the teachers indicated a preference for meetings with colleagues who were respected and competent, they acknowledged the infrequency and variable quality of the activities.

4.3 Teacher communities and networks

While there have been many formal, and informal electronic networks for teachers established since the early 1980s, an overview of these can extract a limited number of approaches, and an even more limited range of implementations which had been somehow theoretically informed before their commencement. Networks tended to be developed as a "why not" response to seeing the potential for teachers to (somehow) use the technology for speaking with one another and for sharing documents.

It is not surprising that many networks for teachers appeared as a result of enabling technology being suddenly available. In most cases these implementations created networks with technical capacity well beyond the knowledge and skills of users, and able to support activities that could not be realised until skills training and theoretical understandings could be improved. Shears and Dale (1983) describe a pioneering network which operated in Tasmania in 1982. TASNET comprised two hundred and fifty terminals with one located at each secondary school. At the time of the report, the use of this extensive network for teacher professional development was mooted as an "emerging issue" (p. 52) and yet the system was in regular use by librarians who used it to access a library catalogue card service, and offered (electronic) mail to all teachers. At the time, Shears and Dale reported limited few other global efforts in providing networks in schools (France, U.S.A., Canada). No others were identified with any interest in networking, and only Tasmania considered the networking of teachers for professional purposes. Interestingly in their recommendations, the authors recommended a "chain reaction" model for

teacher training (p. 79) but the use of the computer networks or "timesharing systems" as they were also known, did not feature at all.

A short lived initiative of the Victorian State Computer Education Centre (SCEC) saw the development of a powerful network of Bulletin Board Systems across that state in 1985. The author has been unable to source any written information about the original design and aims of this project, but was personally involved with the promotion and maintenance of one of the systems. The project provided a computer and modem to each of the district offices around the state. These computers were to be programmed to interconnect on a regular basis so that educational support staff based in the regions could communicate. Furthermore, it was expected that teachers in each district's schools might take advantage of the service to communicate and to house documents as useful teaching resources. Materials written by SCEC staff at the time described the potential uses and technical issues for connecting to the system and to public bulletin boards, (Kerr, 1986; Kerr, 1987) but projects designed to foster the uses of the systems did not appear in the state until 1988 and 1989 when one regional office and subsequently SCEC provided limited funds for the author's City Limits system. A complete description of that project appears in Chapter 6.

Bulletin Board use requires different structures compared with the Internet based email and listserv constructs which became commonplace in the mid 1980s. The first instances of bulletin boards were not interconnected, and so a teacher communicating with others was physically connecting to the same computer and telephone lines as their peers. As we shall see there were practical limitations in

this method, but a certain sense of community appeared as a result of this arrangement. It could be clearly understood by all teachers involved with a system that they were all heavily dependent upon the same limited computer hardware, and the individuals who operated it. All participants knew and were known to the system operator (Sysop), and by simple means could watch the activities of other teachers to see who had been connected recently, who else they may have been writing to (publicly), and have a much more complete understanding of the extent of their community. In a sense this was a manageable group where names and interests of others became quickly known, and since they were more likely to be geographically located nearby, were also able to meet from time to time. BBS connected teachers dialling the local machine tended to be in the same city and its environs, otherwise they would incur significant long distance telephone charges. As a result, the occasional face-to-face meeting of BBS teachers was not unusual. Once efforts to connect BBS systems themselves into networks succeeded, this close community could be seen to give way to more open and anonymous networks that are now typified by the Internet protocols.

4.4 Developing online professional communities

Valuable work by Schrum, (1995; 1996b; 1996a) Riel (1993) and Harasim (1986) recognised the potential for professional development in computer-mediated environments. In her "Rural Telecommunications professional development projects", Schrum (1996a) listed among her objectives to "...create a community of teacher/learners who would use information technologies to

communicate with each other for professional and curricular activities. " Her analysis of the project suggested that it did not develop as expected, and that an unexpected amount of time had to be spent on technology and internet resources, leaving little time left for "community building". (Schrum, 1996a:252)

Similarly, her 1995 Professional Development Project (Schrum, 1995) found that the intensive work did not produce dramatic results for individuals. Most did not reach their goals, nor fully implement projects and plans. Nevertheless, there was a measure of success for individuals in that they "..continued to explore, read, experiment, and work to implement information technologies in whatever ways they have available." (Schrum, 1995:228)

Schrum succinctly observed that "Communities of practice do not automatically emerge when educators are given access to computers and networks.". (Schrum, 1996a:260). Schrum's research and subsequent recommendations are a most useful resource in an environment where declarations of networking success are frequent and often without much basis. As we have seen in chapter 2.3, projects have tended to be non-evaluative, or at least assume success with respect to one or a combination of the following claims:

1. The project created a self sustaining professional community.
2. The project developed high volume communications traffic (lots of email and files being transferred).
3. The project ran for a long time.

There are of course projects which have made significant contributions to our appreciation of the potential communications technologies in teacher professional development.

Under the umbrella of the highly successful LabNet project, DiMauro and Gal (1994) developed a significant project which concentrated on the roles and needs of network facilitators. Specifically, they worked to develop a community of supporter / moderators charged to develop discourse with other teachers in collectively examining their experiences, reviewing work, and consulting with peers about means to improve their work. (DiMauro and Gal, 1994:125) Telecommunications for professional development was central to the LabNet project which sought ultimately to create a community of science teachers developing ways to implement "project-enhanced science learning" (PESL). Participants: Teacher Liaison Consultants (TLCs) were to work with groups of teachers to support their work with PESL.

Success of the LabNet project has been attributed to factors which, according to Spitzer and Wedding (1995) were the result of thorough planning. These included attention to purpose, critical mass, and moderation issues. Of course LabNet featured user control over some of the design aspects, but a target critical mass was ensured through advertising and recruitment. While the need to plan and support teacher professional development activities is almost self-evident, the studies outlined gave a most helpful background for the author's study. In particular, a view that structured professional development activities did not necessarily mean that the outcomes and procedures would always be known. In

fact, using several "checkpoints", particularly support, celebration of success, and technical flexibility allowed the research project a sense of strength, and an accompanying relaxed and curiosity driven progress.

4.5 Knowledge construction and networks

The Ontario Women Educators' Computer Conferencing Network, (Harasim, 1986) supported two types of student :

- graduate students of education who took the online course for credit; and,
- K to 12 teachers who took the same course for Professional Development.

Harasim's research provided observations of the teachers' concerns, technical problems, as well as a valuable conceptual statement. She observed advantages to participants of removing time and distance constraints, improvements in professional development by linking home and work, and in equalising the participants. Other gains were noted in the boosting of participants' morale through the group support offered by her project. Possibly the most important issue arising from Harasim's work is that it is described as, "...New forms of communication and knowledge production in the context of professional discourse.", (Harasim, 1986:71) which is particularly valuable in the climate of other teacher communication projects which were unable to provide much documentation or reflection about their actual uses and perceived value. The author's research encountered many instances of educational professional development communications networks missing the opportunities to gather the work and reflections of their participants. Such was often the case when change

agents saw themselves as "too busy working on the task.." for example. Harasim's view that something fundamentally different was being made possible, particularly the 'production of knowledge' is consistent with the author's research which saw several new ways of conceptualising data, information, and communications. Developments in web database (Chapter 9) and MOO (Chapter 10) for professional work are powerful examples.

A second notable project with a view of communication technologies and knowledge building was developed by the Ontario Institute for Studies in Education (OISE) and titled the Computer Supported Intentional Learning Environment (CSILE) (Scardamalia and Bereiter, 1994) The researchers developed this project as a discourse medium for students, and while considering the teacher also as participant, they were expected to develop the topics and broad goals for student discourse. The technical parameters and possibilities raised by this project are significant. First, the system was based on a Local Area Network, and thus expected electronic collaboration on a local scale. Second, the discourse functioned on the basis of participants passing notes to the database, rather than to a personal or group address.

The notion of "knowledge building communities" grew from this. Students were able to create links between documents, add comments to discussion items, and were required to justify these connections. While this approach was student centred and restricted to the local area network, and hence to a "safe" community of collaborators, it displays a more far-reaching approach which networked teacher professional development might have enjoyed.

4.6 Specific issues in Computer Communications

> *Networks offer learners and teachers access to new ideas, perspectives, cultures, and information- enriching locally available resources. The group input enables multiple perspectives on a topic. Cross-cultural communication and global understanding are also facilitated...time, place, and pace of education are expanded and become more individualised while peer interaction and collaboration are emphasized.*
>
> (Harasim, 1995:12)

There is much evidence that network use itself is motivational for teachers and students. The proliferation of online "projects" which appeared in the late 1980s with K12Net (see Chapter 6.4), Global Classroom Project, and somewhat later, the Australian Telecommunications Calendar (Williams, 1994) has been a direct outcome of educators seeking to employ the networks in a curriculum focussed activity. More recent examples, such as the Mag-Net 1998 Projects page (Ismail, Richards et al., 1998) show that the intentions and expectations of teachers have remained similar, apart from the inclusion of more sophisticated technology including video and database applications. By the same token, it is evident in the Mag-Net projects that the level of accompanying documentation and the degree of attention to curriculum frameworks and established theories of teaching and learning is a high priority. A complete discussion of the Mag-Net initiative and its relevance to this research is given in chapter 7.2.

The uses of networks by students celebrated connections to remote schools, international 'same language' schools, and less frequently to international schools

with different parent languages. The 'pen pal' style of projects invariably preceded more elaborate curriculum based activities. In spite of their limitations, communications between students sharing information about their homes, pets, and television preferences have been effective activities universally reinvented by well-meaning teachers. A detailed discussion of relevant communication projects related to the author's research begins in Chapter 6.

The potential for networks in learning environments does not, however exist solely with the ability to bridge and inform cultures, but rests with the added ways in which learners can engage. This engagement refers to work with materials, documents, databases, and with peers and experts alike. Networks offer diverse means for learners to interact, to establish collaborative groups, and to better understand the ways that they best work and learn. Orlikowski, (1996) working in an industrial setting, introduced Lotus Notes (Lotus, 1995) as a means for employees to communicate and to respond to client demands. She noted that while people's styles of work changed from face-to-face to online, the members of the group were not necessarily geographically distributed. This suggests that some other aspects of the network, probably the improved functionality of a knowledgebase, and communications asynchronicity provided tangible advantages for users (Orlikowski, 1996:42)

One of the author's concerns was that of the early "online projects" conducted for students in schools, few realised the potential of networked learning beyond a "ping pong" of email, or a search of the Internet.

4.7 Professional networks as a requirement for specific projects.

There have been a significant number of professional networks which were developed directly or incidentally to enable or support student learning activities. For the main parts, these have been projects which involve students writing letters, collaborative writing tasks, or data collection activities. Highly promoted projects of this kind have tended to be global in nature. The celebrated I*EARN projects, and particularly the Learning Circles established by Margaret Riel provided solid infrastructure for teachers wishing to engage groups of students in global communications projects. Riel (1998) observed benefits for teachers participating in the Learning Circles which reinforce the potential for professional community and collaboration :

> *When asked to rate the effects of participation on their professional development, their average response was 4.4 on a 5 point scale, higher than their assessment of than any of the student outcomes. This finding indicates that teachers valued the opportunity to collaborate with their peers. The team teaching arrangement resulted in many discussions of educational issues with teachers who have access to very different resources and information. The diffusion of good ideas moved rapidly across district, state, national and international boundaries as teachers compare notes on what changes have or are taking place in their schools.* . (Riel, 1998)

Oz-TeacherNet (Williams, 1995) was developed to provide a single focal point for Australian teachers' professional communications. It provided a central

mailing list and various archives of software and educational resources. In time this grew to realise Williams' vision of an "Australian community of Internet-using teachers to foster an Australian approach to the sound educational use of the Internet." (Williams, 1995:133) The *single* community of Oz-TeacherNet represented by its mailing list conceptualises the sense of electronic community differently to other efforts. Previous teacher networks which operated on Bulletin Boards (see Chapters 6.2.1, 6.3.7 and 6.4) had been exposed to a larger number of focused communities which were identified either by subject area (e.g. Maths, Music...), by level (e.g. Senior, Junior...), and by projects (e.g. K12 Maths puzzles). Superior connectivity via the Internet caused the Bulletin Board communities to wither away, but their Internet-based alternatives featured immense memberships and less focus. In the early days of Oz-Teachers, new list members were invited to post a short introduction as they joined. An overwhelming number of similar, directionless postings followed, which may have helped individuals feel more welcome, but certainly proved that all of the members lived somewhere in Australia, and wished to know more about the Internet (sic). The dynamics of discussion lists, the extent of their memberships, level of activity as a function of membership involvement, and *lifespan* require as much planning as the projects which members are expected to adopt. List lifespan was an issue recognised by Oz-TeacherNet administrators :

> *The life of any list will be determined by the volume of traffic it supports. It is therefore possible that some lists will be fairly permanent while others may only exist for a short period of time. These lists will complement the functions of the general list, oz-teachers, in that they will be able to cater for discussion of issues*

> *which, while of significance to some members of the community, may not be of particular interest to a majority of members.*
>
> . (McKeown, 1998)

To attribute the lifespan of a list to traffic overlooks the other dynamics. Highly successful curriculum projects and support networks have made use of lists and other asynchronous services which subsequently closed. The continuance or closure, or even the volume of traffic supported by these services is not an appropriate measurement of their success. Indeed, relatively quiet lists and bulletin boards may have greater benefits to members as a result of better 'signal to noise ratio' or more likely acceptance of one's ideas. Similarly, a service which closes at the completion of explicitly stated aims doesn't imply that ongoing effects or other benefits were not achieved. In full context, McKeown is referring to a construct of 'smaller' lists which serve specific functions which might not be of interest to the large Oz-Teachers list community.

4.8 Issues

4.8.1 Approaches to the Skills Training of Teachers

A necessary component of most professional development activities which involve technology is the "enabling" skills training and support of participants. This is particularly interesting with projects where the technology itself is either the focus, or part focus of the study. Often, projects involving teachers and telecommunications have treated the technology as an "enabling" (my quotes) function. This means that effectively, the technology is regarded as secondary to the (educational) aims of the project, and various concerns follow:

- To what extent do we value the technical skills gained?
- How do we account for the technology skills of the participants affecting the outcomes of the project? And,
- How do we provide useful information about the kinds and levels of skills required to enable a project so that future researchers can best implement successful endeavours?

Schrum (1996b) as a result of two projects (qualitative approach and using ethnographic techniques) made certain recommendations including:

1. A "train the trainer" model is supported..
2. Telecommunications should be used by staff in preservice courses.

Schrum's research provided a number of valuable insights into the potentials of communication technology, and improved understandings of the practicalities of implementing the technologies and supporting their use. One of Schrum's projects provided Macintosh Powerbook computers and modems and accounts on a University mainframe in order for participants to develop collegiality. A side benefit of this was that respondents thought that the PowerBook computer itself was the "biggest strength". (Schrum, 1996a:250) The project in question included Saturday training and sessions of up to 6 hours duration. At the time, it was apparent that participants would have needed to travel to face-to-face workshops, rather than employ an electronic self-directed approach. Schrum reported the frustrations of participants who encountered machines or accounts not being correctly setup for their immediate use after training, which indicated the level of reliance that trainees had upon "fault-free" systems. Studies of this kind were well financed and able to support participants' travel expenses and other costs in a way that other initiatives could not emulate. Voluntary

participation, self-help projects, and on-call documentation by contrast were the hallmarks of projects which were similarly enthusiast driven but without funding. The author's project managed several initiatives that were completely unfunded, and placed a heavy reliance upon expert participants (see Chapters 6.3, 7.1, 10.6)

4.8.2 Technology and Training

With few exceptions, teacher networking projects, or projects with indirect aims for teacher professional development have been based upon a model of 'technology then training' which, while understandable, they have not resulted in dramatically different outcomes for the teachers concerned. In effect, pre-existing communication systems; bulletin boards, listservs, telnet applications and the like have been pressed into service and training programs and materials developed without particular consideration for the specific needs of the target group. In fact the 'system' of CMC hardware and software, client software, client training, moderator training and so on tended to be regarded as discrete episodes or objects.

It could be argued that the simple model of providing technical training which will apparently then enable professional communication fails in a number of respects;

- training in software and hardware is usually conducted before applications of the 'system' are fully understood;
- the actual curriculum or collaborative aims if any, are frequently seeking to investigate or prove effective use of the technology; and,

- problems are underestimated, and usually identified as simply technical or training issues.

These are particular concerns since a project's failure can be too easily attributed to some or all of; poor training, poor technical support, user ineptitude, and poor software. In Chapter 2.5 it was shown that we should regard these projects as social systems under construction in the first place, and that they are necessarily in a constant state of structural change.

4.8.3 User Support

Technical and other end-user support are frequently overlooked or at least underestimated as complete and planned component in implementing systems. This project attempted to position the researcher, technical and other support in roles that would be informed by the above literature. This would have avoided the common interpretation of 'good support' as being merely responsive and friendly. Nevertheless, this aspect of the research was not questioned, and possibly should have been.

4.8.4 Distance and cost

Interestingly, the use of networks in pre-service training has been largely concerned with spanning distances and "institutional barriers" (Merseth, 1990:2) In the late 1990s, economic imperatives appeared to have caused new interest in providing initial training with networks as an inexpensive alternative to providing on-campus facilities, computer labs, and scheduled classes. In other words, there is a danger that networks in these contexts view the technology as merely enabling traditional modes of learning over distance, or at a reduced cost.

Teacher networks of the kinds described by LabNet, the Australian "Oz-Teachers" mailing list, and the author's "City Limits" Bulletin Board, consider the process of teacher professional development as a learning issue, where they model new and effective modes of learning through action collaboration for an older cohort!

It is important to note that participants of the researcher's City Limits Bulletin Board project started to use the system as a means of communicating and working with other teachers, but almost universally sought to demonstrate the potential of the system to their students.

4.8.5 Modes of discourse: hidden communications

Little has been learned about the communications which occur as a result of various online systems which are not visible from the network itself. Spitzer and Wedding (1995) identify three "modes of discourse" of this kind. They refer to users of the LabNet system who are silent while learning the etiquette, or as a result of intimidation; to participants of the system who spread the communications to individuals who are not members of the community; and to private email communications between members. The negative connotations of lurking have been discussed in Chapter 2.8.3, but it would seem reasonable to expect that members won't speak to every issue appearing on a bulletin board or listserv simply because the topics are not always of interest. It is more significant to ensure that members who *might* have a contribution are identified, and encouraged to speak up. To this effect, non-intrusive databases of members'

skills and interests could be maintained and monitored by moderators. Two further modes which are particularly relevant to moderators' roles are:

- writing private email to the author of a public posting; and,
- posting a public message as a result of direct or indirect encouragement.

In the first instance, this approach may be adopted as a means to retain anonymity from the list, or to test an idea for fear of ridicule or of being identified with some person or idea. The second mode can have a powerful effect upon a system when normally quiet participants become vocal, particularly when there has been a public encouragement by some high status member or moderator. Obviously, the positive effects would be to strengthen the community and the individual concerned.

4.8.6 Moderation and Facilitation

The need for moderators of online discussion systems was established early in the history of Computer-Mediated Communications. In 1979 DIALOG system had both open and closed conferences and moderators. (Zuboff, 1988:365) The actual role of the moderator has been loosely defined by various writers, (Harasim, 1986; Mason and Kaye, 1989) to include hosting, chairing, choosing a working model, providing contextual cues to the moods, establishing members' roles, expectations of the discussion, and meta-communication.

Feenberg (1989) considered that the success or failure of online groups could be attributed to a number of generalised matters, which would properly become the responsibility of online moderators:

- systems, training, materials adjusted to proficiency of the group;
- selection of software and systems suited to the needs of the group;
- construction of conference architecture by breaking down the various concerns of the group into separate discussion forums;
- provision of leadership, development of moderating skills; and,
- starting activities with all members clear on the agenda and procedures.

(Feenberg, 1989:28) .

We should add to this list the various devices available to moderators that are either mechanical or metacommunicative. Labelling messages directly, or announcing the arrival of significant messages would be one form, and may go some way to assist members who believe that a system is generating too much traffic. Participants or moderators can nominate the purpose of a message as 'promise', 'request', 'tip' 'information', much the way a subject line would help readers, but with a more limited vocabulary. The frequent uses of "Re:" and the name of the listserv or system in subject lines is an example of how this rapid filtering can take place. It could also be easily automated using most email readers. (Sproull and Kiesler, 1991:76)

4.9 Summary

This chapter has identified the projects, initiatives and technologies used to establish and to maintain teacher communities through the use of computer networks. There are four themes in this discussion:

- Establishment and visions of communities that came about through the introduction of the network systems.
- Opportunities that these networks created for their communities,
- Consideration of the measures of success for these groups, and
- Training and support mechanisms.

The communication potential of networks to support community building was seen by a range of practitioners and bureaucrats at an early stage of technology development. The author was involved in many of these prior to the commencement of this research, and was able to gain an improved understanding of the needs of teacher communities as well as a desire to construct and support such networks. The mid 1980s were busy times for educators seeking to employ communication technologies, and their efforts have resulted in effective and in some cases long-running associations. More importantly, they have given rise to valuable experience which underpinned the work of many subsequent researchers and enthusiasts. The author's involvement in these technologies began at an early time with experiments into the technological possibilities. These endeavours were problematic in that they were conducted without much support and while recognised as innovative, were not conducted within the traditional parameters of research. In fact this final project is really a culmination of those efforts, organised and documented. The experiences of Schrum, Harasim, and Riel informed the ultimate designs of this research.

It was noted by most researchers in some way or another that establishing online communities for educators needed to be more than providing technology. The

quality of ongoing support, clear knowledge of purpose, and continuous monitoring and moderation are not surprisingly primary requisites. A clear statement of likely outcomes should be added to this, since it is evident to the author that many stories of success and failure were based upon unrealistic expectations. In particular, the expectations that a network would grow immensely and quickly, or that participants would donate vast and valuable contributions as a matter of course.

Experience of the above researchers shows the need for a threefold structure of training, support, and moderation. All of the projects address these concerns, and all were able to claim value from the investment of those efforts. It should be added, however that many training and support activities appear to lose recognition through their informality. Considering the numerous small messages of encouragement, tips, observations of others' experiences, and face-to-face activities taking place around such a network, it is clear that they have considerable value in developing and maintaining the network. These support and training activities are for the most part poorly documented, and for this reason, those informal communications and observations have been deliberately sought and publicly valued in this research.

I believe that the future management of networked communities, their communications and development of new knowledge need to be more "self aware". It may be that a technology solution could be effected that would enable "tagging" and other context or valorisation labels for online discourse. The nearest thing appears to be a strong moderator who brings about these

discussions, and who helps create a positive metacommunicative and reflective influence. A technology similar to Scardamalia and Bereiter's (1994) database appears to show this potential in the hands of a suitably managed community.

5 Research Methodology

The research undertaken by the author with his group of research participants needs to be described using the language and methodologies of several distinct and familiar approaches. While this work does not fit comfortably into any particular or even group of methodologies, it both borrowed and grew from certain quarters. In this chapter, several of the key methodologies and established practices that gave rise to the project's processes are explored. It is argued that the narrative and largely participant – based approach is rigorous from the point of view of clear intention and transparency of processes. Typical examples of participatory action research which have similarities to this study demonstrate close conformity to data collection and analysis methods which are not challenged here. Rather than enjoy the formulas, conventions, and indeed wisdom of established methodologies, it is more appropriate to treat the project herein as a narrative which relates an unique and thorough exploration of educators developing and developing with technology.

5.1 Qualitative Research

There are powerful resonances for the author contained in the words of Denzin and Lincoln (1994) who describe the qualitative researcher as *Bricoleur*. A history of tensions in working with technologies in educational settings, sometimes with negative results and discouragement has nevertheless left behind an enthusiasm and willingness to explore the potentials of technologies. While the *bricolage* might be more aptly defining the tinkering with methods and

approaches, it is perhaps at the same time mocking the author's predilection for technical experiments. The qualitative researcher:

> *...encompasses the strategies, methods, or empirical materials at hand. Research is an interactive process shaped by personal history, biography, gender, social class, race, and ethnicity.*
>
> (Denzin and Lincoln, 1994:2-3)

While the current project seeks to document those events, decisions, outcomes and accidents which the group either experienced or caused.

Writing and narrative particularly in a postructuralist context, is at odds with the traditional understandings of ethnographic writings, where a kind of dispassionate style, approaching scientific credential is sought (Richardson, 1994:519). Richardson describes these in terms of an assumed *scientific authority* (p.520). Validating and authentication of data are dominant themes in this research from a number of points of view. In the first place, the group was interested in informing and being better informed about the ways in which one must attribute authorship, authenticity and fact to electronic documents. In the second place, the project needed to be quite self-aware in identifying these discussions as they might occur through people's concerns and initiatives. Narrative reports by email and their subsequent interpretation, documentation and response are as challenged by the research method as they are by the technology. The methods used in this research needed to support many methods of gathering, reviewing, and reflecting upon the events and observations that took place.

5.2 Ethnographic methods

The author describes the current study as 'ethnographic' in which the participants' behaviours and observations recognise the inclusion of the structures and technologies into the given social setting. Equally, it could be argued that this approach has explored the social contexts of various technology systems. This is a result of the ways in which each system was built by a group of people, and often with reference to their perceived needs of others. It was considered that the informed views of socio-technical structures understood by the researcher and participants discussed in chapter two would make this possible. In effect, the study was interested in the actions of the participant group and the researcher, as well as those who came into contact with the products of the study. Several incidents in the life of this research saw the wider education community brought into close contact with the research through their interest in particular developments. Particularly strong examples can be seen in chapters 6 and 8.1 of this work.

Atkinson and Hammersley identify features of ethnographic research which include:

- *emphasis on exploring the nature of particular social phenomena, rather than setting out to set hypotheses about them.*
- *a tendency to work primarily with "unstructured" data, that is, data that have not been coded at the point of data collection in terms of a closed set of analytic categories.*
- *investigation of a small number of cases... in detail*

- *analysis of data that involved explicit interpretations of the meanings and functions of human actions, the product of which mainly takes the form of verbal descriptions...*

(Atkinson and Hammersley, 1998:110-111)

This description is useful to the project in that adequate attention can be given to the work of the human actors, but still it needs to be tempered for the researcher's purposes to elevate the importance of accounts of technology developments and impacts. There are significant technical issues that this research documents; many of them managed directly by the researcher. The following chapters describe in detail the range of issues for each initiative.

It is argued in this thesis that the technology skills of individuals need to be accounted for in any useful discourse about people and their uses of technology. The researcher is concerned that projects involving technology in educational settings often lack suitable technology planning, the inclusion of appropriately skilled group members, and might frequently suffer from poor technology solutions.

This research was to describe and interpret the roles of the human and technology actors in order to better understand their relationships and to provide sound and useful material that will inform future work of this kind.

A collaborative or participatory approach has been developed so that the likelihood of undemocratic or hierarchical influences in the study are exposed, indeed avoided if this is possible. The researcher at all times has made his

political and technological viewpoints public, but the open and frequent disclosure of each participant's motives and fears was to be a feature of the work. The researcher likens this disclosure or evidence to a fibre or thread which weaves through all of the research activities, at once binding them loosely together, and at the same time providing a context and reference point. To complete the analogy, the thread changes in strength and size as it passes through each of the research events. Atkinson and Hammersley (1998:121) caution that the goal of ethnographic research is the production of knowledge, and that (apparently difficult) practical goals ought not to replace this, but the researcher and the participants of this project were equally focussed upon the full exploration of systems. This is not at odds with an ethnographic study, but recognises that the two issues cannot be separated.

5.3 Participative Inquiry

"Research as participation" provides a framework that the author wished to embrace at the core of this work. This kind of research, contained within the broad descriptions of "co-operative inquiry", "participatory action research", "action inquiry" (Reason, 1998:262) supports the researcher's world view in that it assumes that people are self-determining, at least to some degree. Participative inquiry methods recognise that people ought to work co-operatively towards agreed socially productive goals. This is with a self awareness that recognises the individuals and group as having some responsibility for the deliberate, and secondary outcomes of their actions. In this context, it is acknowledged by the group that they must deal with the changing social roles, disposition of their

labour and language, and be responsible for the development of their own socio-technical systems. To conduct a study of this kind needs a method with a refined understanding of the activities of interest, and viewpoints that will be taken.

5.4 Action Research

Kemmis and Wilkinson (1998) provide indicators for the study of professional practice through action research. They regard these aspects of practice as :

1. Individual performances, events and effects viewed objectively from outside.
2. Social and material conditions and interactions viewed objectively from outside.
3. Intentions, meanings and values viewed subjectively by the practitioners themselves.
4. Language, discourses and traditions viewed subjectively by practitioners.
5. Change and evolution of practice, taking into account the above, understood as .." .. ..reflexively restructured and transformed over time - in its historical dimension."

(Kemmis and Wilkinson, 1998:27)

The researcher's original design for this project considered that a traditional Action Research model would be an appropriate and helpful approach to work involving technology and humans. Significant work in Action Research for teacher professional development has been produced (see Chapter 3.4), and the body of theoretical literature suggested that features of Action Research methodology would provide a rigorous framework with this study.

> *Action research is a type of investigation combining practice and theory that is designed to both cooperate with as well as support less-enfranchised actors and groups in a system of study. Researchers following the action research paradigm explicitly question the acceptance of the status quo, patterns of control, normative choices about technology, and operating constraints on action and choices.*
>
> (Williams, Rice et al., 1988:pp.45-46)

Williams, Rice and Rogers indicate the features of action research in that it attempts to combine practice and theory by:

- Providing feedback to all relevant actors in the system of study.
- Providing continuous feedback to the respondents of the study.
- Participation by the researcher in the process of change.
- Developing alternate actions for the participants in the system.
- Considering actors as participants in, rather than objects of, the research process.
- Enabling researchers, practitioners, and respondents to gain from the research process.
- Attempting to balance the needs of multiple sets of actors with needs of the researcher (e.g. access to initial sources of data compared to concerns about confidentiality, and later publication of research results to academic audiences compared to feedback to the users). (Williams, Rice et al., 1988:46)

The author's interest in Participatory Action Research is largely because of its support for a view of the inherently constructive nature of actors. Moreover, participative inquiry methods support the understanding that the "phenomena" cannot be usefully separated from its context., (Kemmis and McTaggart, 1988; Williams, Rice et al., 1988:47; Kemmis and Wilkinson, 1998) .

5.5 Narrative

It became clear to the researcher, that established methodologies for action research were to become more problematic in this study. Over time, the need to adhere to the initial data collection and participant feedback and reflexive processes became less of a concern. In fact, while the intentions and process of the research remained the same, the dynamics of the group caused the research method to evolve and become somewhat subsumed into process. It is probably more correct then to reflect upon this research project in the context of both the participatory action research in the sense of its "political" and process-outcomes focus, but otherwise as a Narrative Inquiry. This enables us to encapsulate the group and its activities, as well as to explain the processes which were developed for collection and analysis of the group's data. In this study, all of the participants have a voice. According to Connelly and Clandinin, narrative inquiry is characterised by "mutual storytelling and retelling", (Connelly and Clandinin, 1990:4) and it is this fundamental belief in the importance of the participants' own telling of their experiences , most highly valued.

This approach to the research is characterised by several factors :

- The researcher should be neither silent, nor a mere observer to the study. In fact whatever approach was to be taken needed to take account of the author's deep involvement with many of the technological processes as well as the establishment or reinforcement of social groups which were aligned to the technological activities.
- A clear understanding that the process of telling the stories is as much a part of the research as the social and technical developments. This provides a context where the research itself defines a technology system, and one which equally values the participants' articulation of the processes.
- Participants "living", (Connelly and Clandinin, 1990) telling and re-telling of their stories helps to define and redefine the nature of the systems.

While traditional narrative data sources would include field notes, journal records, interviews, story telling, letter writing, autobiographical and biographical writing, the electronic communications which underpin this research add others. Electronic mail, list email, and bulletin board style messages are obviously used, together with some systemic and other electronic communications technologies which could be encapsulated by the researcher or by individuals. Detailed explanations of the data collection methods used in this research are fully described in Chapter 5.6.

Narrative Inquiry affords this research considerable flexibility. There is little emphasis placed on realising findings that are generalisable or externally validated, or tested for reliability (Connelly and Clandinin, 1990) These authors identify "apparency, verisimilitude, and transferability" (p7) as more helpful criteria.

Now there is a temporal issue raised by Connelly and Clandinin described as an "illusion of causality" attributed to Crites in Connelly (1999:7). In this view, events appear to display cause and effect connections when viewed and reviewed by narrative researchers. This serves as a warning in writing narrative, first in interpretation of events, and second in the irrelevant use of narrative data to produce generalisable results. Miles and Huberman (1994) give a similar warning in the terms of researchers needing to attend to the "variables"; the concepts and results of story writing and interpretation, and "process"; the temporal connections and chronologies (Miles and Huberman, 1994:147) .

In adopting a Narrative Inquiry, it is important to accept the personal and interpersonal issues which feature in both the inquiry and the writing. Without this, incorrect assumptions of relevance and verisimilitude are likely. A further caution can be raised that narrative inquiry can suffer from overoptimistic interpretation. Here, it must be assumed that the researcher is not able to be completely removed from the findings and interpretations, let alone his impact on the conduct of their study, the attitudes of practitioners and his use of technology. By recognising this fact, an open arena for the researcher's voice need not be a limitation, and in this case efforts were made to ensure that the influences and voice of the researcher are highly visible.

This study is no less vulnerable to criticism than other narrative studies. The researcher acknowledges the tensions that arise. In particular, the "untold stories" (Connelly and Clandinin, 1990) which are overlooked or ignored for whatever reason, and the balance in selecting specific records for retelling in

whatever depth. These concerns manifest in the full or wordy story telling where larger pictures are made available to the audience, or on the other hand some distillation where the researcher is possibly more comfortable in telling the story to an audience equally comfortable with the narrator's role.

In selecting the various incidents, events, developments and interactions amongst all of the human and technological actors in this research, the author has attempted to expose strengths and weaknesses in various stages of each of the several projects, and indicate and explain the failures where they occurred. There are techniques with which the narrator may shape the selected events which need to be exposed.

These include :

- broadening - making general comments about the type of character, event, or society; and,
- burrowing - focus on the event's emotional, moral, and aesthetic qualities.

(Connelly and Clandinin, 1990:11)

Both techniques in the researcher's context are encompassed by the telling and retelling of the participants' stories, but also the individual self-conscious, and group self-conscious discussions about the social and technological effects that their work is producing. Miles and Huberman (1994) offer guidelines for case explanations that are consistent with this approach. They include the issues of "understanding the case", avoiding "aggregation", and preservation of case "configurations" (Miles and Huberman, 1994:207) , all of which attempt to ensure that the relevance and contexts of events are appropriately documented. In this study, concerted effort was to be made to ensure that participants would

return to ask about the meaning of an event, and how a new story changing the meaning of the event or its significance might be written. Generally this was achieved through continuous email or bulletin board communication between the participants and their submission of regular progress reports.

5.6 This study

5.6.1 Technology and the Researcher

It was made clear at the beginning of this research that the author would take certain responsibilities such as training and provision of enabling technologies, and also that my interests, enthusiasms, capabilities and limitations would be highly visible. As far as possible, the group's mailing list contained all of the messages that pertained to new systems being set up, or existing ones modified, so that objections might be raised in the event that I might be making changes to the project that were not sought or needed.

Even so, no attempts were made to "protect" or hide development activities that were my initiative. In this research, innovations were enacted for one of the following reasons:

- member(s) of the group indicated dissatisfaction with a process that was technically soluble;
- member(s) of the group indicated a specific need which might be met with some aspect of technology;
- the author or another group member became aware of some technology which indicated potential for themselves or others.

Some of the systems developed were based in technology that the author had developed prior to the commencement of the research. The research could indeed be regarded then as a logical continuation of the researcher's earlier work but documented and driven with the assistance and reflections of a group of enthusiastic individuals. The timing and sequence of major research events, particularly their adoption, rejection, or development provides an important framework to appreciating the study.

5.6.2 Timeline

Table 5-1 outlines the sequence of significant events preceding this research along with the commencement dates of major technological projects which it initiated. The table provides the reference points against which these developments can be interrelated and furthermore understood in the wider context of external events which were taking place at that time.

Date	Event	External Events
1974		First bulletin board software
1985		Creation of FidoNet
July 1987	Author installs Bush Telegraph Bulletin Board (BBS).	
December 1988	Author installs City Limits Bulletin Board (BBS)	Creation of K12 Net
	Research fosters other educational bulletin boards, and connects them to City Limits network	
April 1992	Author creates EduNet network.	
June 1995	**This research commences**	
June 1995	Researcher develops City Limits and EduNet into Internet email systems. (Chapter 6.3)	
July 1995	"charlotte" mailing list created to support this research (Chapter 7	
July 1995	First projects underway	
	Charlotte archive and Web site	
	CuSeeMe Reflector installed. (Chapter 8)	
	Web database systems installed. (Chapter 9)	
January 1996	EdMOO launched (Chapter 10)	
February 1996	Last School based BBS point installed at Sixth Primary School (Chapter 6.3.7)	
April 1996	City Limits closes, all school based point systems also closed. (Chapter 6.9)	
April 1996	Drover software first version released. (Chapter 10.6)	
November 1997	Drover software second version released. (Chapter 10.6)	
June 1998	Drover discontinued, Java applet adopted for EdMOO	
August 1999	Data collection ceased	

Table 5-1 Project technology milestones

It is important to note that the research inherited some background from the author's previous work in the years 1987 to 1995. Significant developments by the research participants are indicated above along with reference to the specific chapters of this thesis where the work is described in detail.

5.6.3 The target group

The author has an extensive background in Victorian schools and Technical Colleges, and is well known in these sectors. Of the participants in this research, two were well acquainted with the author, through earlier projects involving computers in education. Others were identified to be a part of the research through their known interest in telecommunications. The participants of this study were identified by the author as appropriate groups and individuals who would meet some of the following criteria:

1. Demonstrated enthusiasm for working with new technology.
2. Interest in developing skills with telecommunications in educational settings.
3. Specific professional development needs which might be met through the exploration of telecommunications.

Table 5-2 Selection of Participants

This research did not set out to track the opinions and activities of the participants in order to seek findings that would give information about "types" of educators and technology, or generalisations about how educators in general might use telecommunications. Rather, all participants were understood to have roles as "co-developers", or "beta testers" of a series of product experiments in our own contexts.

5.6.3.1 Group Composition

The research activities were highly visible considering that all were visible either on the World Wide Web, or by dialling in to one of the older systems directly. Consequently additional individuals at various times added themselves to the activities of the core group.

The core group comprised:

- Four teachers at a Primary School who saw the project as a means of learning about the potential of computer communications. Three of these people moved schools during the research, but continued to participate.
- Two teachers at Primary Schools who wished to establish International Bulletin Boards for students to communicate.
- Two teachers from Secondary Colleges who wished to work with the author and other participants to explore the potential of computer communications in all curriculum areas.
- Six teachers at a Primary School who saw the project as an opportunity to gain Internet skills.
- One teacher from a Technical and Further Education tertiary setting who wished to join a group who were evaluating new technologies.

Table 5-3 Membership of the Core group

The core group was in itself dynamic; teachers changed workplaces during the research and several changed positions within their workplace. The changes impacted upon the project in terms of individuals' levels of activities and focus. There were examples of people who suddenly gained positions of responsibility

for related school professional development, and were thus newly motivated, and several cases of people losing access to technology which gave them access to the project, or whose workplace responsibilities caused them to remove themselves from the project. It is notable that people who "left" the project never did so formally, their activities simply continued to diminish. When the author contacted these people they always expressed an intention to become more active as soon as other circumstances would permit (see Appendix 2.2).

5.6.4 Data Collection

Participants all discussed the ways in which their work and their observations might be documented. It was resolved that the products, software, and interactions which took place might be easily tracked by the systems themselves through logging and archiving. The observations of individuals and groups were gathered by a public mailing list, and by private email. The only exception to this was the conduct of two semi structured interviews at Second Primary school. Since the staff of Second Primary School were most concerned with the project being useful in helping them gain skills with the Internet and other "new" technologies, it was decided that a better understanding of the group's existing professional development activities and attitudes would be highly desirable.

The day-to-day activities of the research participants were documented in a wholly electronic form. The author developed two database applications over the period of the research that were used to manage the anecdotal material, technical developments, and relevant literature. The author's database applications were developed to the extent that the final version was a web-enabled database (see

Chapter 9) equipped with a "full text" search capability. Although this tool was as much under construction as other parts of the research at all times, it was particularly useful in being able to help identify relationships and trends from the literature that would inform events and observations which arose from the research. This was made possible through the integration of the literature data with research data. On reflection, it would seem that this brought about a particular view of literature in general that it might be codified as "data", but without prejudicing the way in which authors craft their reports and narratives.

5.6.5 Questioning the research method

Williams, Rice et al., (1988) building on the work of Jenkins (1985) provide a methodological reference for Management Information Systems (MIS) researchers, which has been valuable to this project.

They identify:

- Units of analysis – persons, messages, interactions, systems, relationships.
- Levels of analysis – individuals, communities, groups.
- Threats to validity – variation, alternative sources.
- External validity – generalisability of findings to other situations.
- Internal validity – extent to which the research measures what it intended
- Reliability – how replicable are the processes and results.
- Effectiveness – importance of the results compared with all "costs".

(Williams, Rice et al., 1988)

These concerns were particularly useful to the author's project, providing "points of reference" and some degree of structure that is particularly relevant to a social

system which involved human and technology actors. Some of these could be dismissed, as one would expect since the project did not really expect to be providing largely generalisable results, but was more concerned with effective documentation of the experiences, developments, and reflections of the author and other participants.

Possible weaknesses in the research method that were identified at an early stage included the following:

- "Missing events" – failing to document or archive significant observations and achievements.
- Inadequate articulation of observations.
- Incorrect interpretations of the causes or impacts of events.
- Technology failure in archiving, logging or documentation processes.
- Technology failure causing unnecessary or premature conclusion to an initiative.
- Limitations of technology or technological awareness that would have otherwise allowed better systems.

Missed events could be considered a problem only with respect to the identification of significance. With the exception of the interviews at Second Primary School, the entire data collection model was electronic, and the analysis of data; the participants' postings and activities, tracked automatically. In seeking trends and identifying important concerns and developments, the criteria used after implementing data searches, was to look for ongoing problems and dialogues that would indicate areas for concern or celebration. Otherwise the

author summarised the outcomes of each initiative and added the salient observations of any of the group to the narrative.

To monitor the effectiveness of all participants' observations, while these were subjective for the most part, the complete dialogues were retained in collections of personal email to the author and the aforementioned bulletin board and conference systems' archives. The nature of this study insists that the observations of participants must be considered in the context of their part in a discussion as well as in the context of the broader, social and technical situations. Accordingly, the author attempted to make certain that all issues were resolved and documented to the satisfaction of the person or group and technology system which identified some issue. Unresolved situations or concerns were publicly identified, and hopefully in a way that indicated that future resolution was understood to be either worth pursuing or not. Chapters 6.9 and 11.5 describe projects which were abandoned with an understanding that they would be unlikely to resurface. Examples of this kind of discussion are provided in Appendix 2.11, Appendix 2.12 and Appendix 2.13.

Interpreting causes and impacts became almost entirely a role for the author. In many situations, the stated causes and impacts of a project could be left as part of the "story", but occasionally some were raised which shifted the nature of a discussion. The most obvious example of this is when a person describes their inability to "make it work" as a result of their own lack of skill with software or hardware, while the actual reason can be seen to be a technology failure, or problems of a highly technical nature where participants felt obliged to delve into unreasonable levels of technological complexity (see Appendix 2.3).

Technology failure in logging, documentation, or any other part of the data collection and interpretation phases of this research, occurred at several points, particularly with the early bulletin board systems operated by the author (see Chapter 6). Failures of the logging system which were a part of the general system operation, were not frequent, but required system rebuilding and checking of any missing log or archive information that had occurred. Otherwise the author conducted tests on the database systems that were used with the anecdotal data, as well as archiving processes to ensure that failures would not result in lost or overlooked information. Examples of these processes can be seen in later chapters.

Technology failure causing interruption or termination of projects was a feature of at least one initiative, and the apparent reasons for this as well as observed consequences became an important part of the project and a useful point of reference for participants who were able to witness a small technology evolution so to speak.

Finally, in considering the potential for better technology, (whether or not this was known to be available) became a common point of conversation. Accordingly, each anecdote in this research pays attention to the remarks made, and efforts spent in assessing relevant technologies and in seeking alternatives and improvements.

5.6.6 Project Management

The author took the view that a number of initiatives would give rise to systems of varying success, and with various measurements of success. There was an assumption made that each initiative would be pursued for as long as interest remained. Deadlines were never made that would have terminated or even reduced the focus of any initiative. In the case of each endeavour, the development of the system including the cast of initial participants, and the software and hardware that would be employed were clearly stated, and responsibilities informally documented. The author drew up timetables for training and support activities, and extensive systems documentation was produced and made available to participants. While many of these documents were highly technical in nature (see appendices 5,6 and 8), user guides and electronic mail messages were used to clarify the impacts and limitations of technologies in use. As each initiative became a part of the research, electronic text documents and later HTML documents were created to describe and define the that project.

5.6.7 What were the foreshadowed problems?

When this project was being conceived, one of the systems that was to be studied had already been in existence for more than two years. The author was acutely aware of issues that the research might uncover and hopefully explain, but at that time found them difficult to articulate, and also difficult to criticise objectively. The problems identified at the conception of the research project might have been divided into three categories of technology related, social issues and methodological concerns. In keeping with the focus of this work, which learned

considerably from the literature of business use of technology, GDSS (Poole and DeSanctis, 1990; Sproull and Kiesler, 1991) Adaptive Structuration, (Poole and DeSanctis, 1990; Orlikowski and Robey, 1991; Orlikowski, 1996; Orlikowski and Hofman, 1997) Actor Network Theory, (Akrich, 1992; Latour, 1992) as well as the valuable work of specifically educational researchers: notably Harasim and Schrumm, the author rejects such a classification of concerns as detracting from a complete understanding of the inter-related nature of the work.

The author's notes identify the following:

- Possible failure of hardware and software which might be too costly or time consuming to rectify.
- Over-reliance upon the technical skills of the researcher.
- Increased demands on systems causing further pressure on the researcher.
- Conflict between members of the group.
- Problems in providing rapid technical and administrative support to the group.
- Impacts of non-involved parties entering semi-public discussions and specifically the impacts of non-participant colleagues.
- Possibility of misinterpreted results as participants stru with the communicative administrative aspects of the research.

All of these issues appeared in the research at various points, although they were not destructive, but rather they added to the collective understandings that were being developed along the way.

5.6.8 The presentation of this research

Participants' names and other identifying information have for the most part been coded in this research. In a small number of instances it would be possible to identify individual participants as a result of the high profile of the particular projects concerned. In these cases, the participants were made aware of the fact. On reflection, the phenomenon of becoming widely known through one's work has been evident since message systems first allowed the copying of data to sequences of destinations beyond the author's circle. This is no different to having a letter become public and sent to a series of readers except for the fact that it is difficult to identify an "original", and that copies are exact and can be almost unlimited in number.

All participants and work locations have been coded to different given names and generic location names like "First Primary School". Dates accompany all data so that events and observations can be easily viewed in context. Where data is included in this text from emails, lists, or other sources, these have generally been presented as screen images from software which was used to view the data, often an email package. Data of this kind has usually been graphically modified to remove names or any identifying information which might prove problematic.

Technically speaking, where a database search and hypothesis identified an important entry, this was loaded into software that would have been used to read the item at the time of writing. The screen image was then taken, manipulated as required with a graphics package, and then loaded into this document.

Parts of this work describe projects and initiatives undertaken by members of the research group prior to the commencement of the study at hand. These are included in order to illustrate the organic nature of development of this field, and to provide necessary background. In particular, the early parts of Chapter 6, describing the history of Bulletin Boards and the FidoNet provide indications of technology development and use which follow the entire project.

5.7 Summary

This research can be described as participatory action research in the sense that it is a self-aware study in which a group of educators agreed to work collaboratively towards a shared goal. It would not be correct to describe this work as action research in the ways in which Kemmis and McTaggart (1998) outline whereby strict procedures (or cycles) are instigated, however, the fundamental issues of joint planning and action, collective and individual reflection, and the continuing refining and redefining of tasks are its essence. The data collection and analysis methods were considerably aided by technology, although there was an awareness that these methods' reliability needed to be monitored. The 'sub-projects' which this research created or built on were informed by a view of technology that regards humans and systems (hardware and software) as inseparable actors. (Poole and DeSanctis, 1990; Orlikowski and Robey, 1991; Carlson, 1992) . The research both results in and is a result of the stories which are told. The processes of describing, analysing, and retelling situations and events is as much a part of this work as the narratives themselves.

6 "Was Macbeth Really a Tragic Figure ?" The early experiences of teachers with telecommunications systems.

One of the most jarring events which occurred during the conduct of this research came about as a result of some student activity on a bulletin board constructed for the teachers involved in the project. Although the system involved was constructed to benefit teachers and the research group in particular, casual student use was encouraged. It was in late 1988, that a year ten student "uploaded" an essay to the City Limits Bulletin Board with an accompanying message addressed broadly to other students on the system: "Here's an essay on Macbeth. Help yourself."

Within a week the essay had been downloaded sixty times.

This chapter describes the development of the first parts of this research and places it into the context of earlier telecommunications projects conducted by the researcher and others. The development of two bulletin board systems by the author and the surrounding technologies are discussed in order to contextualize the research. The bulletin board system which was a large feature of the early stages of this research is discussed in considerable technical detail since the implications to the researcher for its effective use hinged upon the system's reliability and other measurements of effectiveness that appeared to be solely in the hands of the researcher. The researcher's work in this phase of the research

was closely bound to the emerging communications technologies, and so these technological advancements are described.

A discussion on the emergence of educational networking methods follows, relating the significant changes to teaching and learning that was foreshadowed by the research group.

6.1 Bulletin Board Systems in Schools

The first computer bulletin board was developed by Ward Christensen and Randy Seuss in 1978. Although the Advanced Research Projects Agency Network (Arpanet) was operating with a crude email application as early as 1969, the bulletin board represented a newly democratised communication system. When Arpanet separated itself into a Military network (MILNET) and the new ARPAnet for universities, robust communications protocols including TCP/IP still were available only to people in military or academic institutions which could support large communications infrastructure. Bulletin boards were designed to be publicly available and technically flexible. To attach to a bulletin board required a simple microcomputer or computer terminal, freely available software, and a modem. Not surprisingly, the earliest users of bulletin boards were computer hobbyists interested in posting messages and exchanging files related to their interests. Just as there were teachers interested in the potential of microcomputers in learning and administration as soon as they became affordable, the interest in using bulletin boards in education followed quickly.

6.1.1 The Bush Telegraph

The author became interested in bulletin boards as an educational tool in 1982, and built a BBS in one of the schools associated with this research in 1984. Teachers at the school named the system "The Bush Telegraph", a joke which illustrated the remote location of the school, and the poor communications which staff at the school felt that they had to endure as a consequence of working there. This was construed as a positive step for the system which was regarded as a local curiosity, but fondly enough. The aims of the Bush Telegraph were twofold:

- To provide electronic communications opportunities for students at this remote school and several in the surrounding district.
- To offer a network for teachers of local schools to oversee and foster new communication projects between the students of the schools.

Bush Telegraph comprised an "IBM-XT clone" computer fitted with a 1200bps modem on loan from the local regional office, and a telephone line which was installed into the school for this purpose. Geographical limitations were expected with this initiative from the outset since Second Primary school is located in a telephone district which would result in expensive calls for any other school dialling from outside the district. In fact, the "communications remoteness" continues to be a problem for this school and others like it. Efforts to provide a high speed Internet connection to this school as part of government policy in 1999 struck similar problems and the installation was delayed, waiting for the provision of a purpose built radio tower.

6.1.1.1 Uses

Over its two year lifetime, the Bush Telegraph attracted regional publicity and a small band of enthusiastic followers in Victorian schools. As the system was not networked to other host computers, traffic was minimal, and restricted to communications between teachers who were otherwise known to each other and the students of their classes. Based in a primary school, the predominant traffic of the system was messages between individual students. Efforts were made by the teachers promoting this project to ensure a 'content based' communication, however, the novelty of computer communication was such that focussing the students to the project material was difficult.

6.1.1.2 Known Problems and Early Lessons

Bush Telegraph was described largely as a system for primary age students. Its anticipated use by teachers, and the promise of supporting or replacing existing face-to-face teacher networks was never realised. Before its closure, a small network of five teachers was using the system for professional interaction, planning sporting events and exchanging 'home grown' software. A feature of this project that was highly regarded at the time was the ability for users to exchange text documents via the system regardless of their schools' computer hardware and software. In fact two of the teachers made regular use of the system as a communications means to move files from one computing platform to another while the target computers were located in the same school. Its closure by the author followed a decline in use which was attributed to the dispersal of the most active teachers to more distant schools. These teachers now

found the telephone charges too costly to justify connecting their new work locations to the Bush Telegraph.

6.2 History of FidoNet

The FidoNet network was begun in 1984 by Tom Jennings as the design for an amateur owned and run communications network. Jennings wrote bulletin board software called *Fido*, and following its success, developed the necessary protocols which would allow multiple bulletin boards to interconnect. Jennings has since stated that his desire had been to create a system based on "anarchist social principles" (Jennings, 1999) FidoNet grew to support 32,000 bulletin boards at its peak in 1996 (Jennings, n.d.) . Almost all of these systems were operated by enthusiastic amateurs who, in spite of their differences were able to manage a minimum or cost-free international communications network which provided for many thousands of computer users. FidoNet itself was made up of bulletin boards which were known as "nodes" in most countries of the world, although the largest concentration of these was in the United States and Canada. To become a FidoNet node, a system operator (sysop) agreed to manage a bulletin board system to certain standards, and to pass users' messages through to other nodes without cost to the user. Thus a user in Australia could make a local telephone call to their local bulletin board, and write messages which would eventually be forwarded by FidoNet systems to another user's bulletin board almost anywhere in the world. The protocols specified by FidoNet specified a highly efficient and manageable means of transmitting data locally and internationally via modems. The management and development of FidoNet were

dispersed to all system operators of FidoNet bulletin boards, who received a weekly electronic newsletter, and voted electronically for policy and representation. The network supported bulletin boards with widely divergent aims including religious, cultural, artistic, political, and hobbyist aims, and still managed reliable communications and effective management.

6.2.1 Educational Uses of FidoNet

Since its inception, FidoNet has been used by teachers and education researchers in various ways to explore telecommunications, and to encourage students and peers to participate in projects which take advantage of the technology.[2]

6.3 "City Limits"

The City Limits project began in 1989 in Boronia, Victoria as an attempt to indicate to educators the potential for computer communications technology for teacher professional development and support. It was the City Limits Project that gathered the teachers and others associated with this research. The project was initially funded by the Ringwood regional office of the Ministry of Education in Victoria. That initial request for funding included a requirement for two laptop computers and pocket modems which would be loaned to teachers to facilitate their first experiences with the system once established. Unlike the Bush Telegraph, City Limits was a networked FidoNet system. From its inception, City Limits connected to the established Fido network in Melbourne through a daily data telephone connection or "poll". The researcher installed and modified

several Bulletin Board (BBS) software packages to permit the City Limits machine to network effectively (Appendix 4.1). In fact, dissatisfaction with bulletin board software plagued the City Limits project and all early phases of this research.

At the time, participants regarded the frequent changes in software and interface as a necessary consequence of working with a new and exciting technology. I am inclined now to view this as early vision of a new critical role for educators in evaluating technology applications in educational settings. The process of installing and maintaining a bulletin board includes aspects of customisation and design which are not normally part of an educator's use of technology. These included the production of menus and interfaces for users (teachers and students) dialling in, the posting of regular information bulletins, and the updating of support documents. The screens developed by the researcher for City Limits are shown in Appendix 3 together with a brief discussion of the influences and logic which caused the designs.

6.3.1 The Importance of being Herb McIntyre

Herb McIntyre is a teacher located in a busy secondary school in New York. His importance to this project is that he was the first overseas educator contacted by the author's electronic community once the machinery became "Fido capable". The author, while reviewing some messages on a public bulletin board (BBS), noticed a posting that read: "Hey you guys in Australia? Anyone got a computer

[2] FidoNet bulletin boards were still operating in late 1999, but their impact on education had been overtaken by Internet applications in the period following 1996.

and a modem?" (McIntyre, 1988) At the time, a return BBS message would have taken more than a week, and so the author telephoned McIntyre in his school staff room one afternoon (early morning Australian time) to complain about Herb's poor understanding of Australian technology. A challenge followed that they might establish some educational co-operative projects as soon as City Limits became networked, and Herb's local council funded a modem for his students.

6.3.2 "Paper-type" documentation and online support

City Limits quickly became a popular system, and as a result of various promotions, had a constant stream of teachers wishing to "join". Members of the research group offered to develop a Users Manual, but the urgent need for this caused one to be written by the author (Appendix 5.1), and online support for new users was provided by other members of the team. Considering the lack of available graphics and screen capture software, all City Limits manuals featured "ASCII" (typed character) representations of computer screens. This was hardly a complication, since the screens generated by the City Limits machine were graphically no more advanced (see Appendix 3).

6.3.3 Background: Mail, Echomail and Internet email

A range of mail services was offered by City Limits. In its early days, the amateur "FidoNet" network provided mail connections between City Limits users and other teachers and students at FidoNet capable system in other parts of the world. Person-to-person mail, called *netmail*, is sent between bulletin boards and is an effective process based upon a "store and forward" approach. Each bulletin board contains an address book known as a *nodelist* which contains the address

topology for each machine. The message is passed from system to system in the logical direction described by the nodelist, being held at each system for repackaging with other mails for the target address. It is then forwarded on at the next connection made by the bulletin board to its host. Netmail transactions were astonishingly fast in the 1980s, allowing teachers to send mail to other continents and expect a reply within two or three days.

The second mail system supported by FidoNet systems was known as *echomail.* Echomail is based upon the agreement of a number of bulletin board operators to share a "conference". Unlike netmail, a message posted to an echomail conference would, through FidoNet be replicated at every bulletin board carrying that conference after the systems interconnected each day. In this way, discussions involving hundreds of people could be read from many bulletin boards internationally, and responded to.

> Echomail is a conferencing system that works through the FidoNet e-mail system. Unlike "mailing lists" in the internet which also use e-mail to get forum messages from place to place, Echomail is separate from e-mail when it comes time to reading and writing messages. Echomail messages are bundled and compressed and use the FidoNet e-mail system only as a distribution system.
>
> (Wagner, 1998)

Educational echomail conferences developed rapidly, and culminated in the creation of the K12Net. K12Net and its importance to this research are discussed in Chapter 6.4. It is important to note that the structure and etiquette of echomail

carried important understandings that are as relevant to Internet based communications as they were at their inception.

Echomail resulted in the complete history of a discussion being viewable at multiple bulletin boards. This had a range of implications:

1. The dynamics and cast of a discussion could be viewed in their entirety.
2. Problems with synchronicity: people being unaware of simultaneous postings, or being frustrated by time delays affecting the temporal sequence of messages.
3. The sudden introduction of cultural matters since discussions were taking place without local boundaries.
4. The need for documented standards of behaviour in postings so that certain conversational behaviours could be disciplined.

It is important to note that the topology of Echomail meant that an unwise or inflammatory posting could not be "stopped" from promulgating across the world. In fact methods implemented by the K12 council to supervise students' uses of Echomail established protocols for system operators of bulletin boards to manually delete inappropriate messages.

Internet email from bulletin boards became possible at the very end of this research, and is documented fully in Chapter 6.8. Internet email is also a "store and forward system" but based upon communication protocols of the Internet.

6.3.4 Telephone lines and multitasking

The need to support multiple telephone lines with this system became evident as soon as the first interstate and overseas network connections were established. Simply put, the team were unable to access the system while it was transferring mail packets, and mail transfers were taking between twenty and sixty minutes per day. Similarly, frustration with the frequently "busy" modem line indicated that additional modems and lines would be urgently needed.

Supporting multiple users online at the same time was beginning to present a problem in early 1990. The research group and general users were surprisingly tolerant of the system being busy with other users or mail connects, a fact probably explained by the fact that they had been made aware that the advanced functions of the system were coming to them at little or no cost. Nevertheless seeking solutions for a multiple line system were not trivial.

At the time, one expensive BBS software package marketed as TBBS (The Bread Board System) was known to be available in the United States. Other multi-user solutions to the requirements were investigated, but were even less understood in this context, and more expensive than the TBBS system. A solution was sought by employing various multitasking operating systems or add-ins to the City Limits computer. The pursuit of a good match between the operating system, external multitasking software, BBS software and available hardware remained a quest until the system's eventual closure three years later. It is true to say that the service, while seemingly effective and reliable to users, required continuous attention by the author, and the location and installation of numerous software patches to function with any degree of reliability.

6.3.5 The role of the researcher

Over the period 1990-1996, City Limits underwent four significant hardware upgrades, telephone line and modem additions, two changes in operating system, and the adoption (and rejection) of four BBS packages.

Two issues need to be underlined with respect to the hardware and software environment:

1. Considerable responsibility for system integrity had to be taken by the research group to ensure that meetings could take place, data kept intact, and the "userbase" (database of users) maintained.
2. The lack of support resources, possibly due to poor recognition by Regional Administrators, forced the solution of technical issues back into the hands of the research group. This prevented, or at best limited the scope of some of the more adventurous and otherwise time consuming activities that might have been pursued.

6.3.6 Funding

An initial grant of $10,000 was made to the City Limits Pilot project by the Director of Education (Eastern Region). Those funds were used to purchase a computer that would operate the system, and two laptop computers which could be loaned to prospective users. In 1992, due to failing computer hardware and large operational traffic, an application was made to the Victorian Ministry of Education Computer Education Centre for further funding. A grant of $5500 was made to the project by this group to purchase a new computer for City Limits, and for a smaller "satellite" bulletin board to be set up in a regional centre. These systems were purchased and installed, both remaining operational

with the support of Ministry Computer Consultants who were committed to the project.

6.3.7 EDUNET

Interest by educators within and outside the research group gave rise to the development of a number of smaller localised bulletin boards known as "City Limits Points". These bulletin boards were standalone computers located in schools or Ministry of Education offices for the purposes of providing local BBS communication services to a community or a school. Appendix 4.2 lists the point systems and their locations. In a short time a network and documents and software were developed to support these smaller bulletin boards through City Limits. Four of the point systems which evolved were managed by school-based members of the research project who saw the local BBS in their school as a way of further pursuing their work in this project, and providing international communications to their peers and students.

Implementation of the City Limits Points was organised so that the teacher involved would become the system operator of their own bulletin board, and gain the necessary skills for technical management from the researcher. Furthermore, the point system operators were networked via daily netmail and an EduNet echomail conference known as "edsysop" (education system operators). To facilitate what appeared likely to become a large interest by other schools to have their own points, the researcher developed a software installation package that forced certain similarities upon each of the points. This was designed to make maintenance easier, and allow better peer support between the teachers who were managing the systems. The point system menus were designed to appear and

work in a similar way to City Limits itself since all of the teachers associated with the research were well familiar with that system. A series of automated processes were developed so that difficult maintenance of address books (Nodelists) would take place automatically. To become a City Limits point, the members of the research group needed to provide a suitable computer, a modem, and access to a telephone line.

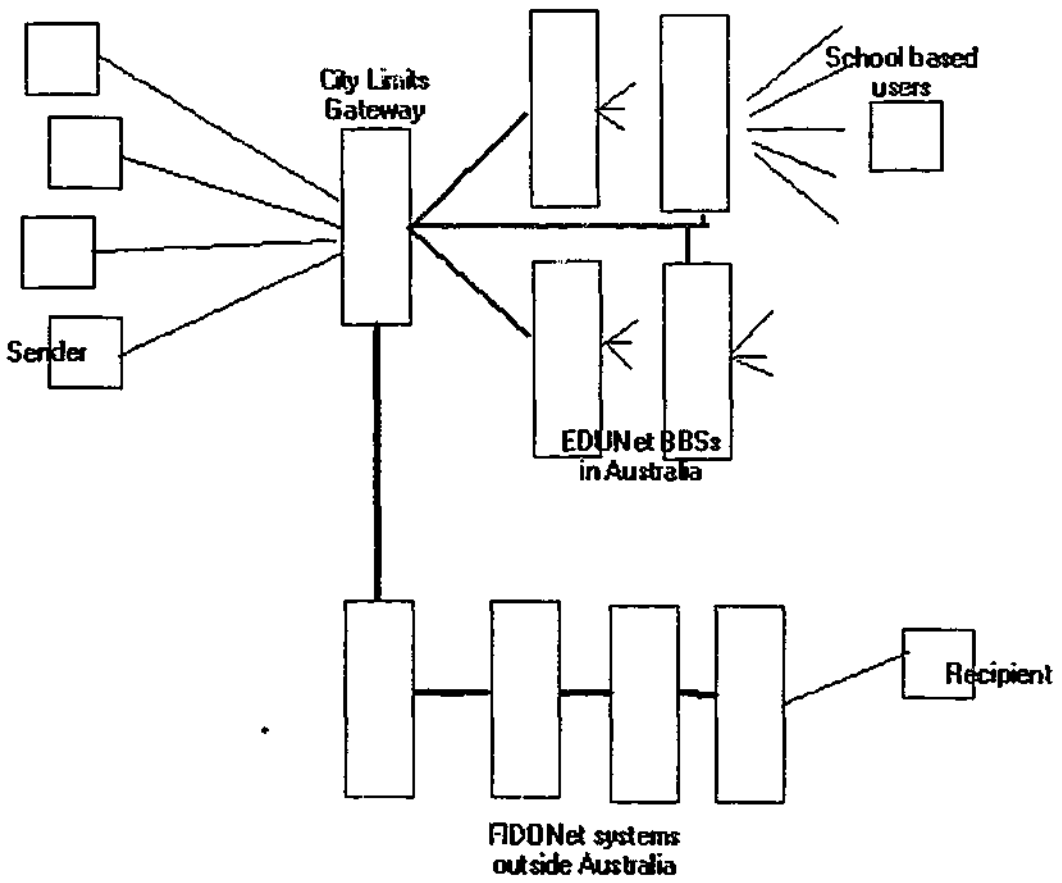


Figure 6-1 City Limits BBS connecting EDUNet and FidoNet

A diagram showing the interconnection of City Limits BBS, its points in schools, and the wider FidoNet world is shown in Figure 6-1. It should be clear that the connections between all systems was made using modems and dial-up telephone

lines, with systems exchanging mail during the early hours of the morning. A schedule of connection times known as a "Poll schedule" was developed to manage the interconnections of the systems (Appendix 4.3).

6.3.8 Known weaknesses

The main technical problem with the City Limits Bulletin board at all phases of its development was its lack of availability due to:

- System downtime while processing, collecting, and dispatching mail, and
- Insufficient lines for multiple callers.

At its closure, the complexity of the system had become in itself a reason for its inability to be sustained. Only the researcher completely understood the processes and their sequences, and if he left the system unattended for more than a day, even the most minor errors would cause mail backlogs. Table 6-1 overviews the mail processing sequences of City Limits prior to closure in July 1996. Further detail is provided in Appendix 4.6.

Time	Process	Explanation
0100	GIGO	Scan the system for mail with an Internet destination and compress into packets.
0105 (typical)	Mailscan	Scan the system for mail with a FidoNet destination and compress into packets.
0106 (typical)	Tosscan	Create compressed packets of outgoing "Echomail"
0300	Call Sydney or Oregon	System disconnects any user on line one (high speed) and dials the FidoNet uplink. Transfers FidoNet mail and Echomail, receiving inbound FidoNet mail and Echomail with destinations for any of the EDUNET systems.
0300-0800	Incoming Mail	Receives calls on line from "downlink" EduNet systems according to a schedule.

Table 6-1 City Limits mail processing events

6.3.9 Continual pressure for Operating System and Hardware upgrades

A constant source of stress in the running of the City Limits system was the need for it to support "multitasking". Multitasking is the ability of some computers to perform different operations at the same time. In the case of a bulletin board, effective multitasking meant that the computer would be able to process incoming and outgoing mail, index databases, respond to users, and take multiple online callers at the same time without degraded performance. When this research began, the initial difficulties had been attended to with the installation of DESQView software, (Quarterdeck, 1994) but the limitations of the underlying hardware and Operating System were still evident. Installing additional memory and faster processors supported the operation of City Limits until the stage was reached where there was a clear need for a Unix system that would support such high levels of activity and multiple tasks. The researcher was already uncomfortable with the amount of time demanded for system maintenance which had come to the stage of consuming at least two hours each evening for purely technical tasks. Moving the system to a Unix platform was ultimately rejected since it was evident that maintenance of any system of that size was going to need someone with exclusive interest in technical maintenance. Technical issues were already sapping the researcher's time from preferred evaluation and support activities Over the course of the research, the City Limits machine had two motherboard upgrades, three hard disk upgrades, and several memory additions. All of the hardware additions and modifications were performed by the researcher, with the system being backed up and taken offline for the necessary work to be completed.

6.3.10 The need for well publicised file format standards

The research group's earliest experiences with bulletin board technology involved some experimentation with transferring files from person to person over distances, and with exchanging files between computers of different types. The Bush Telegraph system pre-dated IBM PC and Macintosh computers in educational use, the computers most used to connect being Microbee (an inexpensive Australian made Z80 class computer), Commodore 64, and to a lesser extent Apple II. At the time (1985), exchanging files between Microbees and Apple II and Commodore computers was almost impossible. It was quickly discovered, however, that systems like Bush Telegraph were able to support text file transfers between users. These experiments led to the development of standards and online documentation for teachers wishing to exchange files or to establish collaborative projects for students. Before embarking upon any educational or professional development collaboration, the people concerned were directed to establish their expected frequency of communication, and the kinds of files that would be sent, their maximum size, and their format so that compatibility problems could be avoided. The documents produced for this phase of the Bush Telegraph project were found to be so effective that they were revived when the research began and used in their entirety within the City Limits User Manual (Appendix 5.1). Among these documented standards were discussions about the advantages of using simple but uniform formats for documents including Rich Text Format (RTF), plain text, and preferred methods for packaging and compressing large files or large numbers of files using ARC, LZW, and ZIP archiving software. Compression software of these kinds was problematic in that users needed to obtain shareware licenses, and that the

programs themselves were difficult to use. Additional documentation and specific technical support areas were established on the City Limits and EDUNet points to assist. Ultimately, and range of collaborative projects were conducted by the research group including collective poetry writing, joint authorship of cross-school newsletters, and joint authorship of serial stories. It was noted by the participants in this research that their investigations of the technology frequently developed exciting models of learning activities, and that the general tenor of these activities did not change very much as the technologies improved. This suggests that there are aspects of educational experiences through telecommunications which are fundamentally valued by teachers and is consistent with the findings of Harasim (1986) and Reil (1993) These experiences include opportunities for collaborative work, and the advantages of working asynchronously. Collaborative development of teaching resources was not really explored by the group, although substantial discussions and some sharing of materials took place. The researcher's vision of a distributed 'library' of teaching documents that would be developed and evaluated by groups of teachers was realised, but the rate of contribution was not high. In fact most of the teacher documents uploaded to EDUNet systems originated from a small group of individuals while they were downloaded for inspection or use by many educators.

6.4 K12Net

K12Net was developed by educators associated with FidoNet in 1990. Using the established FidoNet network, an international group formed a series of

discussion areas for the use of teachers and students. Each discussion area was assigned a "moderator" or person responsible who would oversee message content and resolve issues related to the subject under discussion. The technology selected for this purpose was echomail (see Chapter 6.3.3), since a message posted onto a K12 bulletin board would, in a matter of days be "echoed" to other bulletin boards around the world. A complete list of the K12 Echomail areas is provided in Appendix 6.2. The wealth of discussions, and the fact that there was a single "location" for educational telecommunications projects created considerable interest in BBS use which ultimately brought the members of this research project into contact. K12Net Echomail was available on the City Limits BBS from 1990, and fed to the EduNet point systems in the schools where the research practitioners were located. Individuals associated with this research became highly engaged with the K12 networks, becoming international moderators or managers of projects. One became a representative on the K12 Management Council.

6.5 Teachers' Use of Bulletin Boards

In Chapter 2.3.1, some early remarks were made about the processes of measuring success and of the diffusion of bulletin board technologies. The lack of formal official endorsement of Bulletin Boards as educationally useful environments created an unusual diffusion process. Teachers considered joining the City Limits and Bush Telegraph systems usually as a direct result of having seen a presentation at some school-based professional development activity. There is no doubt that the proponents of the systems were "selling" an idea to

other teachers, but usually making rather loose connection with other activities of the sessions. A typical scenario might have been the conduct of a twenty to sixty minute presentation given by the author at a school staff meeting. The environment for effectively generating interest and initial support for these processes was obviously poor since there was insufficient time to deal with significant issues, and the staff meetings often had other agenda. Nevertheless, requests to conduct information sessions were regularly made, and growth of the number of users was dramatic.

Teachers made various uses of the Bulletin Boards which could be summarised as follows:

Activity	**Details**
Private email	Corresponding with teaching colleagues, family and friends
Gather teaching resources	Downloading lesson plans or samples of work.
Gather computing resources (casual)	Downloading software.
Search for specific computer resources	Networking, modem utilities, software drivers, and system management utilities
Follow teaching and learning issues	Especially K12 Net, EduNet discussions
Ask questions about teaching practice or learning theory	Especially local teachers, but also to interstate and overseas teachers via K12Net.
Play online games with other online users.	These ranged from trivial (Tetris) to adventure (Wumpus) and language games (Scrabble, Crosswords).
Chat online	Almost exclusively recreational. Senior secondary students were actually the predominant users of Chat.

Table 6-2 Teachers' Bulletin Board activities

6.6 Teaching Resources

The ability of the bulletin boards in general to support teachers transferring electronic documents was highly prized. By the time that the City limits system closed, there had been enough interest, and enough documents to have made serious impacts on the design and structure of the system:

- File areas were created for teaching materials organised by curriculum area (Appendix 4.4),
- The researcher and teachers actively sought wordprocessed documents and databases for inclusion in the filebase,
- A program was located that would automatically create daily lists of the teaching resources held on all EduNet systems,
- A program was located and installed that would allow users of other EduNet bulletin boards in schools to mail a request for a teaching file that would be automatically delivered from the EduNet system which could locate the file,
- Security measures were put into place so that student users would be unable to locate or request teaching documents.

Experience showed that users were keen to search and download files from the teacher areas, but also that free contribution of materials was not very common. Most commonly downloaded files were those with official status from the Department of Education, for example curriculum statements, and examination guidelines. The contributions to teacher-public areas were limited, but it is important to note that system statistics indicated a much larger "traffic" of files

between teachers when it was possible to transmit files to an individual. In other words, the reluctance of teachers to locate their work for the use (and scrutiny) of other teachers on semi public basis was offset by their willingness to share work with known individuals.

6.7 Offline Mail Readers

Users of Bulletin Boards, unlike Internet users are constrained by the need for a physical connection to the BBS "server". The limitations of available telephone lines discussed in Chapters 6.3.4, 6.3.8, and 6.3.9 were further complicated by users' concerns about 'tying up' their home and school telephone lines, sometimes at considerable cost while they composed or replied to messages. An "Offline Reader" was introduced to the City Limits system in mid 1995, which permitted users with special software to download a "packet" of mail from predetermined public and private areas. The downloaded mail packet could be read and responded to at a more convenient time. The technology in this case involved the identification and capturing of new messages for the teacher or student concerned. On their command a compressed mail "packet" was generated and a download session commenced. The menu devised for this purpose is shown in Appendix 3.8. From the perspective of a teacher or student initiating or responding to messages, the offline reader gave better opportunities for reflection and more careful 'crafting' of messages. In Chapter 3.3, the matters of temporality in email were discussed in the context of the research of Hesse et al, (1988) and Rice, (1992) both working with technologies well in the future of these Bulletin Boards. Even so, the issues are clearly congruent with the

applications of this earlier technology. In fact, concerns of cost, interaction time, and online time are consistent themes in the adoption and continued use of systems. In practice, the City Limits Offline reader was used only by a small group of enthusiasts not directly connected with the research. The QWK Offline mail reader was a large program, and time consuming to set up and learn. Members of the group clearly preferred to respond online or to install their own Point Systems (Chapter 6.3.7) as a more complete solution.

6.8 lecity

The creation of the FidoNet, K12Net and EduNet networks each represented substantially improved communication opportunities for the teachers and students using Bulletin Boards. The introduction of each of these networks to City Limits and to the school-based bulletin boards associated with City Limits was accompanied at each time with a sudden increase in the number of users, and in the frequency of their calls. Since members of the research group became aware of the resources afforded by the Internet, which at the time was a new and exciting technology little used in education, the researcher set about developing a "gateway" comprising hardware and software that would connect the City Limits machine and its EduNet points somehow to the Internet.

Placing City Limits itself on the Internet was rejected by the researcher as too expensive, and not in the spirit of providing communications services free of charge. That process would have needed a permanent connection to an Internet Service Provider which at the time was uncommon and technically difficult. An

alternative solution was developed by the researcher with the advice and assistance of teachers from First, Second and Third primary schools. A diagram explaining the processes is shown in Figure 6-2. Messages with an Internet email destination were written into a special area menu (see Appendix 3.9) which allowed directory searching and help documents. The message was required to contain the destination address written in a particular form on the first line (see Appendix 2.14). After the teacher or student disconnected, the City Limits machine would recognise the existence of an Internet email and enter processing mode. Processing performed conversions and compressions of the file, packaging with other Internet destination messages, and a dial-out to the Internet host which had been selected as appropriate for the task (see Appendix 4.2 and Appendix 5.3). Message transfers by this method were very rapid since an email placed on the Internet host would be at its destination within minutes anywhere in the world. Replies were as rapid as the recipients' attention, but would wait at City Limits until the original writer happened to reconnect. Practically speaking, international and national transfers of messages by this process was significantly faster than the FidoNet, K12Net and EduNet "store and forward" approach, although the technical aspects and maintenance at the City Limits site had, by this time become very time consuming for the researcher.

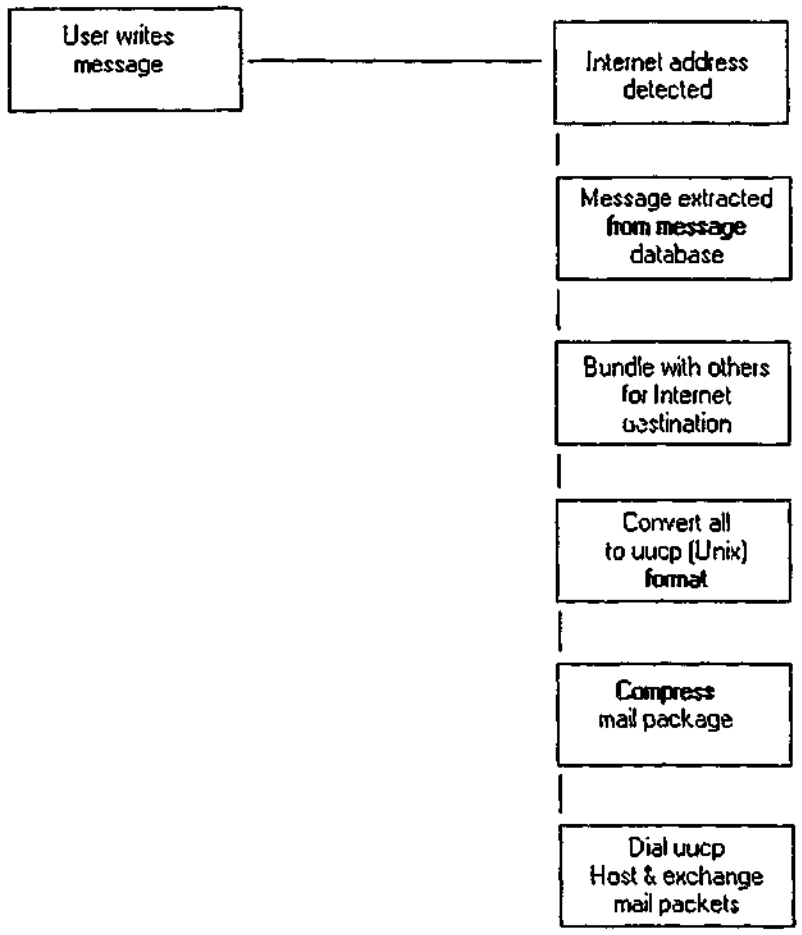


Figure 6-2 City Limits' Internet mail procedures

By January 1996, a domain name had been registered as "lecity.edu.au", and arrangements and protocols established so that the connection of messages between networks was automatic. Just as the introduction of each new network caused large increases in City Limits traffic, the Internet gateway brought on sixty new users within the space of two months. Until that time, new users were being processed at the rate of approximately ten per month. Teachers gave the following reasons for their interest in the Internet options of City Limits and EduNet:

- Bulletin Board access to Internet email meant that a teacher using the BBS could effectively have the ability to send and receive unlimited email with Internet users for the cost of a telephone call,

- Teachers (and students) were able to advertise a personal Internet email address in the form john.bloggs@lecity.edu.au ,
- The City Limits gateway permitted direct communication between teachers who used bulletin boards, and educators, academics,
- The gateway suddenly made it possible for teachers and students to communicate with educational and scientific organisations.

6.9 The Demise of Bulletin Board systems in Victoria and around the World

For a time, the Internet connectivity saw a resurgence in teachers' and students' interest in bulletin boards. While this phase of the research coincided with the rise of educational resources available on the World Wide Web, the extent of those resources was small[3], the author and teachers associated with this research came to the conclusion that too much time and effort was being placed on the technology infrastructure now that alternatives were becoming evident. It is the author's view that this in fact is the fundamental reason that bulletin boards in the wider community declined. A system which could support a reasonable sized community would need multiple dialup lines, and eventually would outgrow the capabilities of hardware and software that any but a large corporation might afford. The alternative, as soon as Internet dialup costs declined, was to place the technical infrastructure of connection into the hands of technical groups, but try to retain the content and community through a Website.

[3] Several attempts were made by educational WWW sites to obtain copies of the City Limits "Teachers' Files" and curriculum resources in 1996 and 1997.

The technical requirements of running City Limits, and of providing technical support to its ten busy[4] point systems in schools grew to the extent that the researcher's time in supporting the various projects and initiatives was being reduced to technically managing one large computer, ten smaller ones located many kilometres apart, and software processes which had grown to a point of implosion. Appendix 4 contains detailed explanations of the system or "batch" processes that the City Limits machine was performing. Although the system was proving remarkably reliable with only occasional downtimes, it had become evident that only the researcher was capable of maintaining this system, locating faults, or explaining its technical operations. The World Wide Web offered high quality graphics on screen to teachers who were connected by modems even at a cost, and appeared at the time to be a good alternative.

[4]Point systems connected between once and three times daily with City Limits, and exchanged an average of 1200Kb of data at each connection, or the equivalent of a thousand messages.

Some important reflections by members of the group were made at the time of closure. There was a clear sense of loss that was identified as:

- the end of an "era" or other nostalgic concern;
- the lack of alternative communication systems for teachers not able to use the Internet either for reasons of cost or inadequate hardware and software; and,
- the end of a community, which although all members of the research group and many other educators had Internet access, suggested that there was in fact a "place" where they had been assembling.

The researcher and others associated with the City Limits project saw that Internet web sites and mailing lists could provide similar or better services. It was assumed that their time would be better used in administering educational content, and fostering new Internet aware educators and building new communities with them.

To: mag-net@edx1.educ.monash.edu.au
Subject: k12.ed.science

OK fellow Interneters ... if you don't have the venerable
k12 network stuck permanently in your newsgroup list ..put it on now
this a great, moderated, newsgroup that once ran on the Mag-Net BBS system.
Now we can use the Internet .. sorry Information SuperHighway to keep
in touch

The news group name is k12.ed.science
just type your newsgroup in the white space allowed in Netscape Newsgroups and
press Enter

Example 6-1 Internet list mail referring to K12Net resource

6.10 Summary

Early warnings about the heavy burden of systems maintenance were evident to the researcher and participants, but until new technologies appeared which were able to be externally managed and still functional, there appeared to be no alternative. One of the fears of the group was that closing the Bulletin Boards and their networks might completely destroy the networks of educators (and students) which had built themselves up around the local nature of these systems (see Chapter 6.9). This is a matter for further research since there is as yet no study that exhaustively studied the opinions and activities of online educators over this transition. Even so, it is possible that the continuing relationships of online educators might have had especially strong bindings as a result of their early experiences with a known, smaller community

Another result was to discover that the networked bulletin boards provided a highly valued method for teachers to share documents, although the attempts to encourage public sharing of work was not successful. . The 'Macbeth' anecdote that introduced this chapter is important to this discussion since it illustrates that moment when the power of electronic document sharing became evident to teachers, and while they were impressed with its value to their professional work, many were uncomfortable with the idea that students would also take advantage of the technology.

The asynchronous communications afforded by bulletin boards to their users was of course their first experience with being able to work in this way. In spite of

the feasibility of including intercontinental colleagues, this was apparently not more valued than the ability to read and write messages on particular topics as a part of an ongoing discourse. City Limits users were very infrequent posters to international discussions, however they were active in local and state-wide discussions.

Finally there was the matter of valuing "internetworking" in that each time an additional system or network was introduced (FidoNet, K12Net, EduNet, UUCP-Internet) the system activity and membership increased noticeably. This of course permitted liaisons with more distant groups, groups with dissimilar but still valued backgrounds (poets, scientists), and groups newly able to connect to different hardware and software systems.

7 Two Professional Development Networks

This chapter focuses upon the research group's use of computer networks in educational professional development. It can be said that all of the initiatives explored in the research project had some professional development aspects. Two aspects of professional development are considered for a target group which would comprise teachers located in schools, other educators, trainers, and industry support personnel. These two views of professional development concern:

1. The professional activities of educators directed toward improving their skills and knowledge, and
2. The processes which take place in developing the required social and technical skills to make use of networks.

On the one hand we ask "How can I make use of networks to improve my professional practice?" and on the other, "What is happening to me and my to ways of working?"

When this research began, all of the participants were invited to participate in a project which would explore the ways in which they could improve their teaching practice through the use of network technologies. As described in Chapter 5.5, this was to be done through explorations of network applications. While the project progressed, three important discoveries were made, which slightly altered the project methodology.

1. Participants were less concerned about school based outcomes than about generally exploring the potentials for professional gain.

2. Participants created associations and groups, and moved easily into and out of interest groups, often without the researcher's input or knowledge.
3. Participants were generally more highly motivated by their own projects than by solutions to existing imperatives.

The researcher believes that the use of networks allowed more responsive, strategic, and successful professional improvement as a result of the network's collection of "like-minded" practitioners. Furthermore a stronger sense of ownership and a better sense of purpose for perseverance and completion arises when the improvement activity is locally rather than organisationally motivated.

In this chapter, two initiatives will be discussed. The first, the "charlotte" mailing list, was initiated by the author. The second, the Mag-Net project was the initiative of two participants working outside this research, but whose work touched and drew upon the rest of the group, and the researcher. The work of the research participants was unavoidably interwoven with these initiatives. In chapter 5.6 the matters of research participants and their outputs extending into and being influenced by other groups and projects was discussed. The Mag-Net group, discussed in some detail in this chapter is an example of where such a group featured in a mutually beneficial relationship.

7.1 Charlotte - The Creative Agenda

The mailing list "charlotte" was created by the researcher to provide general technical assistance to the research participants and help with their authoring of HTML pages. The list was named after the children's book "Charlotte's Web", and in the early stages, the research group would occasionally refer to public

questions as "asking charlotte". The following examples were taken from the first technical queries made by participants after the research began. Questions were directed to the researcher following up problems which had occurred after on-site training sessions. In these examples, several observations need to be made:

- The general level of computing skills in these participants was not high,
- The problems they were encountering were common to almost all of the participants,
- While the participants knew that the study involved educators at other schools, there was no mechanism for them to regard each other as peers or possible sources of support,
- The capabilities of the participants with the technology was both a frustrating challenge in the sense that they quickly wanted to be productive with the tools, but also one of the research fundamental aims.

In hindsight, the researcher noted in a journal that his delight in the groups' progress was at odds with their wishes to solve problems very quickly and "move on".

Date: Wed, 23 Aug 1995 08:29:30 +1000
To: bernard@edx1.educ.monash.edu.au
From: aaa@bbb.ccc.ddd (aa Primary School)

Dear Bernard you ..... You forget to tell us to put the plug in the wall didn't you!!!!
We sat here for 45 minutes, well maybe 5, clicking retry until all was revealed by Margaret.
Thanks a lot !!!!
Well here is our first email, aren't we clever ?
(Sue and Colleen)

Example 7-1 Assistance with technology

Date: Fri, 25 Aug 1995 12:03:21 +1000
To: bernard@edx1.educ.monash.edu.au
From: {Christine}
Subject: H.E.L.P

Hi Bernard, I've tried to write to you when we are not having problems, but lately we seem to only be writing to you when we need help. I hope you don't mind this.

Reg and I have spent the past hour swearing, cursing etc. trying to get internet working on our other computer (the one with the sound card). We transferred all of the files to the manching, but it wasn't working correctly. We changed the autoexec.bat file but couldn't see where other changes were necessary. Do you have any more ideas? CAN YOU PLEASE HELP??
I went to the mag-net meeting last night and talked to Peter about his project. It was good.
Would love to have another visit from you whenever you can possibly make it.
Regards, Christine & Reg

Example 7-2 Assistance with technology

These examples illustrate the ways in which the participants viewed the technology they were learning, which naturally was also the technology they would eventually use for their own support. It is notable that the participants are concerned about their limited skills with a system which they nevertheless use for their own development of skill. It is also useful to indicate that the above messages indicate the speed with which questions and responses occurred and were expected to occur. In Chapter 5.6.7 the author raises some of the concerns about the technical support infrastructure in the research, and it is particularly valuable to recognise that the speed of communication caused a kind of "reflexive acceleration" in message transactions. Participants were initially excited that they could ask questions of anyone and expect a quick response, but after time it became evident that immediate responses were *expected.*

The charlotte mailing list was installed by the researcher to broadcast these support questions and solutions. Technically, the researcher sourced PERL code for the application *Majordomo* and installed and configured this software onto an available Unix fileserver. *Majordomo* was selected by the researcher after considerable testing. It appeared that this software would assist with the routines of list management including subscriptions, unsubscriptions, and potentially list archive functions. The list was employed by the research participants almost immediately, and managed an average of six to eight messages per week between 1995 and 1997. A list archive enabling searching and re-reading of messages posted to the list was activated in September 1995 in response to the group's requests for "a way to look up things we've forgotten". This implementation was rather crude, and it should be borne in mind that the mailing list technology still worked on the basis of messages being posted and received with the "urgency" of email.

Documents and utilities were located into a central charlotte ftp site for participants of the list to access. The limitations of the Unix FTP protocol were still apparent to users in that files were difficult to locate, and in particular required the regular updating of the directory index files to enable teachers to identify the files of interest. Nevertheless, when the interests of the extended research group developed to encompass newer operating systems, and their agenda to include the construction of WWW servers in two cases, the ftp directory continued to be used as a vehicle for support. Unix programs, Linux utilities and techniques and Charlotte list added to the “Ozlists” database in November 1995, and this initiative caused the rapid outward growth of the

research group's sense of community. The number of members of the list was first intended to be around twelve, but in July 1996 had risen to one hundred and sixty-one. At the end of 1998 the number of subscribers was two hundred and eighty-nine. Considering the fact that posts to the charlotte list still were as infrequent as one message per week, and those largely by established users, there is a strong indication that this "quiet" environment is found to be sufficiently useful that individuals choose to remain connected. By contrast, the fact that messages are more informative than discursive has been interpreted as follows:

- The largely technical focus of the charlotte list means that postings are predominantly question and solution, and that users view this environment as one where valuable responses are quickly obtained.
- The description of the list purposes discourages discussion about pedagogical or implementation strategies, which in turn would be more likely to foster debate.
- A possible perception that respondents on charlotte make definitive posts which discourage further questions.

Analysis of the posts to charlotte (Table 7-1) from August 1995 to September 1998 yield the following results:

Total posts	287	
Number of individuals subscribed at the last date.	289	
Number of individual writers	93	Excluding accidental and "unsubscribe" or administrative posts.

Table 7-1 Summary of postings to the "charlotte" mailing list

A charlotte WWW page was created in September 1996 in response to the needs of the group in locating useful link resources. In fact the main reasons for creating this web page were given as:

1. To provide descriptions and a formal location for useful software and documents, including charlotte's own FTP site (Chapter 7.1) as they were endorsed by list members' discussions.
2. To provide information about the list and how to subscribe, unsubscribe, and make contact with the group needed to be located somewhere permanent.
3. To give a "public face" for the mailing list in order to avoid frequent and lengthy email exchanges with potential new subscribers.

Significantly, the resultant web page was described as a "place", and related expressions that refer to the cyberspace location of these documents and the community ("where", "here", "in..", "put") became common. Interaction between users was not possible in this particular place, and yet the explanations of "meeting in chat" or later "meeting in MOOspace" (see Chapter 10) can be regarded as defining other kinds of space available for community use.

7.1.1 Extending the palette, Broadcasting news

A feature of the postings and follow-ups that the group sent to Charlotte, was the regular if cautious tinkering with mixing the technologies and projects. Example 7-3 illustrates this point where Karen is replying after learning that a Real Video sample of the students' excursion has been made publicly available on a Monash server. Her request for a link from a related page is aimed to improve the context of the online video by closely associating it with its parent project "Antarctic Andy". This project tracked an Antarctic explorer and encouraged email transactions between students at fifth Primary, and other Mag-Net schools (see Chapter 7.2 for a complete description of the Mag-Net project).

To: charlotte@edx1.educ.monash.edu.au
From: fff@bbb.ccc.ddd (Fifth Primary School)
Subject: Re: TeeVee

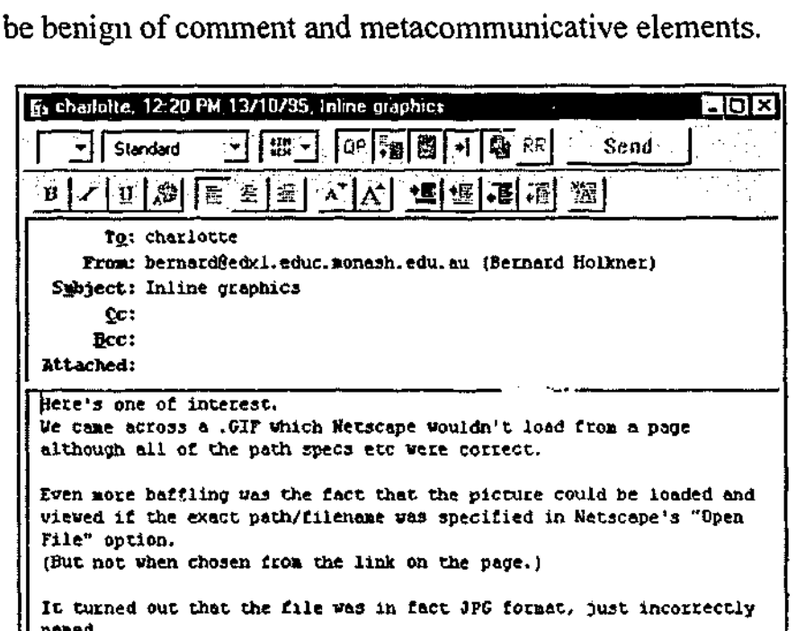
Thanks __,
It looks great. Can we link it from the Antarctic Andy link on Magnify?
I hope to have a new home page for fifth primary school there by next week
Cheers
Karen

>Hi Karen. The video is online (well 2 minutes of it..)
>If you want t select a better "clip" just give me the info....
>Cheers
>
>http://edx3.educ.monash.edu.au/fff.html

Example 7-3 Email requesting bridging of technologies

The other kinds of message frequently encountered on the Charlotte list were of the "broadcast" type whereby someone would use the list as a means of announcing a discovery of software, technique or 'bug-fix' (see Example 7-4). There is a need for analytical research into this kind of list usage. On several

occasions, members of the research group wrote directly, or expressed concern about being seen as "asking stupid questions". The dominance of list traffic by the loud or technologically literate, or even the 'first to announce' generally should be avoided. As we have seen in earlier chapters, there are many reasons why dominance may occur, and indeed it might even be tolerable in some (limited) situations when passive list members decide that they can nevertheless gain from "lurking" while they would not dream of speaking up. Postings to a list can hardly be benign of comment and metacommunicative elements.


charlotte, 12:20 PM 13/10/95, Inline graphics

Standard | QP | RR | Send

To: charlotte
From: bernard@edx1.educ.monash.edu.au (Bernard Holkner)
Subject: Inline graphics
Cc:
Bcc:
Attached:

Here's one of interest.
We came across a .GIF which Netscape wouldn't load from a page although all of the path specs etc were correct.

Even more baffling was the fact that the picture could be loaded and viewed if the exact path/filename was specified in Netscape's "Open File" option.
(But not when chosen from the link on the page.)

It turned out that the file was in fact JPG format, just incorrectly named.
Now it appears that Netscape can interpret such a file when directed to it, but not via a link.

Moral ? Don't dismantle the server as a first option.

Example 7-4 Charlotte posting: software hints

7.2 The Mag-Net Initiative

The "Mag-Net Virtual Science and Technology Centre" (Loughran, Corrigan et al., 1996) was established in response to the need for science and technology professional development resources for teachers in Victoria. The proponents argued that a small grant could support an effective online presence for

discussion and sharing electronic documents and even training. It was believed that such a network would capitalise upon the good will of teachers who would become members of the new group, and be more dynamic, far reaching, and cost effective than the provision of a dedicated building for these purposes. Two of the proponents of this initiative were already highly effective members of the researcher's participatory group, and members of the charlotte mailing list. The researcher considered that it was likely that the new Mag-Net group might draw further members from the charlotte list if not the research participants themselves. In fact considerable synergy developed between the two projects. Discussions in either list assumed knowledge of the other, and there was a high degree of membership overlap.

7.2.1.1 Communications Processes

7.2.1.2 Mailing List

The construction of an electronic mailing list known as mag-net@edx1.educ.monash.edu.au was in fact one of the earliest steps taken to create the Mag-Net network. The list was initially housed on the same fileserver as the *charlotte* list, and subscriptions, unsubscriptions, and archives managed robotically by the same *Majordomo* list management system. Within several months, there were one hundred and fifty-eight individuals subscribed to the list. Of these, the membership was predominantly Australian, with a small number of North Americans and Europeans. Two hundred and eighty-five messages were posted to the list between October 1995 and November 1996. In mid 1996 the Mag-Net activities were moved to a dedicated fileserver which Mag-Net members provided. This was in order to ensure autonomy for the Mag-Net

project, and to enable more adventurous experiments with the technology away from the researcher's activities. Nevertheless, the researcher retained oversight and management roles of the Mag-net online activities to assist the busy Mag-Net project officers.

7.2.1.3 Significance of the Discussion Systems

The description of the Mag-Net "Virtual Science and Technology Centre" suggested that Mag-Net should be conceived as a meeting place or focus. Indeed the existence of the web sites might be construed as offering a fixed location for worthwhile resources which were largely the result of work by the project officers and members. A problem with teaching and learning in a networked environment for newcomers is a common lack of recognition of the importance of members and new members of any project to take responsibility for the forward motion of the group. A dominant issue of this project was the collaboration between members on specific tasks, and the discussion of ideas and initiatives that took place on the various discussion systems. Although the web pages presented an attractive and useful interface to Mag-Net, there was arguably more effect and certainly more activity in direct interaction between individuals and the group. The web pages created by members and project officers were not a good indication of the level of activity of this project, or of the style of work for teachers which Mag-Net and other networking groups modelled for educators. Accordingly, although it would be convenient to focus upon the web pages for the purposes of publicity and information, to do this undervalues the dynamics of the group.

7.2.1.4 Computer Technology – Mag-Net Servers

The initial Mag-Net web server computer was installed on the Monash network to give the Mag-Net project appropriate access to the Internet, and to disconnect the project from the researcher's fileserver. Like the research project's first mail and web server, the Mag-Net machine used *Linux*, a variant of the *Unix* operating system which chosen by the project officers as powerful and flexible enough to support a range of possible requirements :

- Delivery of WWW pages,
- Processing of *PERL* programs invoked by the WWW pages, and
- Handling of 'FTP' file transfers.

A second web server called "Mag-Nify" was installed mid 1996 with the specific aim of providing Web services not possible with the Linux based Mag-Net. Although some attempts were made to ease the task of teachers building Web pages for their projects and schools using the Mag-Net system and a range of HTML authoring programs (*Hot Dog*, *Web Author*) were made available, the apparent ease that a new product *Front Page* offered to developing and uploading Web documents made the installation of a Front Page compliant fileserver a very high priority.

After the new server was installed, project managers began training the Mag-Net members for the new web authoring environment. Although much of this work has taken place near the end of the period covered by this research, a dramatic increase in page creation and modification activity can clearly be attributed to

members changing to the Front Page technology. This is a particularly important step in that easing and demystifying the page creation and modification ensures that more publication activity and more responsive styles of pages can be created. It is notable that Mag-Net project officers and the researcher considered that some HTML knowledge was still important to users, while such skills were clearly no longer essential for the development of HTML documents (web sites). The reason that HTML knowledge was still considered valuable grew from a belief that users ought not to be exclusively bound to using a product which employed corporate standards. By contrast, the standards of HTML were publicly known, and since they were based upon raw text data, a very wide range of development tools could be used to develop the documents. While Front Page and similar products ultimately developed HTML documents, the methods used were seen to permit security breaches on the network and to "lock in" users to one specific piece of software. Finally research participants involved in Mag-Net had concerns about the non-standard nature of the HTML code produced by Front Page.

7.2.1.5 Multimedia

Following a series of experiments with the delivery of multimedia artefacts attached to Web pages, the Windows NT based Mag-Nify server was employed to host "RealAudio" and "VDOLive" sound files and movies respectively. The attempts to integrate movies and large sound files into Mag-Net projects was largely the work of Peter with some assistance from the Monash Education Faculty. The effectiveness of these initiatives is yet to be measured, but was clearly undertaken in the spirit of pursuing a demonstrable version of what

"Virtual Professional Development" might look like. Observers have rightly commented with interest in the potential of this kind of addition to traditional web resources, with an understandable hesitance in attempting these endeavours without assistance. Of particular note was the series of VDOLive movies associated with the 1000 Questions project, placed onto a Monash Education server in mid November 1996. These short movies of Fifth Primary School students explained the background of their questions about Australia and accompanied multiple choice questionnaires which they built and published to the Web. The movies themselves could not be regarded as demonstrating a radical new application of video for educational purposes, but served as a valuable indicator that video and audio elements in web communication ought to be treated as commonplace and to be expected where they might enhance teaching and learning.

To the Mag-Net members and interested observers, the adoption of these advanced technologies meant dealing with software and hardware issues sooner or perhaps more frequently than might have been expected. Both VDOLive and RealAudio, and the earlier but still used "non streamed" audio technologies of "au" and "wav" files required sound hardware to be fitted to the client computer. For some time in fact, these technologies were not available at all to Macintosh computer users, but for the majority of PC equipped Windows users, members were required to download and install "plugin" or "helper" applications in order to view the various media.

This was noted as a frustration by various groups, where the time taken to download, disk space requirements, and assistance with configuration have been somewhat of a deterrent. Indeed at a more fundamental level, technical problems as a result of members and observers using "out of date" browser packages (Netscape versions in the majority of cases), would have to be regarded as a significant issue for all educational activities making use of the World Wide Web. Considering that versions of Netscape in use only eight months after their public release were not able to view "frames", meant in practice that clients were unable to observe certain images, graphics, and sophisticated displays.

This software upgrade timeline is dramatically different to the one commonly understood by schools. Educational software was purchased and installed with an assumption that it would quickly go out of date, but not, as is the case in the World Wide Web, go out of date and become ineffective or useless. This is to recognise the important issue that network delivered material is in a constant state of change which affects both the content and the communication techniques. To give an example, the installation used eight months ago may suddenly be unable to retrieve the information from an important site. Mag-Net project officers performed a key role not only in assisting members with upgrade assistance directly, but also with indirect help in pointing out resources and sites. Most importantly, however, the project officers, and certain members modelled the culture of frequent software updates, and attention to hardware and system configuration. This is yet another example of the way that the technical issues to some extent dominated the activities of the project officers.

It is expected that educators working in an online environment require technical support at a high level, with specific attention given to recommendation of standards. To resolve this, Mag-Net project officers evaluated a range of audio and video delivery mechanisms. At the time of writing this thesis, two new video, and one new audio system had been released which might provide superior or more suitable technology for educators. Without leaving teachers (and students) to research and evaluate, or to seek colleagues to assist in setting standards and choosing technologies, collaborative groups like Mag-Net take on these roles. In the event that Mag-Net's members and project officers might not have selected the very best of available tools, the problem is lessened or even deemed irrelevant in that the standards for the group's communications for its members have been set. Similarly, having set technical standards to suit the educational requirements of the group, the technical support issues were simplified and could be consolidated with resources and documents.

This approach of establishing a credible group was one of the major successes of Mag-Net and could be a model for future educational groups. An example of how the group's credibility flowed beyond the Mag-Net project aims could be seen with their Olympic Games web resources. Comprehensive educational resources for the Olympic Games were clearly beyond the scope of a Mag-Net project, but it would seem that the credibility of being associated with Mag-Net, the collection of teaching materials and lesson plans guaranteed value by association with that particular group of educators. Similar experiences have been seen with other established projects on the Internet: The list "pdteam" (Chapter 7.3) which provided primary contact for Victorian Schools' Internet

professional development had frequent traffic about general technical and educational issues. By posting these "off topic" discussions, an individual suggests as a member of the group, that one can assume other participants would be interested and skilled to respond, and that their responses would be valued.

7.2.1.6 Interactive Web Pages

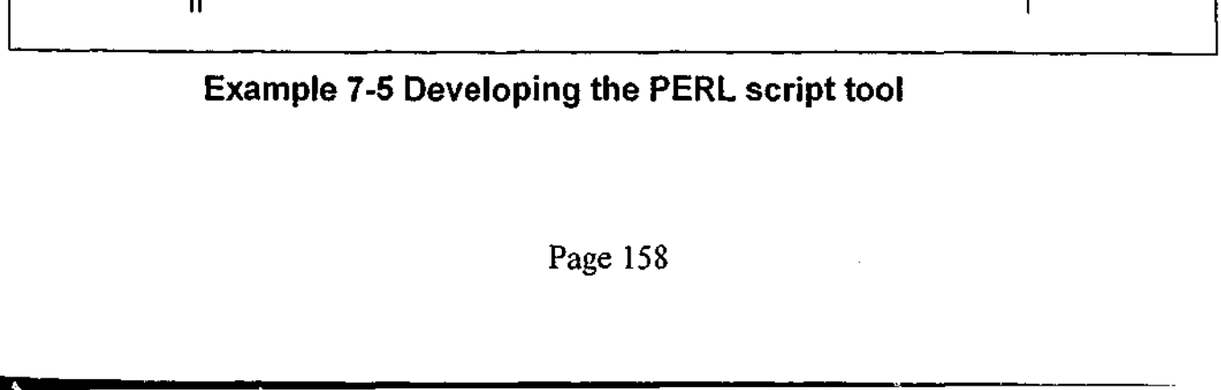
An important component of the Mag-Net project was the promotion of alternative and innovative approaches to the World Wide Web. Project officers and members recognised problems with educational web resources including:

- a predominance of web pages which are rarely updated beyond their installation, and
- lack of interactivity in Web sites.

The processing of PERL programs was seen as a way to add interactivity to Web pages through the computer responding to user initiated requests. The "100 Questions about Australia" project which began as an initiative of a state secondary college is an early example of how educational use might be made of pages with this degree of interactivity. The 100 Questions project required groups of students to create multiple choice quizzes about some aspect of Australia or Australian life. Through the reading and question and answer design, these students were engaged in an effective collaborative research model. The students were required to work in small groups and were given instructions and practice in research, question design and some general project management. Once completed, the questionnaires as web pages were attached to PERL programs so that other students could read the web pages and respond to the

questions, read the appropriate text, and in fact have the system work out a score for the responses.

In reality this style of interactivity was not fully exploited, clearly as a consequence of the difficulty in developing the programs. Mag-Net project officers fostered the development of a simplified PERL program creator by a student at one of the secondary schools involved in this research. This exercise proved that by easing the development process, there is was potential for interactivity which schools were prepared to explore. The *1000 questions about Australia*' project (http://mm-1.educ.monash.edu.au/1000) demonstrated this: where primary and secondary Mag-Net project school students created question and answer pages. Although limited to a multiple choice question design, this gave the students developing the pages valuable experiences in topic research and questioning. The likely outcome for students reading and answering these pages was of questionable value in itself, but powerful as motivation to publish similar works or works with a similar level of interactivity.



Example 7-5 Developing the PERL script tool

Considering the rapid changes in web technology, and in particular the rise in database interfaced applications, it would appear that some of the required interactive functions could have been realised through the Magnify NT server and a database package which could store responses, data, and media which are issued on request from forms similar to the 1000 questions, but without the limitations of multiple choice. A development of this concept was realised later in the research and is fully explained in chapter 9.

7.2.1.7 Connecting the Internal Network: Wingate

The public availability of the Wingate software (Deerfield, 1996) provided an important new opportunity for schools connecting to the Internet. Prior to the wide availability of Internet connection sharing software, schools wishing to allow more than one person to connect at once were required to provide a router or multiple telephone lines and modems: a prohibitive cost in terms of resources and technical support.

Wingate is inexpensive software permitting one computer with a modem to share its Internet connection with a number of workstations which are connected to the (school's) local area network. In many cases this was seen as sufficient reason to network computers in some of the member schools, permitting the one account and dialup line to be shared by a number of classrooms or offices. The cost difference between using a Wingate setup compared with a traditional "router" system represented a cost saving of thousands of dollars, and provided performance of a reasonable standard. The researcher provided testing facilities

to assist the Mag-Net project officers with an evaluation of Wingate, and of a similar product for Macintosh networks that appeared a short time later. Since the Mag-Net project officers were already deeply involved in assisting schools with their connection to Internet service providers and the management issues of Internet connected workstations, they quickly incorporated it into the technological aspects of Mag-Net's work.

The installation of several of the Mag-Net primary schools were particularly effective. The schools which took immediate advantage of the advanced networking were able to move quickly into web page development, and significantly more adventurous email projects (see also Chapter 12.1 for a discussion about group and individual email addresses). The researcher noted at this point an interesting development in Primary schools' networking had created powerful Local Area Networks in the schools as a by-product of the Internet gateways. While this might have enabled useful teacher collaboration and local student collaborative work, this capability was not realised. The term "Intranet" became popular at this time as if a new and highly desirable network phenomenon had been discovered, but the only real difference between these Intranets and Local Area Networks which had existed in schools since the early 1980s was that they assumed HTML standards for documents. The researcher would argue that the functionality of closed networks had not changed at all. Nevertheless, imaginative and effective applications of Local Area Networks (or Intranets) were overshadowed by global projects.

It is particularly important to recognise the steps taken by the Project officers in assisting schools with their network connectivity. The amount of effort directed towards connectivity issues was seen by the project officers as a "best use of time" considering that members would not be able to realise any level of involvement without substantial technical support. In providing this support both directly through school visits and indirectly through web pages and telephone calls, a recurrent theme has been the process of situating schools' technical development within their own communities. Many connections were undertaken using a model where parents and teachers worked together to plan and physically install networks. Apart from the obvious advantage of involving the school community in what would probably be the most sophisticated technical installation in the school, a more valuable statement of empowerment is made. Through learning even simple networking skills from the Project officers and other member schools, a group of teachers and parents see the network as a simple collection of devices which they can explain to students, and probably troubleshoot and extend when required. Substantial cost savings for schools have also been realised as a result of this work. In early November 1996, Mag-Net members and project officers organised a "Net Day" modelled along the lines of a large networking activity which took place in the United States in 1995. This day was designed to be a focus for schools to address networking problems and developments, and although the participation was not large, approximately four new networks were installed. At this event a number of new technologies were tested at various sites including some real time online network problem solving. This was unusual in that almost all of Mag-Net's activities to date had been asynchronous with the exception of some CuSeeMe television

activities (see Chapter 8.1). The real time connections enlivened the day's activities by reinforcing the fact that similar groups were at work at the same time on similar problems, and also to demonstrate an exciting range of technologies to parent helpers on the day.

7.3 Summary

The involvement of this research with the Mag-Net project had great benefits for both groups. In fact members of the research group were all at some time associated with Mag-Net projects to some extent. The harmony that existed between this group of people is attributed to the "grass roots" nature of both projects.

Unlike traditional teacher professional development activities which had been visible in Victoria until that time, these groups embraced technologies and to a degree celebrated technical skill and achievement. Projects were strongly defined in terms of curriculum outcomes, but a high degree of flexibility in process and timescale was encouraged.

One of the largest professional development activities undertaken by the Victorian ministry of Education related to training teachers in the educational uses of the Internet. The "Learning on the Internet" later renamed to "Learning with the Internet" was successfully tendered in late 1995. Workshops were conducted with a group of teachers later to become internet trainers for their peers. After their initial training and introduction to the materials, this group began to schedule activities in their own local education communities based upon the training and materials they had received and any additional materials that

they had developed for themselves. The contrast in professional development methodology between Learning with the Internet compared with Mag-Net and this research is clear. The hierarchical model on the one hand had invested in the development of materials and processes that had been carefully defined at the outset. On the other hand, a typical Mag-Net project treats professional development as on ongoing process with great value placed upon the continual discourse of interested parties, and the evolution of collaborative support techniques. This is not to say that there were problems with *Learning with the Internet*, but that its construction carried particular assumptions about the nature of professional development.

> *Computer-based communication technology differs from many other workplace technologies because it has more potential to support upward influence and lateral influence, not just downward management control.* (Sproull and Kiesler, 1991:103)

This is useful in reference to the design of professional development activities which are able to be supported by telecommunications methods. Control can be given to groups but effective management of the workplace, structures, and curriculum may not be delegated. In the worst cases, opportunities to contact decision makers are limited to some definition of the group's and moderators' scope.

Throughout the planning stages of *Learning with the Internet* developers assumed that some manner of ongoing support for trainers would be provided. This was partly in recognition of the fact that as each successive generation of trainers was inducted, they had become further removed from the initial training

which had been conducted by the authors of the project. To address this potential difficulty, project managers asked the researcher to provide a mailing list that would function like *charlotte* and support the growing community of trainers. A new list named *pdteam* was created (see Appendix 9), and was similarly successful hosting a searchable web archive of postings so that the wisdom of the trainers would be best utilised.

8 Two experiments with video

"An 'egg question' here. Some high school students together with Monash University have got together to solve a riddle with an egg! On the line is a Monash University lecturer, Bernard Holkner who's going to tell us something about it."

Radio 3AW Melbourne broadcast 19 April 1996

The publicity and subsequent radio interviews which followed the Researcher and Peter developing a powerful video collaboration project were completely misdirected. In an ironic turn of events, the media became more interested in the science experiment that the students were conducting than the highly adventurous multimedia technology being applied.

This chapter extracts a range of observations made while members of the research group investigated the potential uses of desktop video conferencing and of video broadcasting over the Internet. In both cases, the implementations were conducted at a time when the technologies were quite new, and relatively unknown in educational circles.

8.1 Desktop Television Conferencing - CuSeeMe

An experiment with broadcasting television images from a networked personal computer between two members of the group was made possible when inexpensive video capture hardware became available to the group. Initial arguments with the hardware salespeople that their product could be used in this way eventually resulted in two cards being made available for experimental purposes (Appendix 2.6). One card was installed at Monash Education, and the

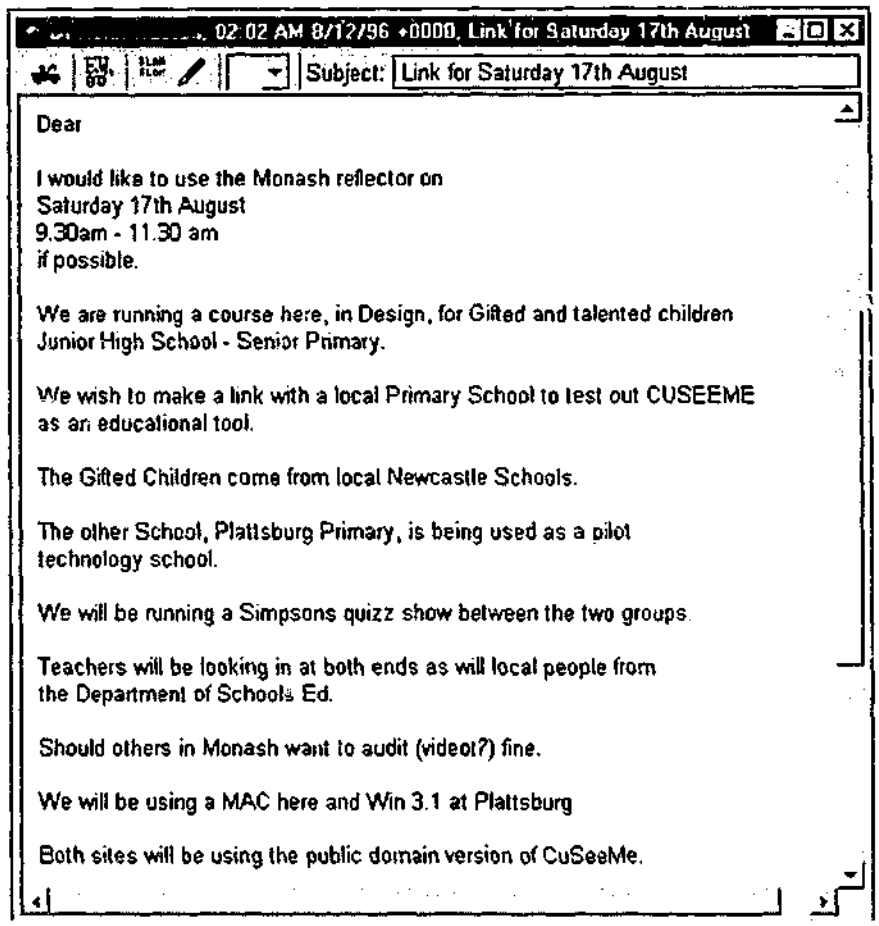
second at Peter's school. Semi-professional black and white video cameras were used with the cards, and the experimental "CuSeeMe" software installed. Although the video quality was poor, and the image rather small (160x120 pixels), the experiments aroused sufficient interest that purpose-built cameras, and improved software were purchased.

8.1.1 Broadcasting

The limitations of "point-to-point" television broadcasts became quickly evident. To establish communication, the IP address of the called party needed to be known to the caller, and this was a technical requirement beyond most members of the group intending to use the system. The fact that IP addresses can change with each connection to the Internet forced the group to email two or three times in order to establish who would call and to what verified IP address. The second limitation of the system was its inability to support multiple users or even passive observers without connecting to some remote "reflector" site. A CuSeeMe Reflector is a system which allows multiple CuSeeMe participants to be interconnected. This is rather like instigating a telephone conference call in that a central system hosts multiple connections. An advantage of using reflectors is that an important event can be "broadcast" to multiple viewers, allowing one or several cameras to be viewed by participants who do not have cameras. They are, however, able to communicate with camera equipped participants by speech or typing. From the point of view of the research group, third party owned reflectors were rejected due to their lack of reliability and the occasional unwanted interference by non-participant public. Provision of a local CuSeeMe reflector was decided upon at Monash University to support this part of the

research. A small and suitable UNIX computer was constructed and public domain reflector software code (see Appendix 1.3) was downloaded and compiled. A booking system was developed, and certain regulations drafted to ensure the security and appropriate use of the reflector. The researcher took the responsibility of technical and educational support for the reflector which gained significant interest from other educators not associated with the research (see Appendix 2.7).

While other educational reflectors were in existence, it was perhaps the fact that the Monash reflector was surrounded by "visible" (no pun intended) supporters that caught the attention of other educators around the world. Example 8-1 is a typical email sent by a researcher who needed the support of a working reflector for his own project. There were serious concerns by the researcher and members of the research group that inappropriate use of the reflector was possible, and indeed there was evidence that reflectors in the United States had been closed after unidentified public users had used the system to broadcast offensive material. It was believed that the high profile of the Monash reflector would eventually cause it to attract misuse, and so a password system was implemented alongside the bookings scheme. Finally, intending users were required to book the reflector, stating their purposes, intended audience, and likely participants. After approval a password would be set for the required session, and the system started. The Reflector was disconnected after each scheduled use to avoid attracting hacking attempts.



Example 8-1 Email requesting booking time for the Monash Reflector

8.1.2 Student Collaboration

The first serious use of the Monash reflector was made in April 1996 when a series of interactions between Peter at Third Secondary College, Joe from the Ministry of Education at Singapore, and the principal researcher began using the reflector with three cameras online to jointly develop a small trans-continental science activity. This would be for Year Nine students in Melbourne to collaborate with peers in a school in Singapore.

Peter and Joe identified two issues with the project:

1. The combined role of the desktop TV with email and FTP file transfer in developing modified curriculum and student activities, and

2. The use of the TV as a culmination of communication activities between the students.

The need for high speed connections to the Monash reflector meant that Melbourne students had to be brought to a Monash computer laboratory, and Singapore students to a Government site. Future communications using the CuSeeMe reflector even between these two countries were made using modems located in the schools, although the picture quality suffered somewhat. For the purposes of the project however, the teachers regarded the success of the project as being in the use of the communications technologies to improve the collaborative work of the students and the teachers.

Figure 8-1 Screenshot of CuSeeMe Interaction

Figure 8-1 shows a screen-shot taken from an observer's computer logged into the Monash Reflector during the interaction between Melbourne and Singapore students. Of the four windows, the boy in screen two is typing a description of

his science experiment to the two girls he had been working with and emailing over previous weeks. The activity was in fact based around the design of a suitable carriage that would protect an egg dropped onto the floor from a height of one metre. The cameras were moved by teachers to view the final tests of the devices.

This mode of communication became quickly assimilated into the research group's collection of conferencing options. Some technical concerns regarding the location of suitable inexpensive cameras, and development of support for this hardware quickly arose. Furthermore several tensions arose with the research participants:

1. Wishing to take part in frequent videoconferences and
2. Facing difficulties scheduling themselves and their classes to be available at a time to suit the other party, and
3. Finding that the hardware, software, and suitable venues in schools were equally difficult to schedule.

Two members of the group made extensive use of desktop television conferencing to communicate between themselves and with the researcher; however, the aforementioned stresses which are clearly related to communications technical synchronicity and social expectations of professional communication eventually caused this professional use to become infrequent. Peter advised that the novelty was wearing off for him, and that it was more efficient to send an email that the other party could deal with at their leisure. Uses of desktop television for students' special events continued, but uses were not frequent.

To: stem-l@lecity.edu.au
Subject: Royal Show
Cc: mag-net@edx1.educ.monash.edu.au

Hi Folks !

You can see the DSE-Mag-Net Royal Melbourne Show Exhibition from the comfort of your home through CU-Seeme. You can download the software from ftp://edx1.educ.monash.edu.au/pub/windows

When using the CU-Seeme software, connect to 130.194.180.169 . We will transmit from about 11am until 8pm, every day of the show.

And please send e-mail to us !!!!! Our visitors to the stand will reply !!!

Cheers.

Example 8-2 Bulletin Board mail advertising CuSeeMe broadcast

Probably one of the most amusing intersections of technology is shown in Example 8-2 in which an advertisement for a CuSeeMe broadcast appeared in the STEM-L mailing list. The posting had originally been made to a City Limits point bulletin board (Mag-Net), and the message automatically propagated to an Internet mailing list which was a part of this research. The activity it describes involved a CuSeeMe camera setup at the Royal Melbourne Agricultural Show in September 1995, and connected to the Monash Reflector. Students who visited the show were invited to be a part of a desktop television conference between themselves, the researcher, and other research participants.

8.2 Streamed Video and Audio

In mid 1996, members of the research group became interested in using video and sound to demonstrate teaching activities after some demonstrations of video capture techniques. The technique of capturing video at this time required expensive hardware in the form of specialised video computer cards and interface cables, and was too expensive and technically difficult for the group to

undertake alone. Nevertheless, video capture equipment made available at the researcher's university allowed several people to bring videotaped lesson material and have it digitised. This was a moderately effective solution, since the large video files created on the university computer could be "burned" onto CDROM which although expensive in 1996, meant that the video files could be taken back to workplaces and incorporated into professional development presentations.

Participants sought ways to share these videos over the Internet, which was a notable development in itself. By this time, the group were seeking new ways to use the networks, and ways to adapt known effective teaching methods for internet distribution. Invariably, the videos were intended for wide distribution to the educational community and were placed in predominant parts of school web sites.

The video files loaded onto the Internet were actually so large as to be almost unusable. Even with the fastest network connections, the videos were taking several minutes to download, and with a typical modem connection to a school, download times in excess of an hour were common. It was timely then that the development of *streaming* technology became public, and its method of delivering video and audio data as a constant "stream" of data that could be played almost immediately appeared to offer a solution to problems of large files.

Figure 8-2 Still from a VDO Live Stream

Technically, the streaming technology featured file compression so that the files themselves could be reduced in size, and the media stream which allowed the recipient (client) to view the video if a small software "plug-in" had been installed. The final transmitted quality of early video streams was rather poor (Figure 8-2) largely as a result of losses due to the file compression, but subsequent projects using newer streaming products were quite satisfactory. The limitations of the *VDO Live system* resulted in slightly "fuzzy" pictures, and animation that occasionally broke the image into disjointed blocks Nevertheless, by mid 1996 a kind of service had been organised so that educators involved in the research and Mag-Net participants could post videotapes to the researcher and have them digitised and loaded onto the researcher's streaming media server. This was an effective and sensible division of labour it was noted since neither the technology nor the skills existed at the schools. It could be argued that unlike other projects within this research, streaming media projects were more effective in allowing the participants to remain focussed on educational content rather than be distracted by a need to learn difficult technical skills. The decision to work this way was mine considering that any skills gained in video capture and stream

creation would be less valuable to these educators in the foreseeable future, particularly when compared with moderation skills or HTML skills to name only two.

8.3 Summary

This chapter has continued the reporting of data and analysis pertaining to the specific technology initiatives that made up the research. The research participants and their contacts were able to make significant use of online video and video conferencing almost as soon as the technology became available. It is notable that these technologies brought about new modes of communication, and that people were keen to explore their potential. Moreover, since the researcher had decided that for this technology at least, the training in digitising, compression, hosting the video conference server, and loading the video streams could not be justified. This was a decision that I made after short consultation with John, who was the most technically skilled of the group. John agreed that the rate of change in hardware and software for these technologies would be such that the learned skills could quickly become useless. Instead, participants using video were kept advised of the technical issues and requirements, but these were actually managed by John and myself.

The following chapter relates the inspiration and the outcomes of an early web database initiative and the significant technological and organisational concerns that arose.

9 A Web of One Page

9.1 Dynamics and Web documents

This chapter describes the evolution of systems which challenged firmly held assumptions of the potential of web documents. One participant of this research in particular developed a series of model applications, which, after some reflection with the researcher proved to be amongst the most exciting and technologically liberating. This phase of the research developed "database driven" web documents that indicated a new independence of web developers from certain technical constraints, but which furthermore established radically different methods of engagement between the developers, readers, and technology actors of a system.

9.2 The Web supporting collaborative writing.

A number of purposes were to be served by Elizabeth's development of the Office Web demonstration project.

She was convinced that better use could be made of organisational websites than the mere promotion and presentation of material to largely passive consumers (students). Similarly, she had observed with satisfaction, the way in which groups of educators had used a document revision and version control system[5] to

[5] Version control is a system for identifying the historical status of a document as it undergoes changes over time. In a document with multiple authors, these systems are critical in identifying the cast and order of contributors, and the changes that they have made. Revision in this context refers to processes where indicators can be made onto a document that show a collaborator's suggestions for change. These suggestions can be accepted or rejected by others in the team of authors.

write curriculum in a collaborative setting. Teachers and administrators of Technical and Further Education colleges (TAFE) were the target of Elizabeth's work in this research. In order to demonstrate the technology and likely outcomes to senior management, she built a sample Web site based at Monash with the assistance of the researcher and certain members of the charlotte-list group.

9.3 Collaboration and Permission

The technical issues of creating html documents (web pages) dogged many attempts in this research when individuals wished to upload completed texts, or to gain access to jointly owned texts. These problems usually reduced to the understanding of Unix operating system where changes to individual and group ownership of a document could become critical, and time consuming. The major web servers were Unix systems at the time of this research, and appeared likely to be the predominant system at least in the near future. To make changes to another person's document which is located in a Unix system, requires that document to given "permissions" that will allow universal or group access. Universal access to html documents is clearly inappropriate since any member of the public would be able to make changes to the original author's document, or indeed to remove it completely. Group access to an html document requires a management overhead within the Unix environment, whereby a skilled operator must perform the allocation of people into (and out of) groups as projects are instigated, and set the various permissions onto the documents or directories to be owned by that group.

This level of Unix administration was avoided by the researcher for a considerable period of time since the work would be so time consuming as to detract from more desirable work with the research group. This concern for 'appropriate' uses of the researcher's and other change agents' time is a theme of this work, and is particularly evident in chapters 1.1.2, 6.3.4, 6.9, 7.2, 10.6 and the conclusion. Nevertheless, high level Unix administration represented the next order of system management that would be required[6].

9.4 Maintenance needs directing a structural change

9.4.1 Perceived problem

The demonstration web that Elizabeth tried to develop needed to account for:

- Rapid modification to web documents,
- Multiple users being responsible for web content, and able to contribute,
- Ability to "re-use" content at will, without duplicating data,
- Avoiding the problems of maintaining interdependent files.

9.4.2 Implementing a database solution

Capitalising on her own programming and database skills, Elizabeth sought, with the assistance of Peter and the researcher, some means to develop a web application or series of pages that might extract their component text from a secondary file. Members of the group had previously (see 7.2.1.5) experimented

[6] Eighteen months later, a technician with Unix skills was employed to provide these solutions for Faculty wide implementation.

with PERL programs to read and write to files with mixed success, but testing of the "Cold Fusion" commercial product became the turning point in realising what was possible. The Cold Fusion application was installed at the researcher's office and at Elizabeth's workplace for testing, and proved so successful that copies were immediately purchased for both sites.

This application installs a second server program onto a functioning webserver that effectively "gets" data from various established databases and presents it formatted for the webserver to issue (Figure 9-1).

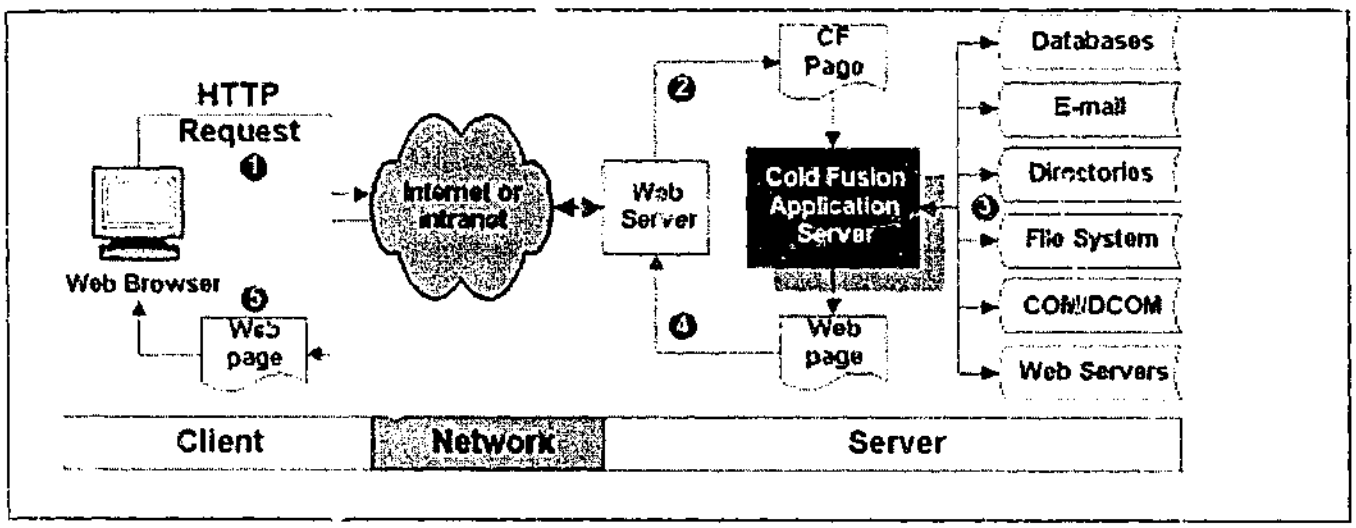


Figure 9-1 Cold Fusion software process

The actual method of interfacing html documents into a database accessible format was not difficult once the software was correctly installed and its general operation was understood. The code example in Figure 9-2 uses the *Cold Fusion Markup Language* which was used by the research group for all web database projects. The programming of Cold Fusion applications was found to be relatively straightforward, and indicative of the potential and of the development processes which would be required by other database "solutions".

```
File Edit Search Help
<!--- Define an SQL Query against the data identified as database4 --->

<CFQUERY NAME="getdata" DATASOURCE="database4"
SQL="SELECT evaln_1.*, Project.*
FROM evalu_table INNER JOIN Project ON evaln_1.r_evaln_1 = Project1.Projectname">

<H3>Results -
This output has been modified to remove the identification of respondents</H3>


<!--- Output the data from the SQL query above --->

<CFOUTPUT QUERY="getdata">
#often_online#
#videos_useful#
#prefer_f2f#
#online_advantages#
#readings#
</CFOUTPUT>
```

Figure 9-2 Simplified database access code

The example shows how a Structured Query Language (SQL) query is written into the html of a web page, to be output in the same page. The results of the output in the example will be the contents of the "often_online", "videos_useful", "prefer_f2f" database fields amongst others, which match the query. All formatting information has been removed from this example for clarity.

9.5 Immediate Outcomes

The outcome of several weeks work was the production of a comprehensive application that would dynamically serve pages required for the administration of the workplace. (Lynch, 1997) The resulting website generated significant interest from several points of view.

9.5.1 Simplification

The "site" which was capable of delivering many hundreds of web pages, actually comprised six pages which are described as "templates". The entire presentation or "look and feel" of the site could be changed quickly by modifying one template, and the results of the change would be immediately visible to readers.

9.5.2 Redefinition of roles

The maintenance of the site became a twofold issue which Elizabeth identified as *presentation* and *data*. This redefining of the web production at her workplace (and subsequent other sites which embraced the database method) brought other people into the web development process in a way which had not been thought possible. Until this system became active, the only method for web-based information to be updated was either:

1. Additions and changes were submitted as text or handwritten notes to Elizabeth who, as the most highly skilled in web technology, would address using html editing techniques, or
2. Targeted administrators and educators at Elizabeth's workplace would be trained in the use of an html editor of some type, given appropriate permissions to access the webserver, and would attend to all design, data, and linked content components of pages that were their responsibility. It is important to note that at this time (1996) the availability of "What You See Is What You Get" (WYSIWYG) Hypertext Markup Language editors was very limited in educational circles. These packages were expensive and not particularly robust

From these points of view, the awkwardness of developing such a large-scale training program for staff suggested very slow progress, and the mechanics of having just one person in charge of all web content were seen as structurally flawed.

Once commissioned, the database driven website allowed an organisational change to take place which was embraced by management in the sense that web development either reflected exiting business practice, or at least could be seen as consistent with the established roles of staff. Since all administrative content could be regarded as "data", and all web presentation of that data regarded as structure and presentation, the involvement of administrative staff in the exacting and responsible tasks of information (data) maintenance could be quickly devolved to those people without requiring training in HTML authoring. Web pages (templates) were written which allowed administrators to update and add content (data) to web pages without even learning a database package.

9.6 Another View of Publishing

Some members of the research group were able to view web content from a particular point of view which reduces it to "data". While this is not surprising, there is an implication that when information is discussed in terms of "data", there are different assumptions that refer to its *portability*, *reusability*, and *flexibility* (author's emphasis).

Data is *portable* in that it can be moved between systems. New groups may use this data without needing to adapt it to different systems. Elizabeth's Web database system demonstrated a method for using the same data, a students course information website, on a CDROM which could be distributed to staff and students. The application design ensured that only one database needed to be maintained, and that it could reside on a webserver. This meant that web users had access to the most up-to-date information, which was being updated in real time by the responsible administrative staff. To encapsulate the information for non-web applications, staff made a copy of the database at an agreed time, and this was copied to the CDROM application for copying and distribution.

Data is *reusable* when the need to re-enter or retype it for different applications is removed. Examples of data reuse were contained in Elizabeth's project whereby web pages from different departments could contain identical information that came from themselves or a third party. In fact, this feature ensured that the information required by all groups, for example an address listing, or a news item, would be automatically updated at all publishing points when the responsible group made changes. One of the exciting features of this process was identified by Elizabeth when she demonstrated that different groups could even present the same content with different emphasis or in new contexts through intelligent use of templates and interface design.

Data *flexibility* is an expression used by the researcher to refer to the ability of web database applications to contain data other than text. A logical step was made from Elizabeth's and the researcher's work to encapsulate Web Uniform Resource Locations (URLs), filenames and locations of graphics, sounds, audio

lectures, and video into web applications. A web search database written by the researcher and Elizabeth, was subsequently able to treat all of these media as "objects of interest" so that a person searching for references could be presented with full text, a URL, an abstract or review, a graphic, or an online video. The database template sorted out the relevance of the data search by content as well as by media.

The immediate outcomes of this particular project were disappointing. The target group of academics who originally expressed an interest in having such a system were unable to load enough data that was of a high enough quality to pursue it. While the system proved to be technically advanced and robust, it relied on the submission of quality data by a group whose staffing shortfalls lead to the project being shelved. It is important to refer this event to the familiar situation of electronic resource warehousing that began with computer bulletin boards (see Chapter 6.6). Again, the lack or loss of a contributing community and culture left a piece of technology "stranded" with an incomplete system.

9.7 Conclusion

The database method indicated a radically new application for the web browsing program. Using the database technology, the web browser program could be used as an interface to almost any database with several advantages:

- Training in a database package was not required
- Installation of database client programs (like Access, or Oracle client) was not necessary,

- Many users could access and modify database provided that their workstations could operate a web browser program.

A view was considered by Elizabeth and the researcher of building a database application which resided locally on CDROM but itself made periodic checks for updates on a web database enabled website. While hybrid (web and CDROM) applications were becoming available at this phase of the research, database applications of this kind were not evident. The researchers altered their focus to web questionnaires instead of following this path.

The Web Questionnaires that were made possible by database driven web documents became another of the significant successes of this research. In this model, web forms were created which could submit their results to a database table located on a web server. Previous attempts by members of the research group to create online questionnaires worked by sending the data to an email address where it could then be "cut and pasted" into a database or spreadsheet. The database version demonstrated dramatic gains by having the users' data submitted directly into a database, added to any pre-existing material. Furthermore, Elizabeth's and the researcher's efforts with these questionnaires enabled users to revisit their questionnaire responses and check or modify them. Administratively, several additional gains were met.

- Users' responses to online questionnaires were immediately visible to a selected audience via a "results" web page.
- Summaries of users' responses could be generated dynamically and viewed as soon as the data had been entered.

- Administrators could be automatically alerted by email of additions, changes or indeed trends in the data as it was received.

Later experiments conducted by the researcher, Elizabeth, and Peter, a participant working in a secondary school, focussed upon three significant web database applications.

1. Online questionnaires.
2. Websites with were largely served from databases to single 'template' pages.
3. A further development where pages incorporating a form and the same form's feedback were able to be dynamically modified with the submissions of visitors.

The last example created highly interactive online documents that groups could add to or edit change at will.

The work described in this chapter was conducted at the earliest stages of database integration, particularly in educational environments. It represented a significant challenge to the notions of online publishing and to our understandings of document ownership and control.

10 "Don't talk to the Waiter"

Virtual Reality in Professional Development

Two members of the research group had arranged to 'meet' in an online virtual reality environment one evening. When they 'moved' into a new room within that space one whispered to the other: "Don't talk to the waiter! I started it off yesterday and couldn't make it shut up!" (Christine, 1997, January 19)

This chapter describes the experiments in using a Multiple User Object Oriented Domain (MOO) for collaborative purposes. As members of the group and other teachers and trainers gave constructive feedback about the environment and its potential, a large software development project began, resulting in the production of EdMOO and attendant documentation and end-user services.

10.1 What was envisaged

The author became motivated about the prospect of exploring MOO technology as an extension of the "message based" communication modes that were becoming commonplace. This was at a time when Bulletin Board systems were already beginning to lose favour, and the rise of Internet email and Web messaging systems (see Chapter 6.9) was bringing about numerous online professional development networks and useful research into their application (Harasim, 1995; Schrum, 1995) It was thought that the MOO environment could at once provide an online meeting place that would support both synchronous and asynchronous messaging, as well as opportunities for the research group to mould its function and appeal with some rudimentary programming. There were

examples of MOOs being used to support professional groups notably TECFA supporting Research into Computer Mediated Communication, (Schneider, 1998) and BioMOO supporting Biology researchers. (Glusman, 1997)

> *BioMOO is a professional community of Biology researchers. It is a place to come meet colleagues in Biology studies and related fields and brainstorm, to hold colloquia and conferences, to explore the serious side of this new medium. (Glusman, 1997)*

The researcher's expectation was that players in a MOO designed for educators' professional development would be likely to adapt the "rooms" metaphor to create a range of personalised, and collaboratively developed work spaces. A complete discussion of the metaphor and its problems appears in Chapter 10.7.1. Finally, it was evident that a MOO could provide a constructive workspace that was highly adaptable to individuals' and groups' needs. In practice this would mean that the research group could build virtual spaces and furnish them with objects and documents. Such a highly dynamic environment might provide alternate representations of ideas, theories and designs. There was also an interest in the potential such a place might have for the students of the research group.

10.2 Construction, Programming and Learning

MOO environments are similar to IRC style chat rooms in their ability to support many users communicating in real time by typing. The real scope of MOO is in its 'open ended' and 'object oriented' database model. All of the spaces (rooms) artefacts (objects) and behaviours of these are programmed by the participants (players). Without the players, the MOO is both empty and featureless. A

dynamic MOO with several active players is likely to comprise many spaces for people to meet and converse, and a range of objects including notes, texts, and textual descriptions of things. The experience of a MOO is both in developing one's own spaces and artefacts for others to experience, and in moving about an environment that someone else has constructed. These constructed environments can be for the purposes of simulation, entertainment or information, but for the research group, the constructed environments might illustrate ways for learners to represent knowledge of issues and objects.

10.3 A Social System

People working or being entertained in a MOO experience the environment and social dynamics that others help to create. When Bruckman considered that these places could be regarded as "a workshop for exploring issues of social hierarchy" (Bruckman, 1992:12) she is suggesting that MOO might be better described as a process, rather than a system. It is as if we were now able to actively engage some of the matters concerning the recognition of social structures in technology applications. Even at its most basic 'text on screen' method, MOOs are effective in communicating rules and etiquette. This is of course a virtual reality system (Curtis, 1997) and social constructs can be highly experimental, challenging and at times dangerous (see chapter 2.8.2).

10.4 Installation

The research group were interested to experiment in developing a MOO as a collaborative meeting place, as a constructive environment, and to experience the

social and technological process that was expected. Bruckman and Resnick (1993b) had explored the notion of online meeting places other than work or home and the importance of helping such a community to grow. This was consistent with Glusman's (1997) and Schneider's (1998) work. Bruckman and Resnick also indicated a real potential for finding professional contacts and developing useful artefacts which they referred to as "Contributory Objects" (Bruckman and Resnick, 1993b:8) .

EdMOO was installed by the author after downloading the LambdaMOO core and database files (Curtis, 1996) which were installed on a purpose-built Unix fileserver within the Faculty of Education at Monash University. In fact the target MOO server hardware was substantially underpowered by the (then) standards of Internet fileservers, being based upon an 80486 class computer which had been discarded as no longer useful for word processing. Over time, the hardware was upgraded, but in fact it was only under extremely heavy load, when more than thirty individuals were logged into the MOO were there noticeable delays or "lag".

10.5 Power and politics in a corner of cyberspace

Power structures in the MOO can not possibly be avoided.

A Wizard / Programmer / Player was hierarchy built into the system at the outset, and while the expression "Wizard" grew from the apparently benign "Dungeons and Dragons" world of Multiple User Dungeons (MUDs), it retains its impact as defining the players of ultimate authority. Curtis (1997:153) describes his own approach to solving social problems in LambdaMOO, but notes that most players

initially treat him "..with exaggerated deference and respect." Further, new users' unfamiliarity in EdMOO placed them at a serious disadvantage when communicating with or in the presence of more experienced or privileged players. Of course in a MOO environment, players can still "present" (themselves) in any way they wish, adopting another or neutral gender, and asserting skills, knowledge, and experiences at will. Gender swapping in MOOspace has been the subject of various studies, (Bruckman and Resnick, 1993a; Cherny, 1994) and these proved of immense benefit in the construction and support of EdMOO. There were two reasons for this:

- Most of the users of EdMOO would initially be the group, and almost all of these were women. It was possible then that EdMOO's primarily female users could engage with this environment in the first instance without the complications of predetermined masculinist, or any other dominating culture, and
- Players from the research group were informed during induction, of the various known dangers of working in these environments. They were also directed to various discussions and papers which would make them better skilled in identifying signals where they or another player might be about to encounter some danger.

10.6 Software Development

Limitations of the LambdaMOO core with respect to most functions apart from "chat" became evident as soon as members of the group sought to explore the programming and other Virtual Reality potentials of the space. The most

frustrating problems appeared to arise when teachers *knew* that programming objects, defining their characters, and more sophisticated communications would give them an experience in a constructivist environment, but found the lengthy help screens and detailed reference sheets (Appendix 7.1) still unhelpful.

The development of the "Drover" software package by a student associated with the research project came about in response to the need for the teachers to more easily interact with EdMOO, its characters, and programmed objects. Further developments of Drover were expected to assist users program their own objects. While Drover was being developed, contact was made with two online MOO-Education communities; the MOO-Education-L, (1996) and MOO-Cows-L (1996) mailing lists. This was useful in discovering two consistent interface themes:

1. The standard Telnet program interface was thought by many MOO administrators to be a disincentive to serious use by any but the most ardent enthusiasts,
2. Some multimedia or at least graphical capability would be highly desirable (Appendix 2.9).

Work at E_MOO, (Bakun, 1996) TECFA (Tognotti, Schneider et al., 1995) and BioMOO (Glusman, 1996) discussed World Wide Web interfaces to the MOO, or a least the potential for this, by allowing the MOO server to distribute HTML documents on a separate port, or by using a separate fileserver.

The author's first extensions of the LambdaMOO environment involved developing a new software program which could be used to overcome the

limitations of the Telnet program used by most MOO participants to communicate with players and interact with the environment. Members of the research group who became involved with EdMOO didn't challenge the Telnet interface, but the author and a young programmer associate agreed that a better interface was possible. If the full potential of MOO interaction and programming for educational professional development was to be realized, then, they believed the Telnet interface and requirement of players to recall text instructions would seriously test the patience of enthusiastic testers. The author and programmer worked to develop two versions of a package that was to be known as *Drover*, with the sole aim of providing a "user friendly" interface to MOOs and to EdMOO in particular. The first version of the package was released in April 1996. It featured simplified logon procedures, and convenient icon buttons that could be pressed to call up common functions, rather than require the player to remember and type wordy instructions.

With the second version of the Drover program (Appendix 8), an important feature of the Microsoft Windows environment was exploited. The programmer realized that Drover would be able to communicate with other Windows programs, notably Netscape, and force the web browser to load web pages under Drover's control (see Appendix 8). Since EdMOO had been built using the LambdaMOO software and database, its programming code could be modified to capitalize upon the communication between the Drover and Netscape. At this point it became evident that support for Macintosh, Unix computers would be lost if the project was to continue, but a quick survey of the research group indicated that no person would be disadvantaged by this, although several players

were required to upgrade versions of Netscape. The result of Drover version two was a program which could allow a player to more easily interact with the MOO and players, create simple programs, and use a new function *Showsite* to illustrate a web page (HTML document, graphic, etc) to other players connected to EdMOO. This powerful feature enabled a series of online presentations in EdMOO and a "Virtual barbeque" training session in which research papers, graphics, and sample websites were shown online, in real time to a large audience (Holkner, 1997)

From a technical point of view, EdMOO and its various client software programs, functioned reliably. Improvements in Web browser programs able to support Java (see Chapter 10.6) led eventually to a decline in the use of Drover for three reasons:

1. Drover, by its nature required the user to download and install large software onto their computers, and there were users reluctant to add a relatively unknown package to their systems,
2. The researcher and volunteer programmer were the sole sources of support for users having trouble with Drover's installation and operation, and while problems were not common, both people were uncomfortable about these possibly ongoing technical roles.
3. The development of the Web-MOO interface that set EdMOO apart from many other MOOs was being effectively lost since it had established a large set of protocols which would need much wider agreement for international development to be worthwhile.

Accordingly, the researcher and the programmer ceased development of Drover in favour of adapting a new and more widely acceptable *Java* client program. The Java programming language was designed to be a flexible and cross-platform (Windows, Macintosh and Unix) solution to software development particularly in Web environments. After assessing all of the available Java Telnet clients that might be adapted to EdMOO, the Cup-O MUD (Stewart, 1997) package was installed and adapted. There were several consequences of this improvement :

- Users wishing to use the new system were often required to upgrade their browser program (Netscape, Internet Explorer) to Java capable versions.
- The new environment was a little easier to manage since it placed all MOO activities into one "Window" on the screen (see Appendix 8).
- To accompany the easier navigation of the environment, the author and two participants established a new metaphor for the MOO. The metaphor chosen was that the MOO would be a virtual city, but surrounded by undefined areas that would be defined and explained by future players. Using the graphical capabilities of EdMOO, a simple visual map was developed.
- New documentation specific to the environment was developed (see Appendix 7.2).

It was interesting to observe that as EdMOO progressed, casual visits by educators became more frequent and at times were formalised (Example 10-1).

To: bernard@edx1.educ.monash.edu.au
Subject: EdMOO

I am the faculty development officer at ... ..y University in the USA and have been showing EdMOO to my faculty for about a year now, to give them an idea of this as a potential tool for their classes. I wonder if I could have a permanent character for when I visit. I come about once each term so I wouldn't use up a lot of resources, nor would I necessarily build anything, just relying on what is posted by others.

Thank you for your consideration,

Director, Center for Teaching & Learning

Example 10-1 Planning Formal visits to EdMOO

It was also observed that regular players as well as visitors often felt the need to communicate directly with the programmer and the researcher about their experiences and plans by email in spite of the fact that the MOO provided considerable facility for communication itself. Example 10-2 is such an email from an academic in the United States advising of her plans to incorporate EdMOO experiences into graduate education courses. This kind of communication was valuable to the ongoing development of the environment.

To: Bernard <bernard@edx1.educ.monash.edu.au>
Subject: Re: EdMOO

Thanks Bernard,
We had a very good session today-- we played with posting URLs (some of which
booted us out--but that is life) and I always show them the waiter for maximum ooh effect.

I teach a class to faculty about teaching on-line
(_____, and I just want to expose them to a) chat and b) the possibilities of MOOs. (And my underlying objective is to build some confidence that they can do mysterious things like visit a MOO and survive.)

Example 10-2 EdMOO visit feedback

Other email feedback of the type illustrated in Example 10-3) served a different purpose in advising the researcher and non-players of their work and experiences that might not have been obvious during a visit to the MOO. This was considered to be a very important function since the MOO was often very "quiet" or indeed empty of players. Messages of this kind allowed people on the mailing lists to be encouraged and acknowledged for the work they had done.

From Kate: Use of EdMOO and Drover

Thanks for you help with the moo. It was an on-going saga I know, but I worked it out - what a clever little secretary I am!! I quickly went in and looked, but there was nobody there, how sad and boring. Do people still use it like they did last year? I hope they do, it was fun. I want to put some instruments into the music room, but I don't know how to do it. If you check 'Henry' you might find that I am still carrying around with me a shiny, black grand piano!!

Example 10-3 EdMOO visit feedback

10.7 EdMOO in use

10.7.1 Metaphors and Navigation

Two metaphors were used to describe EdMOO during the course of this research. The first of these saw the MOO as a building from which the basic complement of rooms: Atrium, Library, Study.. would be improved by the players "digging" rooms or homes for themselves. The Building metaphor was used between April 1997 and June 1998 and was never challenged as either restrictive or inappropriate. It is notable however that the construction of a Space Station by a student player, and a Desert Island, by a pair of unidentified players clearly

ignored the metaphor of the MOO as a building. In these cases, travel into the places was via the verbs "fly" and "sail" respectively. This was in contrast to the usual way of moving between EdMOO rooms by the verbs "north", "open", "upstairs", "outside", and other expressions more likely to be used to move about in a building.

The City metaphor (Figure 10-1) was thought to be a likely successor to the EdMOO building, since it would allow rooms within buildings, new buildings, and other spaces to be more easily understood, although there was technically no reason why the earlier metaphor could not have been expanded. The city metaphor provided several new possibilities:

- The environment could more easily support a range of educational, professional development, and recreational activities.
- As a learning environment, traditional understandings of study environments might be more easily managed (library, university)
- The management and development of specialised "rooms" by individuals and groups would be possible.
- More intuitive starting points for constructions beyond the City metaphor could be supported (National Park, Space Dock, Bus Station, Docks)

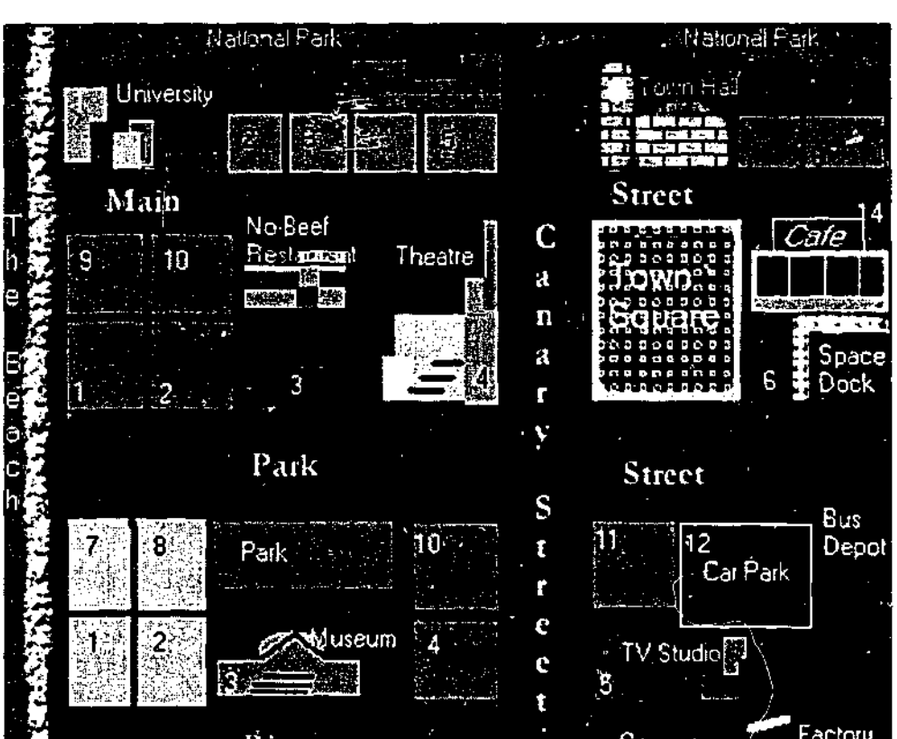


Figure 10-1 EdMOO City Metaphor – Navigational Map

A persistent concern for the researcher was that the metaphor chosen might limit the ways in which visiting educators perceived the ways that EdMOO might be used. Fanderclai (1995) lamented:

> *All too frequently I log onto an educational MUD to find myself in a virtual representation of a university campus. Separate buildings highlight the traditional divisions among disciplines, and within these buildings are elaborately programmed classrooms. Teachers can lock students in and others out; they have tools for delivering lectures, for silencing one or all members of a class, and controlling who speaks when.*
>
> (Fanderclai, 1995)

The City metaphor was an attempt to avoid this while trying to keep some level of familiarity and comfort for novice users. At the same time, to simplify the computer environment for users, we resolved that the multiple window requirement of the *Drover* software (Appendix 8) ought to be phased out. Using the *Cup-O-Mud* Java applet (Stewart, 1997) and the Web interface that was developed for EdMOO allowed the entire experience to be managed in one computer window using HTML Frames (Figure 10-2). These screen divisions provided a set of navigation buttons, an HTML area for displaying multimedia content, and the Java version of Telnet in which players could type their messages to each other and instructions to the system.

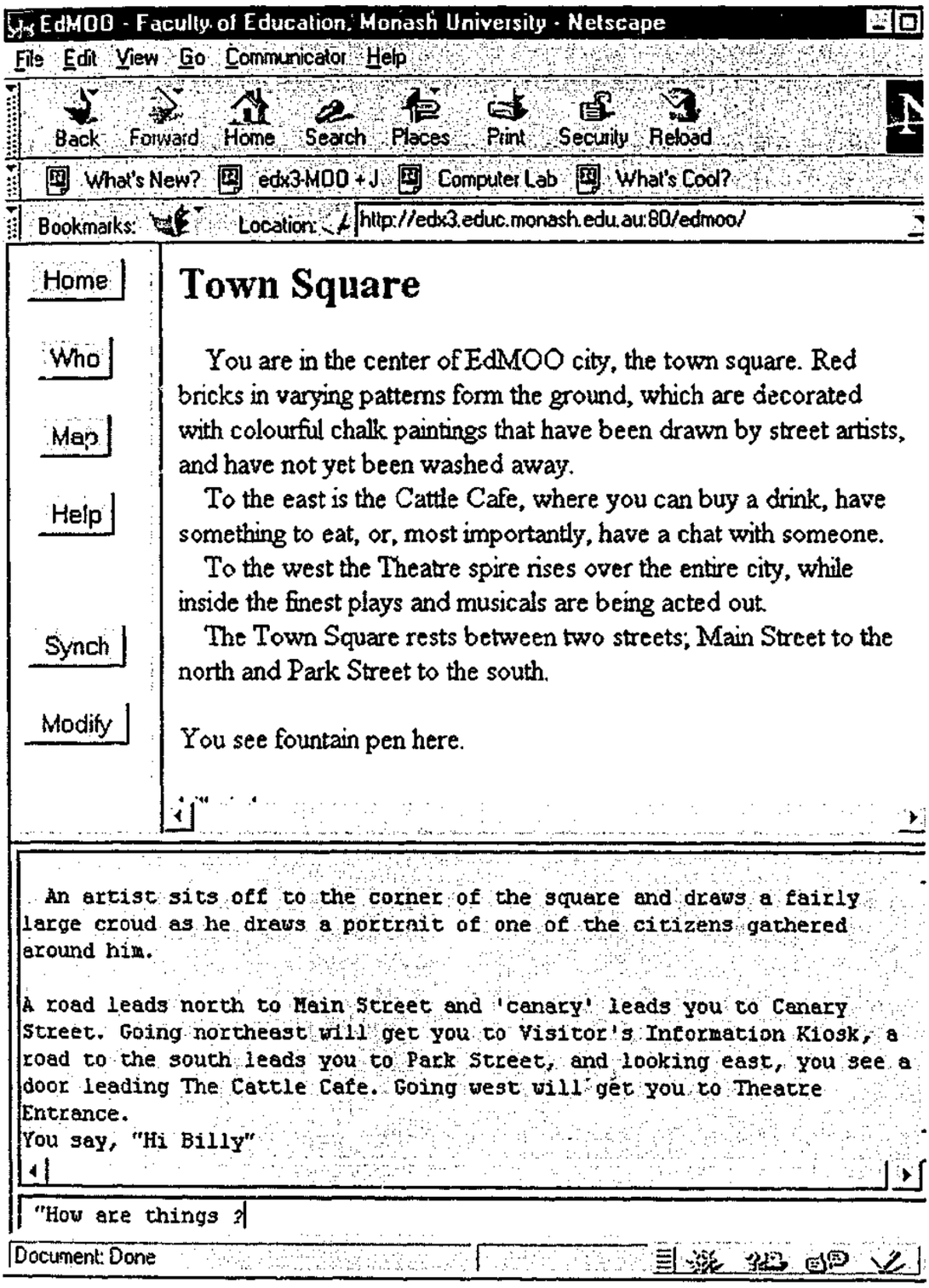


Figure 10-2 EdMOO with Cup-O MUD Java and Frames interfaces

The resulting interface took advantage of the navigational map so that players could move about EdMOO by mouse clicking on the graphical representation of a building or space. Modifications to EdMOO code by the author and

programmer allowed the various frames to communicate. In effect the requirement was that the HTML window displaying a player's location or the HTML properties of an object that they were looking at, needed to inform and be informed by the typing (Cup-O Mud) window as if a relevant instruction had been typed. Similarly, the logical design of the program to account for players accessing the environment from any of the three methods (Menu, Telnet command line, and HTML Object browser) required a particular conceptual design (Figure 10-3).

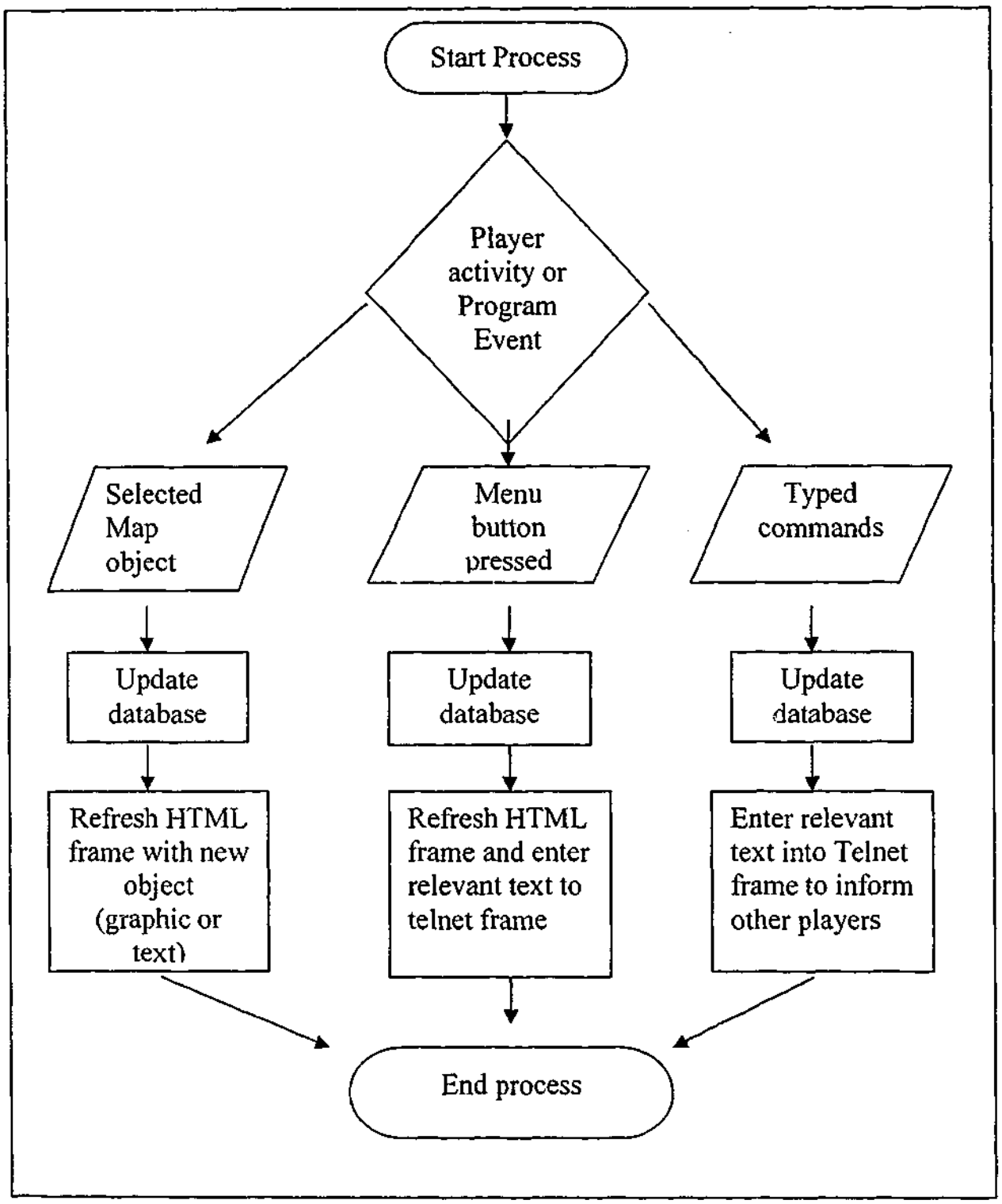


Figure 10-3 Process flow : EdMOO with tri-frame interface

The process flow diagram explains the interface and database methods used in developing the tri-frame environment shown in Figure 10-2.

10.7.2 Building and Programming

Creating (building) objects for MOO lessons or other interactions served to enhance and enliven visitors' experiences, and of course it was expected that regular players would build objects to furnish their "homes" or hopefully to build objects that would by their nature and behaviour explain certain concepts or understandings. The author considered too, that there might be potential for players to construct objects and environments that could present problems in a different light. In any case the advantages might be expected to include:

- Use of multimedia artefacts in the HTML Object frame that would add to or replace a printed description,
- Novel representations of problems and understandings through the simultaneous presentation of print and media,
- The programmed behaviours of objects either automatic or in response to another player's action that create simulations and virtual realities.

Some of these intentions can be seen in the literature of MUD/MOO, particularly as Web interfaces became possible, (Bruckman, 1995; Fanderclai, 1995; McAfee and Eustace, 1995; Bakun, 1996) The author was convinced that the MOO environment would provide a valuable experience for the research participants. Furthermore it was thought that the clumsy interface could be overcome by using Web navigation and object browsing. The author and programmer developed a range of tools to assist participants with building and programming tasks. Without the tools, building or creating objects required most users to refer to printed documentation.

Two examples of building code are given below.

```
@create $thing called comfortable armchair alias
chair
```

This code creates the object with an alias so that players can refer to the object as either "chair" or "armchair"

```
@dig out,outside|in,inside to Native garden
```

This code creates a "room" called "Native garden" which can be accessed by typing either "out" or "outside".

Although the code was not particularly difficult to remember, players were found to be slow to create objects and rooms. To make the creation and modification of objects more straightforward, the author and programmer built a special place called "The factory" where constructions and building workshops could be more easily undertaken. Players would typically move themselves into the factory and select from a menu a suitable fill-out form where they could enter construction details. The form featured a series of steps to be taken and error checking so that failures were minimized. A "Modify" button was added to the menu frame at this time to enable players to edit the description or HTML properties of objects being viewed. It was always the author's intention to develop the factory further so that really difficult programming tasks could be handled the same way, and to some extent this succeeded but was never truly reliable. Invariably, players (the research participants) encountered difficulties in programming object behaviours that required code repairs beyond the scope of the factory order forms. The programmer's description for the factory (Figure 10-4) was designed to encourage the metaphor.

Description
This place has obviously not been seen by a cleaner in years! There is dust everywhere, rust on parts of the machinery, and the carpet is getting a little mouldy.

The walls and ceiling are unpainted metal, but are sturdy and look like they wouldn't fall down even if hit by a demolition ball. Huge machines and robot arms tower above you, constantly manufacturing new parts and buildings for EdMOO.

The place is noisy, but not unbearably. It seems the builder of this place was more concerned with making it efficient rather than customer friendly.

This factory can be used to help you build objects quickly and easily. Just hang around until one of the robot assistants comes up to help you.

Figure 10-4: Description of the EdMOO Factory

The description explains a "robot worker" which was in fact software activated by the player entering the factory. This robot worker would ask a series of questions of the player to build the required objects.

Robotic Factory Worker' Dialogue	
Hi and welcome. I am here to serve you.	
What kind of thing can I help you build?	(object, container, or note)
What would you like to call your () ?	(name)
How would you describe the () ?	(description)
Do you have other names for the () ?	(aliases)
...	
There, the () is finished!	
{The robot hands you the new () }	(Object now owned by player)

Figure 10-5: Programmed Robot dialogue to assist players' constructions

10.7.3 Users' Programming Activities

Participants' programming activities during the period of this research were not really extensive. All participants were granted sufficient permissions on the system, and provided with printable documentation that explained programming principles at varying levels of difficulty these included a tutorial written by the

researcher (Appendix 7.3) and two well known MOO programming documents: "The Cow Ate My Brain", (Blankenship, 1993) and "jduJ's Wind-Up Duck Tutorial" (Anderson, n.d.) . Participants found that programming objects was very time consuming, and solving programming problems difficult and frustrating. Several good examples of programmed objects were developed nonetheless. Christine programmed a grand piano that could "play music" by describing the sounds in text. A special meeting called *A Barbeque in Cyberspace* was called by the researcher to encourage programming, in late 1998. This event attracted more than thirty users, including four of the research group. At the end of the session, some examples of programmed toys, talking food, and a recreation of "The Magic Pudding" character from Norman Lindsay's book had been developed. It was at this meeting that Christine remarked to Kate that they had been chatting with the Android Waiter which had been programmed by the researcher a week earlier: "Don't talk to the waiter! I started it off yesterday and couldn't make it shut up!" (Christine, 1997, January 19) .

10.8 Summary

The exciting development of EdMOO educational initiatives was one reason which justified the large investment of time and effort, particularly at the author's expense. Again, the impact of the project demanding such a level of reliance upon my time and technical skill had been foreshadowed (Chapter 5.6.7), and appeared at several other points of this research including the database development (Chapter 9) and Bulletin Board projects (Chapter 6.9).

The outcomes of this work produced several lessons with virtual reality components such as narrated "walks' through imagined spaces and other educational constructions. Furthermore, the various enhancements to the MOO produced by the programmer and myself served to provide an experience of this technology application that was approachable and concise. Without these developments, users would have needed to develop programming skills and spend considerably more time in exploration. It is unfortunate that educators' voluntary and casual uses of MOO are rare, but this is understood as work requiring a large individual commitment. Educators were at least able to state that they understood the significance of this environment while they may have been unable make an ongoing and regular commitment.

11 Cyberlab:

Delivery of Courseware or Creating Learning Environments?

This chapter describes the development of a promising learning environment which was undertaken as a small project by the researcher and two other members of the group. The significance of this project is the changing attitude of the group to the educational value of the system under development. Two members of the group had experience with *Competency Based Training* which, at the time was a curriculum development process endorsed by various Australian Governments. Competency based Training (CBT) was based upon curriculum being written in response to agreed industry standards of performance.

> *Objective 1:*
>
> *Equipping Australians for the world of work*
>
> *To improve international competitiveness, to foster economic growth and to increase productivity, Australia must build its national stock of skills.*
>
> *Training Packages (which include national competency standards and qualifications) will enable people to develop the specific skills needed by enterprises and industries. Packages will be available across all industry sectors and be widely used for training delivery and assessment.*
>
> Source: Australian National Training Authority National Strategy 1999 (ANTA, 1999)

11.1 Driving forces

Having earlier been involved in the development of curriculum for the Information Technology industry, two members of the research group set about envisaging the potential for an online training course that would use a Web environment to deliver training in Microcomputer Hardware. Both people were familiar with the curriculum, and based the experiment upon knowledge about the potential for web delivered courses, and a possible scenario where instructors could be located online as tutors for these materials. This was seen as a challenging experiment that could test the relationships that existed between trainees, their instructors, and support texts and materials. The module selected for the experiment was "ITC302 Microcomputer Hardware" since it presented some specific challenges of its own. In particular:

- As a "hardware" module, there were competencies to be demonstrated that might need more hands-on activities than other more theoretical modules.
- This module was significant in many college Information Technology courses, and so a working model of a web product to deliver the content would attract significant interest of trainers.
- The two developers were skilled in this content.

Product development began on a contributory basis, with the two developers adding components and techniques as they were conceived. The product evolved in fact by the two participants working directly onto the product, and thus components and functions could be seen added to the product from day to day for those others of the research group who expressed an interest in it.

11.2 The model

The developers took the approach that students would work through the training materials from their workplace or home locations, beginning with the clear statement of goals, and from each of the goals, which were in fact the curriculum's learning outcomes, move into the areas of content which were of interest. Two modes of assessment were considered; an informal self-evaluation that would be offered at many points of the course, and a formal evaluation of progress that would be visible to the designated instructors, and used for final assessment.

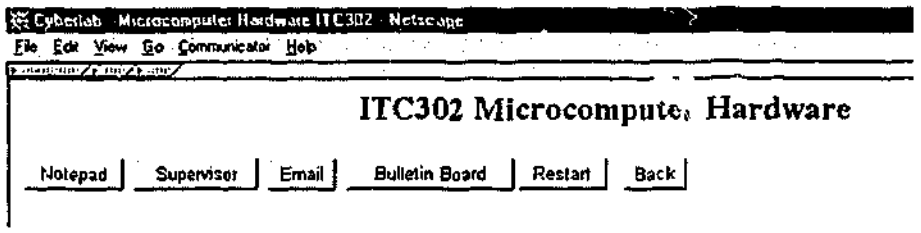


Figure 11-1 Cyberlab Toolbar

Figure 11-1 is from the screen display of the tria' module. It shows the "Toolbar" developed by the researcher that describes the fundamental pedagogy of the product.

Notepad	A private wordprocessor which was located on the student's computer for their own study notes.
Supervisor	A button to summon assistance from a trainer. This button "paged" a duty trainer who would be able to enter a "real-time-chat" and type responses to the trainee's typed questions. The researchers had the view that eventually systems like this could make use of audio chat or even desktop television with the advantage that trainees might feel less isolated using these means. At the time of the experiment, work with CuSeeMe by the research group (see Chapter 8.1) had proven this potential,

	but the cameras and powerful enough computer hardware were unlikely to be available to trainees.
Email	Generate an email which is directed to the trainer.
Bulletin Board	Move into the online discussion system to post a question or observation for the group, or to review the discussions of others enrolled in the course (see Chapter 12.4).
Restart, Back	Course navigation artefacts. It is important to note that the lack of an effective course navigation tool was considered a weakness of this design throughout the product's development. The researchers conceived of a method for incorporating a dynamic navigational tool which the learner "built" for themselves as they worked using a web database system, but this was never realised.

Table 11-1 Cyberlab Toolbar Functions

It was the researchers' belief that curriculum ought to be completely visible to learners which brought about a hypertext curriculum interface to the learning content.

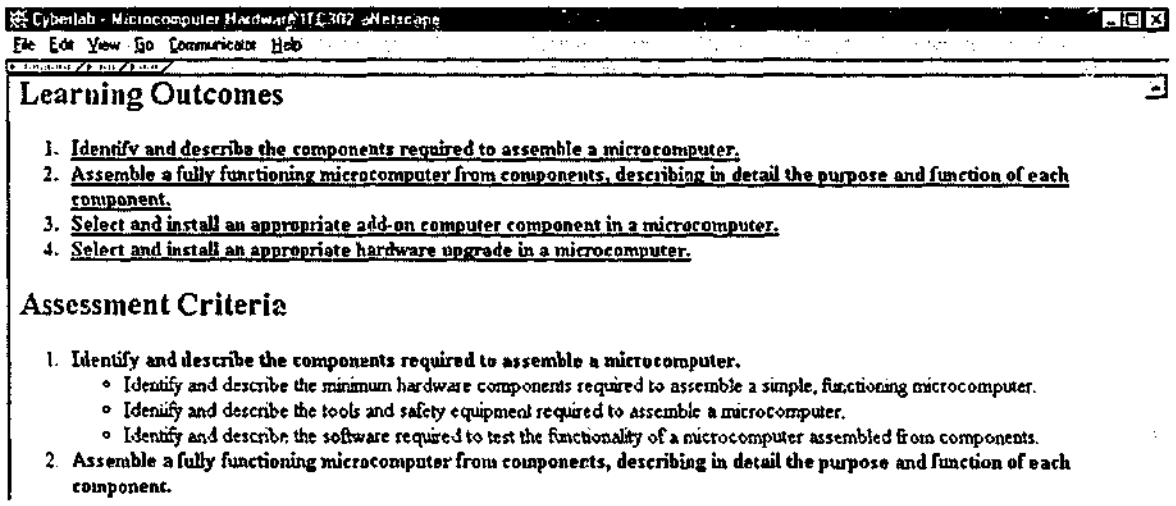


Figure 11-2 Cyberlab Learning Outcomes

This is shown in Figure 11-2. One of the navigational methods for students to interact with the module was to be via the curriculum learning outcomes. From each of these they would be able to "drill down" to the specific content and self-

test items. This is not to say that other navigational methods were rejected. A logical step-by-step path through the content was also designed, which would allow the students to move through progressively more difficult content, but this interface was never realised. There was a view amongst the developers that a third method could co-exist which would provide leading questions to the learner, and take them through various content and testing items as a consequence of their responses. This method was also rejected at the planning stage. The reasons for these two rejections are given later in this chapter.

11.3 Interactivity again

The instructional method for Cyberlab was straightforward. The research group conceived that it would involve the student connecting from time to time and interacting with the Cyberlab website. The website would lead the learner, or allow the learner to explore areas on content which would be ultimately assessed through an online quiz. The matter of assessing practical work like the installation or testing of computer hardware was never realised in this project. The student learning was to be reinforced through the use of some interactive elements, and through some scheduled online discussions with an instructor. Figure 11-3 shows one of the Cyberlab screens designed to teach about the typical locations and appearances of computer components.

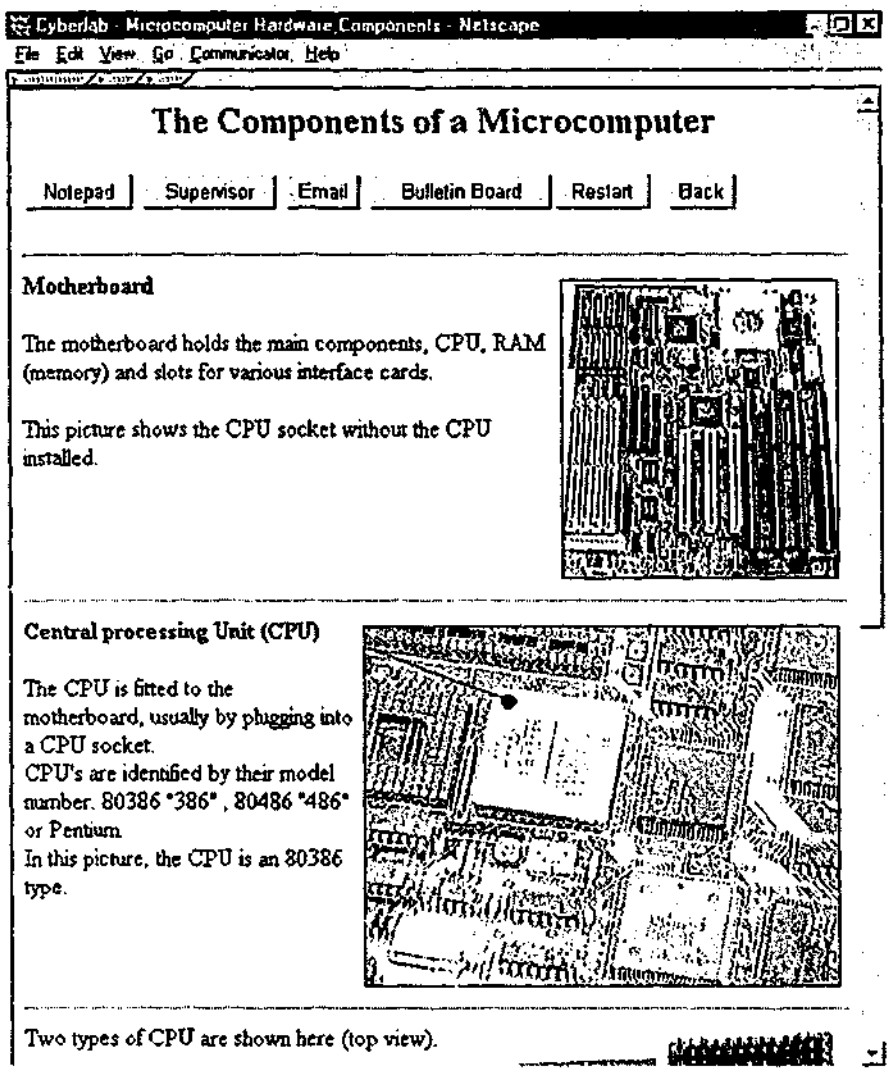


Figure 11-3 Cyberlab Lesson Webpage

A technique known as "clickable image maps" (Raggett, 1997) was used to allow students to explore the motherboard graphic in this example. Such a graphic can be used as a navigational artefact so that users (learners) can move through content by pressing the computer's mouse on a part of the picture. In the example above, the learner might click the Central Processing Unit to receive that part of the lesson, or to gain more information about the component. The metaphor of an HTML document (webpage) is within the *Windows*[7] context. This means that users are expected to negotiate the content through the use of the

[7] I am using the generic expression for a Windows environment as a description of the type of computing environment, rather than the trademarked Microsoft Windows Operating environment specifically.

Windows artefacts (mouse, icons, pull-down menus). Hypertext Markup Language Documents enabled the inclusion of graphics and hypertext links in networked documents, placing them far ahead of the presentations familiar to Bulletin Boards. The transition to the World Wide Web of HTML documents obviously added a navigational and illustrative dimension to documents on networks, but the research group's excitement over Image Maps was nearly as significant. Image maps in the Cyberlab project were used in a variety of ways that pertained to navigation. They were notable too for their value to enable users to move around documents without reading text, or even to select areas of diagrams and graphics to be more closely examined. One of the Cyberlab prototypes featured the ability to obtain successively more detailed images of a computer's internal workings by clicking on the areas of interest.

11.4 The concept of an environment

At the time of Cyberlab's development, the expression "Virtual Classroom" was experiencing a kind of renewal as a result of the new opportunities offered by web (html) documents on networks. In 1992, Hiltz (1992) described features of the virtual classroom with some interest in its "architectural analogy". The sense of "place" in computer-mediated learning environments persists as a theme (see Chapters 3.3.2, 6.9, 7.1), Hiltz describing these educational software facilities in terms of "counterparts in the traditional (physical) classroom" (ibid. p.189). Here are resonances with the words of Fanderclai (1995) (see Chapter 10.6) who somewhat later saw these architectural metaphors, as well as the textual or other representation of school paraphernalia as limiting the potential that these (MOO)

environments could offer. Virtual Classrooms are typically described in this way, one suspects for two reasons:

1. An electronic environment described in this way would be less threatening to potential users, and
2. There is a need to convince a sceptical public or administrative or educational audience that the activities taking place can, in fact be educational.

Cyberlab was designed with a view that the trainee's working [illegible] was in fact the collection of tools which the researchers regarde[illegible] logical arrangement on the screen. The researcher and parti[illegible] rejected any view that Cyberlab should be described as a "virtual classroom" [illegible] in any terms that would see it as emulating a real life learning experience. Moreover, the researcher himself regarded the use of the word "virtual" as problematic since it at once implies an attempt to simulate something , and at the same time devalues itself as a representation of the real (place) and promotes the view that virtuality suggests new ways of representing the people and their relationships. Neither was an aim of Cyberlab. It was categorically a means of providing online resources and tools.

11.5 Abandonment

Early in the development phases of the Cyberlab, there were concerns expressed by the researcher and two of the group regarding the educational effectiveness of the proposed environment. Some of these concerns were related to the apparent re-construction of a school or college architecture either graphically or by inference, or indeed by the language used (café, classroom, lesson...). Other

concerns related to the assumed roles of learners or trainees who were to experience the environment. While there was a strong argument that the technology used in this way offered considerable advantages of accessibility in the sense of study location and times and duration of study, their access to suitable machines and networks could not be guaranteed. Further, the research group became concerned about the potential for having this work misconstrued as a commodity that could replace better modes of learner engagement. The researcher regarded Cyberlab as a demonstration of what online learning support might look like. A proliferation of self contained online courseware appeared in the late 1990s, which in the researcher's opinion demonstrated a minimalist approach to learner support and almost an abrogation of teachers' and administrators' roles which could easily result from expecting students to manage their own on-line learning. Before the Cyberlab project was abandoned, the researcher and Elizabeth had discussed using her recently developed web database models to provide a better organisational structure for Cyberlab. This would have given the system several advantages it was argued:

- Tracking of student progress for learner feedback,
- Tracking of student navigational paths for product evaluation and improving the interface,
- Maintaining student and class information,
- Storing Question, Answer, Information data in a reusable and searchable environment,
- Templates that could be reused for multiple online courses given an agreed instructional model.

11.6 Summary

Cyberlab was discontinued due to its sympathy with disengaged learning processes. A poor application of Cyberlab materials would be seen as forcing learning activities into experiences with computer software, with insufficient controls over the learners' uses of discourse and reflection.

The researcher and members of the group were in agreement that there was a danger of education and training providers seeing online course materials as a single solution for learners who would find it difficult to attend learning "centres" due to their location or work commitments. There is a considerable difference between taking advantages offered by online methods, and the wholesale replacement of familiar learning environments.

On reflection, the advantages of traditional instructional modes needed to be "reclaimed" when it appeared that technological or economic agendas were driving an inferior and largely untested model of learning online.

Some of these concerns are :

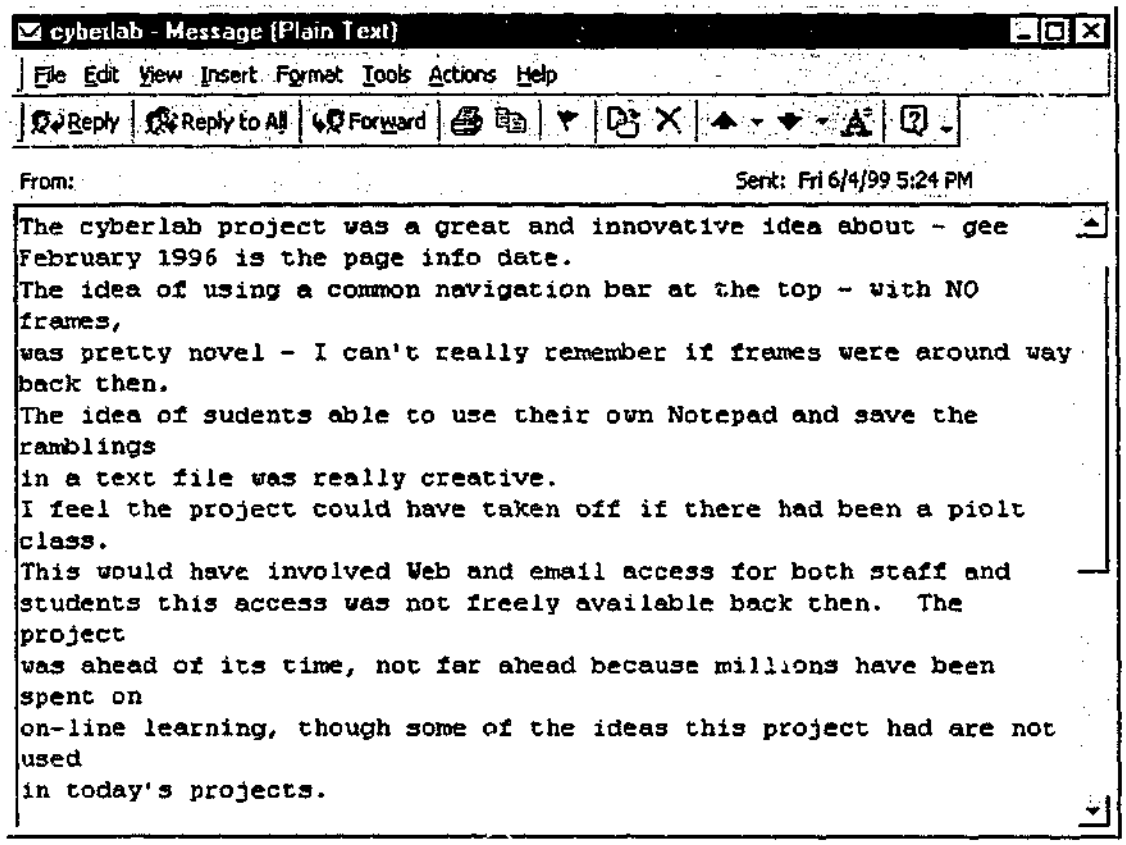
- Familiarity of learning by attending a "place" which features others engaged in the same pursuit, and skilled facilitators.
- More easily understood contexts of support through visible body-language, gestures, vocal irony, and other cues that are extremely difficult to convey electronically.
- Opportunities for collaborative learning activities
- Security in being "seen" by the facilitator / assessor, when online learning brings some fear that the student and their concerns are less visible.

Table 11-2 Concerns for online learners

It is worth restating that learning environments of this kind are somewhat different to the uses of electronic communications in learning that were discussed in earlier chapters, but the researcher considers that a danger still exists in the production of efficient systems that are built without adequate opportunities for discourse, customisation, or indeed any design that insists on learners following specified and inflexible steps.

In a follow-up discussion by email at the end of the research project, Elizabeth wrote a candid summary of Cyberlab (Example 11-1).

This message was written one year after Cyberlab had been abandoned.:



(Elizabeth, 1999)

Example 11-1 Reflections on the Cyberlab project

It is significant that products of this kind have continued to develop while the author's concerns about the long-term implications of these learning environments has become a matter of debate, particularly in college and university education. There is considerable interest in changing pedagogy (Kearsley, 1998) , and in the sound evaluations of technology applications for online study of the type that Cyberlab demonstrated. Of particular interest is the work of Reid (1999) in assessing University approaches, of Yetton (1997) in establishing technology models, and in commentators such as Hagel (2000) who adds a cautioning voice to the substantial momentum.

This chapter has provided a descriptive analysis of an online learning initiative, drawing particular attention to the pedagogical concerns of the technology. The

following chapter continues the theme of social impacts of communications technology and extracts concerns raised from several of the projects that made up this study.

12 Being anonymous or being Kathleen: Problems in contributing to online discussion

"..you probably know that Kathleen was really sick, well I am sorry to tell you that she died three days ago."

Bulletin Board Message from an anonymous student: April 1996

This chapter brings together issues which arose from the group considering applications of mail and similar asynchronous messaging. When viewed in their entirety, the methods, technologies and intent of message transmission that the research group had encountered, raised several concerns. These are organised under headings of those concerns while the examples are brought together from the complete range of technologies and projects that comprised this research.

12.1 Identity and email

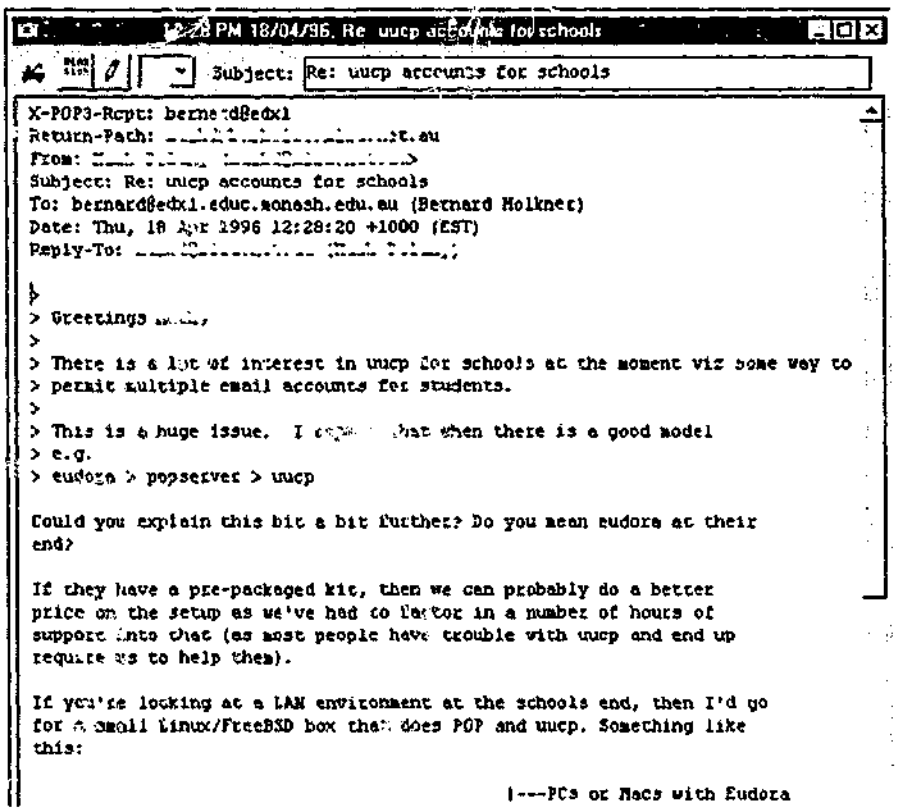
12.1.1 Being an individual

At several points in the course of this research, the matter of email addressing for numbers of individuals became a point of interest. While this was usually seen as a technical problem, the implications are larger. In the context of bulletin boards, an address corresponded to the login name of the person dialling into the bulletin board. It should be recalled at this point that a bulletin board in the period 1984-1994 was a device which housed, forwarded, and archived messages, but was at the same time the users' access point to the network. If a user had an interest in the themes of several bulletin boards, they would typically dial each of them in

turn, logging on and collecting mail from each service. Two effects arise from this style of network. First, accounts are "owned" by the modem owner and second, each bulletin board being accessed was likely to have its own community of users even though there may be significant overlap of active users (see chapter 6.9). This was the case with research participants using City Limits: in most cases they were also regular users of point systems (see Chapter 6.3.7) in nearby schools, and other educational bulletin boards. The way in which such a user was known to the network then differed substantially from later email service usage whereby participants occasionally created multiple email accounts on the Internet that would represent different personae or perhaps different "constructions of self" to ease communication with different groups. In the case of bulletin board logins, it was common for users to login to several systems to be a part of their communities, but these people were known to the group, used their real names, and knew many of the other participants by reputation if not professionally. Obviously, the need for personal and private email addresses was critical, but the technicalities and expense frequently prohibited the creation of accounts for all interested individuals, and particularly for students. As we have seen, interest in using bulletin boards and email for student projects has been a feature of this research, and of course individual accounts or identities for students were seen to be highly desirable.

A regular theme that was observed in this research was the will of participants to seek ways to involve technologies arising from this research in their "classrooms". To these ends, participants sought methods for their students to share dialup connections to bulletin boards, avoiding the cost of multiple

telephone calls, and methods for students to share in network mail and internet mail as it became available. The latter was a significant challenge for the researcher, and lead to the development of protocols for student "accounts" to be managed and their messages passed reliably between systems (Example 12-1). Technical details of how these protocols were implemented are given in chapter 6.8.



Example 12-1 UUCP solution to multiple email addresses

Even so, a range of strategies was tried to work round the limitations of these technologies, and these are noted because of their significant impact upon the status and privacy of the individual. In the first instance, research participants and others permitted students to login to bulletin boards and to send and receive email using the teacher's password. This was obviously a far from satisfactory arrangement, which gave way to generic or class email accounts being created in the form *fourthpsgrade5@magnet.monash.edu.au*. The researcher cautioned

participants using this strategy since it represented a security problem if the passwords fell into the wrong hands, but moreover that while expedient, this actually was giving students an inappropriate model of email use. Several other methods were tried (see Example 12-2), some of these highly technical, but all actually failing to provide personal email to students in the sense that they were reliable and supportable without extremely high requirements for technical support. Reliable personal and private email only became possible some time later when Internet modem sharing and more advanced router systems began to appear in schools (see Chapter 7.2.1.7).

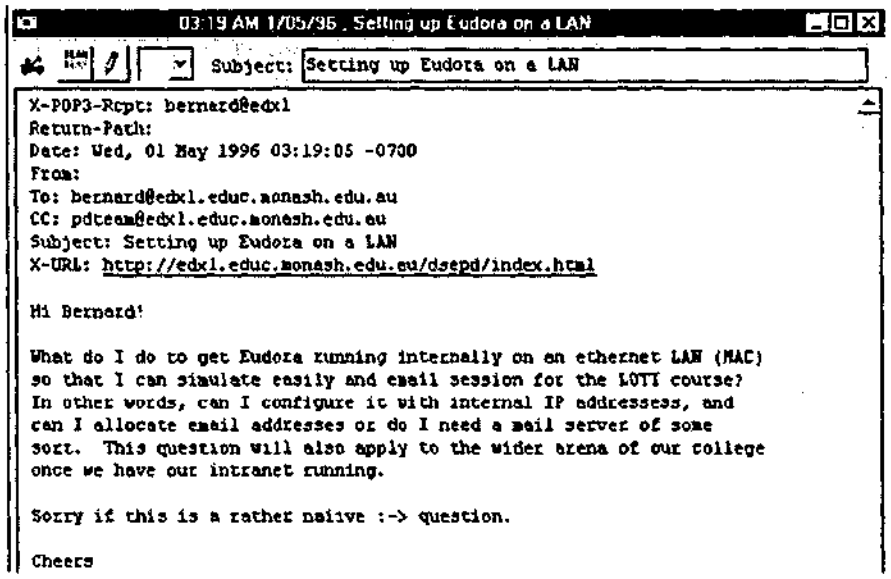
> "A number of people have been asking about additional e-mail mailboxes for staff and students in their school. In the past this has been a problem since accounts had to be made at your ISP's mail server. However now, there is a shareware product called "VPOP3" that splits your one ISP e-mail address into as many as you like and this happens at the *school* end of the.."
>
> (Peter, Mag-Net list 23 March 1997)

Example 12-2 : One solution to the need for mailboxes

12.1.2 Addresses and addressing

While the technical aspect of having access to an account on a system where mail can be collected, there are also social issues surrounding email addressing that emerged in this research. Example 12-3 introduces two aspects of address usage. First, the addressing of a message itself suggests that the pdteam teachers' network was being addressed as a 'cc' (Carbon Copy) while the question itself is addressed to the researcher. This is interpreted as an example of the network

being able to identify a co-operative expert rather than a panel, or indeed that the person who created the network technology was seen as a likely source. It also serves to oblige the named group member to respond to the group as well as to the person who posted the query. To ignore this might be seen as failing to fulfil obligations of membership. If the researcher merely responded in direct email to this question, the group would be only aware of an unresolved problem and might assume that the researcher (in this case) either did not respond or was unable to respond.


03:19 AM 1/05/96 . Setting up Eudora on a LAN

Subject: Setting up Eudora on a LAN

X-POP3-Rcpt: bernard@edx1
Return-Path:
Date: Wed, 01 May 1996 03:19:05 -0700
From:
To: bernard@edx1.educ.monash.edu.au
CC: pdteam@edx1.educ.monash.edu.au
Subject: Setting up Eudora on a LAN
X-URL: http://edx1.educ.monash.edu.au/dsepd/index.html

Hi Bernard!

What do I do to get Eudora running internally on an ethernet LAN (MAC) so that I can simulate easily and email session for the LOTI course? In other words, can I configure it with internal IP addressess, and can I allocate email addresses or do I need a mail server of some sort. This question will also apply to the wider arena of our college once we have our intranet running.

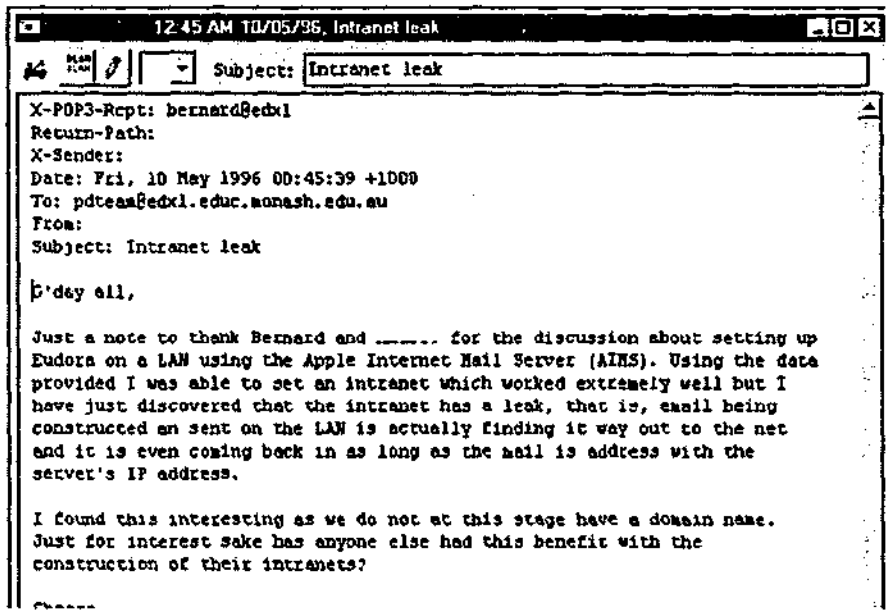
Sorry if this is a rather naive :-> question.

Cheers

Example 12-3 Addressing a technical query

In this case, the question was answered directly, and the reply "carbon-copied" to the list and consequently to the list archive for future reference. Technical support was provided, the value of the group was confirmed, and the material preserved for future reference. This example is also notable for the trailing epithet "Sorry..." and devilish emoticon :-> and perhaps should be regarded as indicating irony or at least understatement. The technical query at the time of

posting presented a very difficult problem, and a useful response was (correctly) considered to be of value to others.



Example 12-4 Follow-up to technical query

The original author wrote a follow up message in this instance which included a private message to the researcher, and a separate response addressed to the list (Example 12-4). A likely reason for the notably polite character of these messages is that the members of this particular list were most likely to be acquainted through face to face meetings and other professional relationships. It is also my view that a strong sense of ownership and value of the list created this climate.

12.1.3 A Masquerade: Anecdote and Outcome

Another example of the impact of community on a list occurred at the time when the City Limits bulletin board was at its highest popularity. It was common at the time for students to make use of the system during school hours, often under the supervision of the researchers and other teachers who saw this as a useful experience. Considering the fact that internet resources were small and difficult

to access, there was considerable excitement in being able to establish writing projects and discussions about culture. Some of these included long distance calls from country and interstate schools, but certainly established contact with students in many parts of the world. After a sequence of very expensive calls to the system from a country school in early 1995, the researcher decided to monitor particular connections in case a school's account was being compromised. This was a matter of concern, since it was not considered ethical for System Operators to read private email, nor to track the activities of individuals. Nevertheless, it was quickly established that the calls were being made without school authorisation. Further monitoring by the researcher established that the caller, a teenage male from a country school, had been using these connections to communicate with several students in the Melbourne suburbs. In doing this, he had created an account in the name of a female and had managed to convince the audience that the person they were speaking with was a seriously troubled teenage female. After some discussions between the researcher and Henry, the teacher/participant at that school, it was decided to confront the boy and insist that he correct the situation.

Sadly, the boy decided that his constructed female persona had developed such a following of friends and supporters: they were in the habit of suggesting to "her" ways of meeting new friends, and dealing with parents, that he could not face confronting them with the truth. Instead, he created a third persona, and used that one to advise the community "Kathleen was pretty sick as you know, and unfortunately died three days ago."

The ensuing activity from the system was chaotic. Several students who had never met in real-life decided that a wake should be held, and visits made to the country town. It is important to note at this point that the researcher's absence from this discussion was only three hours. In that time, the fake announcement had been made and many follow-up plans put in place. The true story was immediately communicated to the community by the researcher and Henry.

Until that time, various "cyber-relationships" had been observed by the researcher and teachers involved in this project, but none had involved the construction of a persona. From the points of view of Henry and the researcher, the second significant concern from this sad story was the speed at which events took place to the extent that the only way to modify, correct, clarify or stop a chain of events was to be online for the entire duration. At this very early stage of computer communications, it had become clear to the researcher that he had immediate responsibilities to the communities which developed from his systems, and that to be effective, he would need to be attached to them, or "online", or at least easily located.

12.1.4 "Free" email and Anonymity

In Chapters 6 and 7, the need for individual email accounts was discussed, first in the context of allowing many students to access congested bulletin boards, and second to allow teachers and students to somehow share single internet connections. Much less of an issue after commercial organisations such as AltaVista, Netscape, Hotmail developed "free" email for anyone with an Internet

connection. Similarly, through the HTML interface, these services enable users to read and send mail from any WWW connected workstation. This feature, although slow to access email, permitted users to access email while travelling, from public Internet terminals, friends' computers, or schools, without the need for the usual modification to email program scripts and definitions. This use of the term "free" is of course used in a pre-digital context. By accepting the terms of use with one of these systems, we might consider the transactions to be free of immediate financial obligation by the users. Anyone can use one of these to create personalised and private email logins. Free email accounts became widely used by students in the schools and universities associated with this project in late 1998. To their credit, the services also permitted the creation of anonymous accounts if required, and while much has been said in the popular press about antisocial impacts of anonymous emails, teachers associated with the author's research and their students gained immediate benefit from these. An anonymous or fictitious email address permitted them to try out services and systems without worrying about being identified. This was useful in case that service turned out to be interested in using personal information in some way that the individual would disapprove, or even worse, to use that information in a damaging way to the individual. A particular concern of the group was that personal information, or even just a true email address which identified the person might be used in ways that were technically beyond their comprehension, and whose impacts could be professionally or personally harmful. The example quoted by the group in discussion centred around the telephone book: The researcher explaining that this document in its traditional format was harmless, but the same information provided in other forms, such as sorted-by-address, could be used in damaging

ways: Our example described a fictitious burglar who could create a dialling list of telephone numbers in a district in order to ascertain which homes were unattended. Another concern was that there appeared to be scope for unscrupulous service providers to learn about individuals by merging seemingly benign databases. Research participants foresaw the likelihood that information about individuals, addresses, preferences, and interests, would become a saleable commodity, and generally wished to avoid placing themselves into this position.

Free email had generated a paradoxical solution for service providers. Offering email access to any individual without charging them appeared to be magnanimous and expensive. From the point of view of the user, they are typically presented with advertisements each time they collect or send mail from these accounts, and if that is an annoyance, it may not be enough of a concern to offset the gains of having the account. Users also gain from the confidence that their real identities are to some extent protected while they use these accounts, and so may join lists and other communities knowing that if problems arise, they can merely discontinue using that email account. From the point of view of the service provider, many would have accurate information about the true identities of their users and not disclose that information, but guarantees of this kind were new and untested. The researcher observes that the service provider may indeed "on-sell" data about the email addresses, and reading preferences of their users, and whether or not the individual is correctly identified is largely irrelevant: what matters is that the data can be used to reach the person concerned. The researcher argues that the dated notion of "free" fails to encompass significant costs which only become evident with online digital transactions:

- Systems are likely to track user activity and employ the information for customised advertising or for social or political harassment,
- System administrators are able to merge or reconcile data from diverse source to create information or misinformation about individuals and groups,
- Trade in data is likely to be extremely difficult to monitor or control,
- At the time of writing, there were no organised methods for individuals to correct inaccurate or false information.

12.2 Archiving: Problems with Permanence

Automatic archiving of mailing lists has been generally regarded as a useful means to encourage contributions to the list community, as well as to avoid the likely problem of new members posting questions and solutions that have been dealt with previously and perhaps repetitively (Hesse, Werner et al., 1988; Sproull and Kiesler, 1991:134) . The following extract from a list message was written after the author realised that members' archived posts to the list were being indexed by large search engines.

> "...It is not so much the information that is the problem, but the judgements that can be made from this kind of data in isolation. Is it wise to archive everything that is written on this mail server and then to make that available to anyone?"
>
> (Identified poster to public mailing list, 1997)

Example 12-5 : Problems with archiving list mail

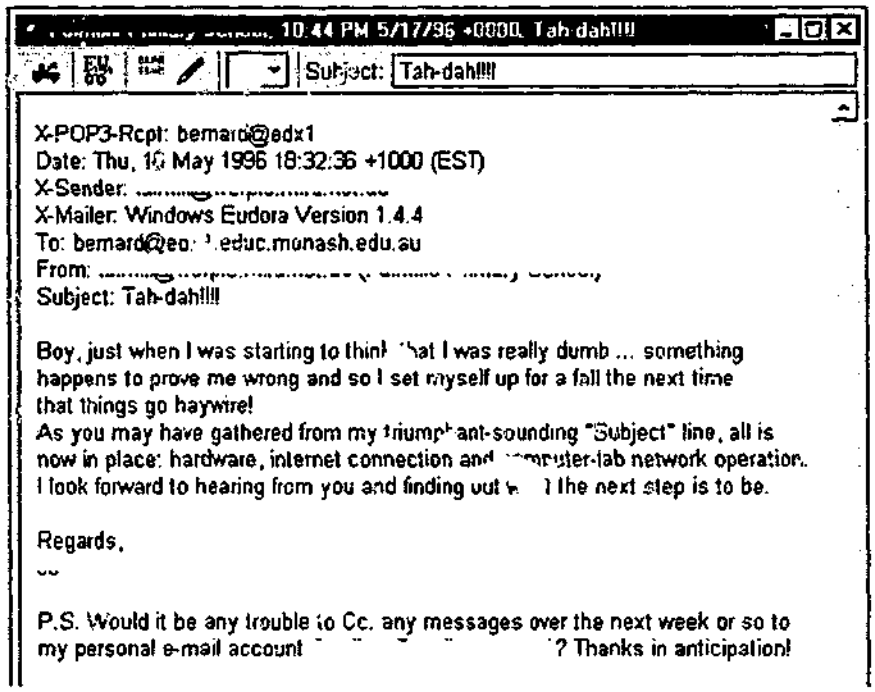
To analyse this person's concerns reveals a number of issues:

- Search engines may be able to enter and index list archives without the knowledge of contributors;
- Search engines may index and contextualize postings incorrectly, or with unwanted emphasis;
- Contributors to a list may be personally identified, and
- Contributors may be identified in relation to others or to ideas and activities against their wishes.

12.3 Use of Private Email

The "charlotte" mailing list provided the location for the researcher and practitioners to announce, complain, and resolve matters when the content was considered reasonable for public viewing. Interestingly, all participants made extensive use of private email for "asides", or more particularly to raise matters which might have embarrassed the writer or recipient. Without dwelling upon this, private emails were most often questions about hardware and software problems that people thought they ought to have resolved for themselves and did not wish to divert other discussions. In Example 12-6 Bill, an individual who aligned some teaching and telecommunications projects with the research group, wrote a self-congratulatory note. The message indicates that Bill has reached an important installation stage with his school's system, and he now requires some further direction.

Being anonymous or being Kathleen.



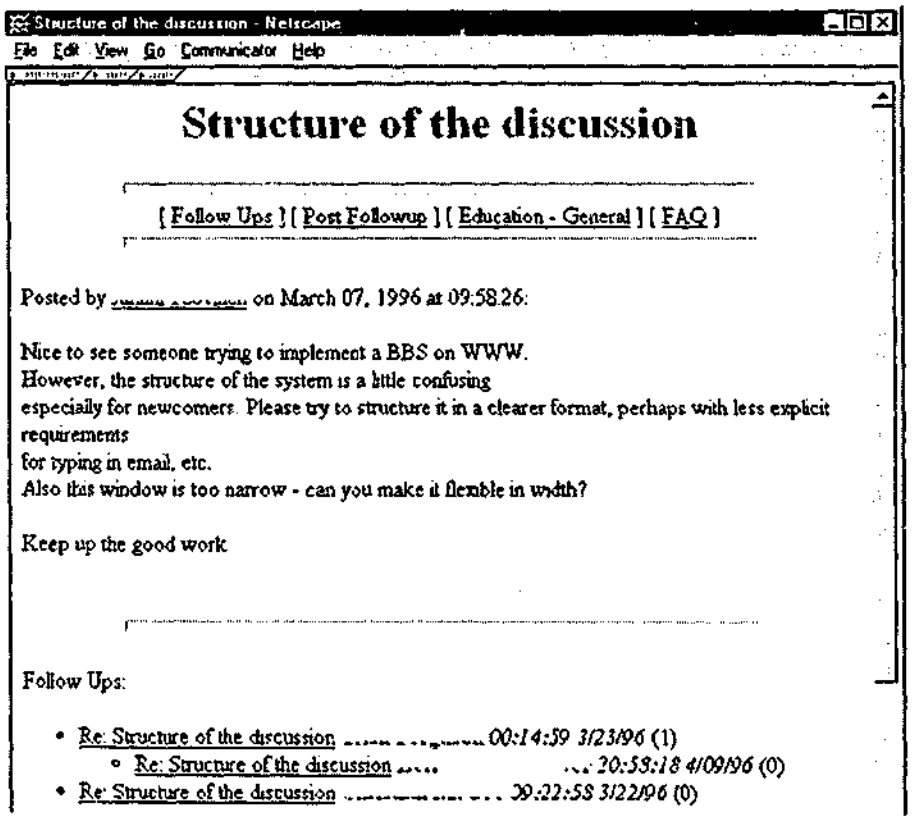
Example 12-6 Private communication alongside list discussion

12.4 Discussion Forums

A continuing theme of the research was a quest for high quality text conferencing systems. This issue really grew out of the Bulletin Board technology that many of the participants had been familiar with and possibly wished to re-create. The Bulletin Boards associated with this research have been discussed in Chapter 6. Unlike email, Bulletin Boards required a separate and conscious "login" that almost symbolises travel into a "place". Typical screen images of Bulletin Boards shown in Appendix 3 illustrate that these systems all had their own 'look and feel' or user interface which could be quite radically different to other communication tools. Email, by contrast always appears in the same software, and so "locates" a discussion amongst all other public, private, and list communications.

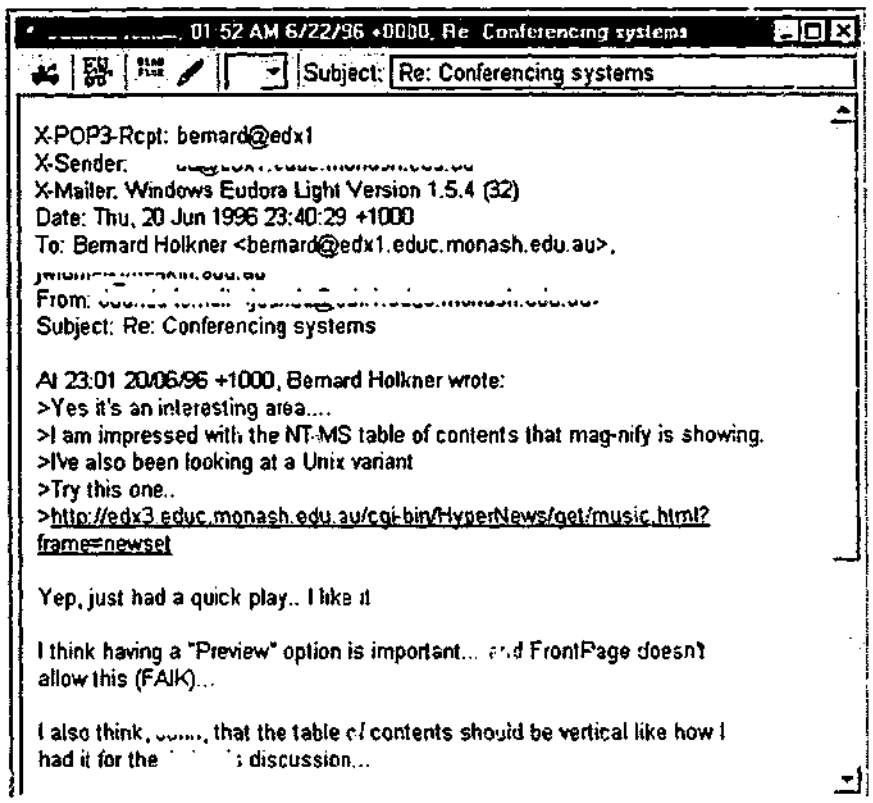
Discussion Forums, which are otherwise referred to as Web Boards or Web Forums became popular in Internet circles at about the time that this project began. Indeed the opportunities raised by the techniques of using HTML in this way were highly valued by the research group. These Web Boards offered scope in :

- Locating discussions in a "place",
- Requiring a conscious act of "entry" to the discussion space,
- Potential for hypertext linking between messages automatically,
- Possibilities for including hypertext references beyond the Web Board to external html documents (web sites of interest),
- Possibilities for other artefacts (graphics or sounds) to be embedded into messages.



Example 12-7 Bulletin Board style in Internet Topology

The evaluation of these environments was an ongoing process of discovery, selection, feature testing, and adaptation. As one of the fundamental communication and data collection tools for this research, the effectiveness of the discussion system was paramount. In the cases of each product, including those developed specifically for this research, the "open" nature of the software usually invited members of the group and the researcher to make changes to the systems in response to group needs. Since most were HTML and PERL documents, modification was usually straightforward. It was observed, however, that as most of these tools were modified and adapted, people would sooner or later determine that the required technical efforts might have become too great to be continued without assistance. Certain other discussion products were rejected without modification when their general potential was found to be lacking due to inflexibility or poor design. Evaluating these products became a systematic and regular process. This brought about a realisation that a kind of 'quest' was taking place, and that the group ought to expect semi regular relocations of the research discussion as systems were replaced due to lack of function or reliability or when new techniques were discovered or developed by members of the group. Example 12-8 is taken from an email to the researcher by a practitioner who was engaged in improving their own discussion system which was for public access of teacher managed projects.



Example 12-8 Email describing proposed changes to discussion systems.

12.4.1 Automation

Figure 12-1 shows an edited message sent between members of the research group which the sender titled "Speechless".

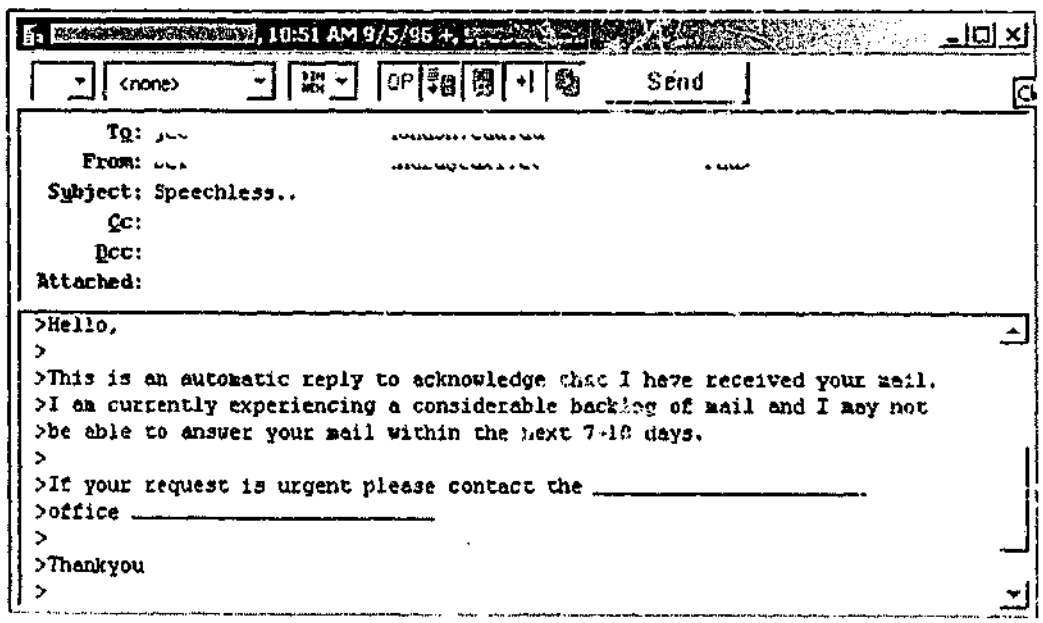


Figure 12-1 Auto-responder addressing a list

The message is a forward of one which appeared in a list used by the group, but sent by a person who was not directly involved in the research. The author of the quoted message should be regarded as an interested observer who joined the list to stay in touch with research developments. The quoted message was sent out as a complaint that the observer had allowed some automated email program to write to the list. The message author's position was interpreted by the research group in several ways:

- They wish to be a member of the group but are too busy to read the mail,
- They allow software to address the members of the list rather than do it personally,
- They would risk the possible impacts of their software writing to large numbers of people unsupervised.

On the surface, this was considered an arrogant use of the list, but after a brief exchange the research group decided that the writer's intent may not have been quite so antisocial, and messages of this kind ceased. One of the principle concerns, however, was that, if left unattended, these programs could confound human communication in lists, and make it extremely difficult to contact the program owners to have problems solved. While auto-responders have been fairly crude applications, and available to enthusiasts of bulletin boards in the mid 1980s, the size of community that they were able to address, and the potential for harm was relatively small. The dangers of "agent" software in this role have been documented, (Eichmann, 1994; Helmers, Hoffman et al., 1997) but the day-to-day impacts of these simple "intelligent" and automated software packages were a significant concern to the research group.

The group did not in fact establish any particular list of concerns about ethical and legal issues, but these discussions were nevertheless regular. From the time that members of the group began to work with students and the World Wide Web, the methods and desirability of monitoring or controlling student access to certain materials entered the discussion areas. Since most participants were also Mag-Net members, they were able to contribute to and gain from a discussion area and file repository set up by Mag-Net project officers. This resource set out methods for understanding the issues, and implementing them into schools and other organisations. It was the researcher's view that internet censorship methods were usually based upon poor advice, and commonly fear of administrators that their "duty of care" to students might be challenged. Throughout the life of this research, participants took the view that more could be gained by teaching students about ways to evaluate and authenticate materials gained from the World Wide Web than by attempting to shield them from all but a list of approved resources. Nevertheless, all were at some time required to advise their peers and administrators about methods of "protecting" students.

12.5 Summary

This chapter has documented some events and processes which suggest areas for future research, particularly with respect to the ways in which groups and individuals adapt or modify technology to meet their needs. It furthermore highlights some specific ethical concerns that I believe ought to be the basis for a concerted public information program. Educators involved in this study frequently chose to adapt communications technologies to support their teaching.

While it may have been a naïve view on my part, I had expected that the terms of this research, being focussed upon the professional development issues and concerns of the participants, that the outcomes of their work would be realised as documents or environments that would address a small, even closed community of professionals. In fact, the efforts of the participants produced professionally useful materials without a doubt, but these frequently took the form of semi public documents, or materials for use with student groups. I consider that preparing materials that demonstrate teaching and learning activities through the involvement of students is an effective means of informing colleagues. Where these applications of technology differ from videotaped lessons, to give a example, is that they are likely to be "in progress" and observable by colleagues as if they were taking part in the activity. In several cases, participants became involved with each other's classes by virtue of the communications that underpinned the learning projects.

In Chapter 2 several theories were discussed that provided some ways to explain the relationships that exist between technology systems and humans. Some of these, particularly the theories of adaptive structuration, and actor network, recognise the dual nature of the relationship in that humans both change and are changed by systems. It is concerning that an enthusiast (like myself for example) might allow some of the technology affected social changes to take place without due recognition of their impacts, and so the examples of this chapter, particularly those which describe humans being misrepresented as a result of technology, or deceived by others – even unwittingly, require further research, and development of some language conventions. An example of the need for language

development would be the distinction between a person being misrepresented or being mistaken for another person, a fictional person, or a persona which exists only for the purposes of the communication. All would be legitimate and potentially useful constructs, but each bears a different kind of expectation. A person "harmed" either by insult or defamation would experience a range of problems depending upon the exact nature of their "existence" at the time. My view is that the death of Kathleen might have been a salutary lesson to the people involved that they should exercise care in believing the identity of a correspondent, but the event is more interesting in that there were no established protocols for dealing with the situation once it had irreversibly moved into the world of human action. These protocols can be developed after better organised documentation of events of this kind is established. This might be in the form of a knowledgebase or journal that is kept up to date with the experiences, discussion, and resolution of online social difficulties. Kathleen did in fact die. The critical importance of having an online identity, being able to construct aspects of that identity, and being able to access networks was regularly perceived by the research group and recognised in their huge efforts to provide access to students and colleagues.

A similar process can be implemented to address concerns about the ways in which people may be harmed through inappropriate use of personal data. The activities businesses or other organisations seeking to extend their influence or sales might be deliberately arranged to gather material from network users, or might indirectly result in additional inferences being made when systems are interconnected. It was my view that the sources and outcomes of all online data

collection that took place in this research should be made available and explained to participants. Steps were taken so that participants would come to expect issues of data security to be discussed in all network applications, but it is important to consider the obligation that researchers working in this area have to inform and pursue these matters. It is worrying that public perceptions can develop that suggest that loss of privacy and the need to correct bad data are inevitable in networked environments. It is equally worrying that individuals might feel powerless to redress these potentially damaging problems.

13 "Owning the Network" - Students building the bridges

> *"..but to connect the rest of the school the kids made a plan to run the wire to each computer. I didn't want the wire to be hidden when we first got it happening, so I let them sticky tape the wire along the corridor walls"*
>
> (Principal of Second Primary School, personal interview, August 12, 1998)

While the research project focused upon teachers working with networks to improve their professional practice, two small but significant outcomes were attributed to the students in two schools. This chapter observes the processes where teachers implemented network systems in their teaching somewhat beyond training in web searching. These scenarios are included for their interest in how networks themselves can be conceptualised and valued. Moreover, they provide a vision for how networks break the barriers that define teaching, research, and professional improvement as separate and separately supportable entities.

13.1 The "Sticky tape" network

Third Primary School was the only site with a number of Apple Macintosh computers in classrooms. Each classroom had one of these machines while the senior classes, grades five and six, had two Macintosh workstations each. The initial activities of this research project brought a range of Internet training to staff, and established a dial-up connection to the Internet so that staff could use email and Web resources through a Macintosh located in the school office. A

modem connected this machine to a local service provider when teachers wished to collect email or locate web resources.

The potential for interconnecting the classroom computers was discussed several times with a view to providing each teacher with email and web access in their own classroom. The researcher regarded this as a highly desirable situation that would allow teachers to :

- Communicate with the researcher at will,
- Communicate with the wider educational community as a matter of course during their work, and
- Treat the networked computer as a reference tool.

Discussions with the school principal about the mechanics of installing the required network raised an exciting prospect. He insisted that the network ought to also support student research on the Internet, but that in order to fully appreciate the network, the students themselves ought to be involved in its construction. Networking Macintosh computers was always a simple matter, however, the challenge of networking through to the dialup computer, and have it "share" the modem was a problem. Eventually software was obtained that would perform this function.

It is interesting to note that at the same time, other groups in this research were successfully networking Intel (Windows)[8] type computers with *Wingate* software in primary and secondary schools (see Chapter 7.2.1.7).

[8] For the purposes of this research, *Macintosh* is used to describe the software environment being compared with *Windows* to avoid an incorrect comparison between Macintosh hardware, and the Windows environment. Readers would be aware that the *Windows* environment is commonly used in educational settings on *Intel* computer hardware.

The principal of the school took responsibility for the installation of the internal network, (Intranet).

> *We had a couple of sessions with the grade sixes and some from the other grades where I explained what we needed, and showed them the wire I'd found. There was some wire already in the senior end so we tapped into that, but to connect the rest of the school the kids made a plan to run the wire to each computer. I didn't want the wire to be hidden when we first got it happening, so I let them sticky tape the wire along the corridor walls.*

Example 13-1 Interview with Principal about wiring the Intranet

The principal was proud of the highly visible network, and had noted children pointing the wires out to their parents as "their network". He also noted that in spite of the fragile nature of this network, the children's sense of ownership had ensured that it was looked after. Discussion with the teachers at Third Primary School indicated that the understandings about network operations from this project were valuable. While there was no staff or student member able to give a complete technical explanation of their network, its fundamental operation and needs were known. Furthermore the early intranet projects which involved messaging between classrooms was brought into the social context of the school. One teacher noted the messaging activity had possibly taken the place of the classroom mailbox which was previously used for children to exchange private messages. Practically speaking, the installation was a large effort, and expensive in terms of the researcher's and the principal's time. Individual email accounts for each child had to be created, protocols for recovering lost passwords, and

installation of server software on one of the Macintosh computers added to an already large technical overhead.

13.2 BBS network in a School

The second example of specific school networking initiative came about as an 'offshoot' of the Bulletin Board Point systems described in chapter 6.3.7. The 'Point' systems developed by the researcher (Chapter 6.3.7) enabled large volumes of messages to be brought into schools for teachers and students to engage in curriculum and recreational writing with local and distant associates. This was a cost effective method which included the ability for each child and teacher to have their own unique username or address. At the time, (1996 to 1997) personal email on the Internet was difficult and prohibitively expensive for schools. The only limitation with the City Limits Point system was that writers needed to take turns on the one computer, or the school needed to provide several modems for people to dial out to a multiline system like City Limits (see Chapters 6.3.4, 6.7 and 7.2.1.7). Experiments with Novell networks and later with more affordable Windows for Workgroups peer networking showed that a school could host a local area network at a small cost, enabling the sharing of printers, backup devices, and library resources. The same peer networks were installed in three participants' schools, namely First Primary School, Fourth Primary School and Seventh Primary School. The immediate success of these networks enabled a dramatic increase in student and teacher activity in writing bulletin board messages to local and overseas contacts since many could be simultaneously logged in to the bulletin board server located in the school.

Technically the networking environment was reliable, although difficult to configure. Primary schools were not typical customers for networking companies and most of these systems were designed and constructed by the interested researcher at the school and myself. At First Primary School, a group of students took part in the cabling of the network under the guidance of a skilled parent. The installations usually required modification to the schools' BBS Point machine, adding a network card and connecting it to other newly networked machines in the school. A rudimentary security model was set up so that the BBS machine could be shared and remain a useable workstation in its own right. The final stages of the installation required means to ensure that the BBS machine was always available to dial out to City limits (Appendix 4.3). This involved a cooperative school parent or cleaner in all cases.

13.3 Summary

This short chapter described the ways in which difficult technical problems were overcome by the research group using low cost tools. The initiative in these cases was different to the other projects described and analysed in this research since the outcomes were to be immediately enjoyed by students. The ability for each school to offer multiple students access to a communication system enabled teaching and learning activities using telecommunications to become a larger feature of the classroom routine. Equally important was the role that students had played in implementing the networks and their subsequent sense of value and ownership.

14 Conclusion

This study commenced with three questions:

- what potentials can educators make of communications technologies;
- how are these people changed by their uses of these technologies; and,
- what social concerns are raised directly and indirectly by these people?

In this concluding chapter I will draw attention to some of the research findings and their implications, as well as take the opportunity to explain some particular concerns that have become evident to me in the course of this study. These reflections are contained within the social, technological, professional and methodological domains.

Whilst acknowledging the limitations of participant research, this chapter also provides the opportunity to explain some particular concerns that have become evident to me in the course of this study.

A number of matters have arisen after investigating the various data of this research:

- The importance of the context in which systems and procedures are placed;
- The various concerns in individuals' and groups' appropriations of technology;
- Defining the structures or 'formalisms' with respect to explaining processes; and,
- How changes in technology, relationships, and systems take place.

The above four points can be considered as 'buttresses' to the research findings. I consider that they create a reference point for the work: holding the research in place, and as supports: by providing a framework.

14.1 Social Issues

Several of the initiatives of this research were able to explore the ways in which people work and socialise through communications technologies, as well as the ways in which the technologies can affect other parts of their professional lives. While I am most interested in the ways in which these educators were able to improve their professional practices, the broader social concerns remain highly visible. One reason for this is that the applications of the technologies were informal, and that the highly experimental nature of the work allowed a degree of comfort. Rather than produce stressful situations, the failures or shortcomings of technologies were usually met with amusement and optimism. A good example of this is the poem written by two participants at the height of their frustration with a new system (Example 7-1 Assistance with technology). It is also important to note that members of the group were either previously acquainted, even if in an online context, or became known through the sharing of experiences in the course of the research. There were no occasions when frustration or failure led to any personal vilification as far as I am aware.

In the course of the study, participants were invited to comment upon a range of social and technical matters that I or they felt were pertinent. In some cases this amounted to initiating an online discussion or referring to a document or research.

Although gender issues were an important concern of mine, problems and comments that were attributed as gender specific were not raised by participants. Nevertheless, I attempted to be diligent in questioning and observing so that particular problems, biases or influences could be identified. Of the fifteen original participants in this research, nine were women. I observed that the women's interest and enthusiasm for the various systems being explored was certainly as high as the men's, as was their tolerance of problematic technology. Only one technology was noteworthy in itself in relation to gender. The EdMOO virtual reality environment (Chapter 10) which might have represented the most threatening environment was in fact significantly better used by women. While the number of users of the system indicated a fairly even representation of females and males, the activity logs showed more connections by the women and longer times spent. Participants remarked that it was "fun" and clearly were more prepared to spend time in developing skills with the communication tools and to a lesser extent programming features built into it.

14.1.1 Cyber relationships

In several parts of this work I have indicated situations in which people found themselves in relationships with others that were affected by the computer mediation. One example is that of Kathleen's demise (Chapter 12.1.3) in which a teenage male adopted a female persona with dramatic consequences for the community which developed around her. A second important example is the way in which people discovered a robot in the EdMOO (Chapter 10.7) and spoke "behind its back" to avoid having to confront it. It was beyond the scope of this

research to pursue the matters of online personality and relationships, but these were consistently noticed as concerns by the researcher and participants. It was resolved by the group that future work needed to be directed towards providing resources and experiences for colleagues as well as their students in identifying situations where online social issues required attention.

14.1.2 Gender

This research has been informed by, and provides some examples of gendered discussion. Again, these have not been primary foci of the work, but the identification of concerns raised by the literature into our own work was particularly helpful in the design, conduct and reflections of our projects. Of the eight specific projects described in this research, four were initiated and controlled by women although the presence of the male researcher was unavoidable. On final reflection, I was consistently surprised by the women's ability to perceive ironies in technology and gender without wishing to (necessarily) confront them. Near the end of the research, Kate and Christine related an incident when they had called in a technician to solve a difficult systems problem.

> "...apparently the technician was impressed that LADIES could do their own troubleshooting!!" (Kate via email)

Kate and Christine found it more useful to laugh at being referred to as "ladies" than to assert their technical skill to the hapless visitor. It has been important to recognise that the women's lack of interest in demonstrating their skills has been misinterpreted as both lack of skill, and lack of interest in the technology. This would be a serious error and suggests that a commentator's position and

background need to be stated just as the source of information should come from the women themselves.

14.1.3 Notions of "Place"

On a number of occasions, the word "place" has been employed to explain the technology context of some electronic communication. It is interesting to note that this word, implying 'location' in the strictest sense, also defines possible modes of engagement, social expectations, technology requirements and likely problems with all of these. EdMOO (Chapter 10) is an obvious example, bringing virtual reality, virtual self, high levels of technology, and the capability to contextualise a discussion as if it were taking place in a particular environment of the authors' construction. Other 'places' within bulletin boards and discussion systems have a less obvious geography, but are still referred to in terms of "what you can do", or "who you find" in "this place". While the wholly immersive and socially preferred worlds of the novels *Neuromancer* (Gibson, 1993) and *Snow Crash (Stephenson, 1992)* are still fictional, the language encapsulates human online interaction using similar technologies. In the terms of all of the communicative technologies that made up this research, the word 'location' is referring both to a geographical and to a contextual place.

14.1.4 Costs

Throughout this research, value judgements have been made in the selection, implementation, evaluation, and reflections that accompany each initiative.

- Financial costs dogged the City Limits and Mag-Net projects, but were less problematic to the others. However, other costs, particularly the costs of people's time, effort and stress are difficult to quantify, and were a large part of all projects.

I shall say more about the costs to myself in a later section, but it is critical to include these considerations for all of the research participants, indeed all educators initiating and making use of learning technologies. Elizabeth (Chapter 9) suffered several occasions when management failed to understand the technical complexity of her work and insisted on shorter than reasonable timelines. Christine (Chapter 7.1) spent immense amounts of time configuring workstations for her pupils to ensure smooth logins and consistent learning environments, and Reg, an operator for one of the bulletin board point systems was frequently to be found working late to set up communications partners and activities for his colleagues and students. While these people rarely complained about the time and effort they were providing, my concern is for the fact that their work became "hidden" as it was preparation and enabling, rather than substantially in front of teachers or students. Accordingly there is a danger that people working in this way are not completely valued, and that the enabling and preliminary work is seen as mechanical and trivial. Another concern is that, as technical work it is sometimes regarded as less skilled or not relevant to the individual's profession.

14.1.5 Visibility

There are problems which arise with the increased visibility of learners and their online work. Public access to student discussion groups and students requests for help can compromise the privacy of the student just as increased visibility of workers in Orlikowski's (1996) research caused them discomfort. Workers' emails and co-operative efforts being visible to hostile peers or management is relevant to students using similar tools. This probably represents a need for a clear understanding of 'degrees of public access' to protect individuals (Orlikowski,

1996:55). Business networks may of course feature different social structures than learning networks. In particular, businesses may have the need to support hierarchies, competition, and control, while these issues are less likely to be deliberately sought in education.

Our research activities, including some of the reflective discourse, were visible to other educators interested in the work, in fact as indicated in chapter 5.6, people known to group members and others chose to become a part of several projects. There were no perceptible problems with this approach since the participants were clear about how to communicate privately for the research project, and how to invite interested parties into relevant parts of the work.

14.1.6 Students Projects and their Implications

Of the many encounters of this research, projects designed for students to become enthusiastic and familiar with telecommunications were plentiful. Occasionally participants used the systems developed in this study, or modified versions of them to show or to use in ongoing student learning activities. These include the asynchronous messaging systems used in the Bulletin Boards (Chapter 6), the Discussion Forums (Chapter 12.4), EdMOO (Chapter 10), and Desktop Television (Chapter 8.1). Others were evident in the literature and day-to-day experience of educators using online networks. The first large educational projects were fostered by K12Net (chapter 6.4) and FrEdMail (Aboba, 1993:96). Later educational initiatives under the auspices of Learning circles and I*EARN (Riel, 1993) provided models where teachers joined a group and were supplied with software network connections, curriculum guides, and even matched with partners. There

are some cautions that I would raise with respect to this approach simply in that the "pre-packaged" nature of the projects have a political impact in the appraisal and selection of suitable project partners. There might be, in the long term some potential for misconstruing the realities of global social and political life when the "matches" are made by a third party. There is an equal concern that the likely partners of student telecommunications projects will be of equal social advantage in their respective countries, and as such the delight of transcontinental communication ought to be tempered with some sound information about the nature of the correspondents and their situations. These warnings are not to detract from the fine work produced by these agencies of course, nor from the insightful developments that well informed teachers can bring to their students.

14.1.7 Understanding the Social Processes

Chapter two of this thesis includes a review of the literature that explains social structures containing technology. It is possible to consider these theorists and researchers to be sequentially "inheriting" from one another, but my view is that they all contribute to a better understanding of the dependencies that can develop between humans and technology and a more complete language that can be used to engage with and explain events. This research adds to this body of knowledge through the documentation of experiences over a significant period of time using a large number of leading technologies. Degrees of the social dependency can be illustrated in each of the projects undertaken, and I am reminded of the expression "incomplete systems" which describes the kinds of technology initiatives that fail to meet their expected outcomes. These are systems designed with a view that the human actors' activities can be known or directed through teaching (professional

development) rather than allow the system to permit human adaptation to and with the technology as one system in effect. I am also reminded of the consistent failures of people in leading positions who attempt to set up "resource banks' or "clearing houses" or similar database initiatives that expect others to contribute their work to an online community. I use the word "community in this case without much conviction: this kind of project has been evident on bulletin boards since the 1980s and was no different to the proliferation of these on educational websites at the time of writing. These are lonely birthday parties where neither the hosts nor the guests are identified.

The problem can be explained as a "stranded technology" or an incomplete system in other words, where the lack of articulation of social structure is the inevitable reason that humans choose not to engage. This challenges the critical mass theorists for however strategically one "whips up enthusiasm" (my quotes), the work will neither be owned nor sustainable.

14.1.8 Ethics

I wish to make two points about the ethic of online communication which became evident in this research. These have been detailed in chapters 6.3.3, and much of chapter 12.

First is a concern about the 'ownership of data'. From the earliest concerns about teachers' willingness to share documents electronically, it has been evident that the matters of tracking, labelling and authenticating people's digital work need a systematic approach. By this I am not suggesting that a single static solution is

possible. Initially at least, public and enforceable methods of identifying legitimate work, and most importantly of contextualising a 'work' in time and in reference to its intent should be developed. This is not just a matter of aggrieved individuals having recourse when materials are inappropriately handled, but also that readers are able to understand the domain of a document. This means the situation and technology of an author as well as their identity: A MOO construction attributed to an individual should be understood in its context alongside an email or an essay by the same person.

My second ethical concern is one of systematic handling of electronic communications and documents. Engines that automatically collect, archive, and index material are built under the assumption that *all* material is collectable, and that relevance is established by the reader. Furthermore, the responsibility for preventing a document from being archived in this way (apparently) rests with the author. There is a exercise of power in this situation: the author may, in good faith, allow a document to rest in an electronic place which appears secure. New developments in technology and changes in standards are likely to see machines capable of seeking out those documents to add to their indexes. The result is that the author needs skill or advice and assistance to be certain that their efforts to maintain their documents' accessibility and context are not being tricked.

14.2 Technology: The "Holy War" of hardware and operating systems

Considerable technical details of the various projects that made up this research are provided within the text. An important overarching concern of mine grew from

frequent frustration with operating systems and computer hardware. Two principal types of computer hardware were encountered in this research:

1. Computers based upon an *Intel* brand processor, otherwise known as one of "XT, AT, 80386, 80486 or Pentium" which specified their Central Processing Unit (CPU) type. Intel processor computers were also popularly referred to as "IBM PC Clones", "PC compatibles", or just "clones", in reference to the industry copies of the original IBM personal computer
2. Computers manufactured by the Apple Computer company, including "Apple II, and Apple Macintosh".

To avoid confusion, it should be recognised that in general use, *Macintosh* computers has come to refer to Apple Macintosh hardware using the Apple Macintosh operating system and its familiar windows, mouse and icons environment. Intel based computers, were by nature of their uses, installed with one of a range of operating systems and environments. These included versions of Unix, Microsoft Disk operating System (MS-DOS) and Microsoft Windows. In the early days of the author's work with telecommunications, there were few computers available for teachers' use, and these tended to be Apple II machines. Schools and educational policy makers of the time favoured the Apple machines because of their wider range of educational software (Shears and Dale, 1983). Apple computers were relatively rare in the fields of telecommunications partly because the normal hardware would not support a modem without a minor modification, and partly, the researcher suspects, that developers of communications software found them lacking in power and flexibility. By contrast copies of the IBM Personal Computer were widely accepted as bulletin board machines and as suitable workstations for people wishing to experiment with telecommunications and connect with bulletin

boards. The author developed particular skills with DOS and later with Windows environments and Unix operating systems specifically to exploit their communications potential in education. Since IBM copies (also known as 'clones') were rare in schools at the time that the author began this work, my attempts to engage teachers in these activities and ultimately in this research were complicated by the need to help individuals in schools attach all kinds of common machines to modems so that they could be used to experiment with the author's bulletin board systems. That said, by the time that this research began, two significant and important realisations were made:

1. Solutions including software, hardware, and documentation had been located or developed by the author to support users of Commodore, Apple II, Microbee, and Macintosh computers, as well as a method for connecting electric typewriters!
2. The use of Intel machines in educational settings had lost some of its stigma, and more of these machines were appearing in Australian secondary and primary schools.

In chapter 6.3.4, limitations of hardware and operating systems affecting this research were raised. Through the life of this research, the researcher investigated, adopted, learned and in many cases rejected hardware and software systems in a quest for effective and 'scalable' environments that could be introduced to enthusiastic teachers. The common impediment to many of these was insufficient or inadequate or inappropriate school computers and teachers whose skills with these computers was limited. The researcher's bulletin board point "kits" (chapter 6.3.7) which were meant to get a system running at a school with minimal fuss and allowing for the researcher to connect and repair the school systems overnight

functioned well, but even minor problems caused the researcher to be making several calls each week. In terms of the value realised by the participant teachers and their students, it was an effective method that certainly exposed the scope for communications in teachers' professional work, but as a model for implementing an ongoing process, I considered it to be unworkable. It is notable that when I developed internet capable systems for the research group, these were based on Unix operating systems which were at once more difficult to manage, but significantly more powerful. While this required more technical skill for my part, the enhanced reliability, particularly when compared with the bulletin board systems, allowed more time to be spent in supporting the educational initiatives of the group. Furthermore, the systems developed to being more tolerant of different computers in schools, and usually provided much simpler software for teachers to use and configure on a daily basis. I observed that changes in school (and home) computer hardware types brought about different expectations and skills. For example, teachers using Apple II computers were almost totally incapable of performing simple file management functions (e.g. copy or delete a file). While their uses of the computer were dictated completely by "educational software", teachers argued that they did not need to know about such things. On the other hand, teachers involved in communications projects, email, document sharing and the like, saw that these technical skills were an essential part of their work.

14.3 Professional Support

14.3.1 Distributed systems

Chapters 6 and 7 of this document describe a range of examples where participants initiated activities on a local scale managed to foster professional groups with practical advantages.

The City Limits point systems, and the work of the Mag-Net project, created large networks of teachers with a strong sense of recognition that their communities were dealing directly with the concerns of teachers. This involved an understanding of professional development that defined the casual and "on demand" activities of practitioners, and that would support systems involving many non-human actors. In this way, responses to online questions, provision of Frequently Asked Questions (FAQ) lists, and Knowledgebases would take equal places as professional development activities alongside scheduled workshops, "Curriculum Days" and post compulsory courses in universities.

In Orlikowski's Groupware project, forms of collaboration, and the ultimate uses of "knowledge" gained from the technology (Orlikowski, 1996:53). In practice, a problem logged to the system was then researched and resolved by any of the group members. We can argue then, that the "work" is not understood as that of an individual. While this might be regarded as perhaps a good model here for a "Just in Time" learning, the more important feature is that it represents another almost imperceptible revaluation of the individual and their work, achievements, or products. In the past, the 'second level' effects of technology (change in attention, contacts, and dependencies) were "constructed as technology interacts with, shapes,

and is shaped by the social and policy environment." (Sproull and Kiesler, 1991:8) More significantly, and probably as a result of more advanced and personally challenging environments, they represent new professional social structures.

14.3.2 Professional development outcomes

This research identified a particular model for educators' professional development that recognises that the communication technologies create an interconnected collection of "encapsulated" activities. Professional development "courses", "programs", "meetings" tend to be fixed in time so that measurable outcomes are highly visible. A group of trainers who attend a course that is designed to improve their knowledge and skills with a particular teaching technique or regulation can expect that concluding the activity is frequently closing down that issue. While promises are made about the need for participants to follow-up or review, or meet again to reinforce and take the project further, this appears not to have been common. Interview data taken before the participants in this research began their projects showed a consistent observation of this 'hit and run' approach in their professional development experiences.

The results of the author's research indicate different methods of engaging educators in improving their practice which might be characterised by the following:

- ongoing dialogues which involve a changing cast of participants and advisors;
- significantly less formality;

- contributions which include multimedia artefacts, sounds, graphics, photographs, as well as practical and administrative materials like databases and electronic mark sheets;
- contributions which give rise to meetings, celebrations, and further projects, and,
- almost complete absence of 'conclusion'.

Over the duration of this research, the capabilities of the technology in educators' hands advanced dramatically. Even so, the actual methods of engaging peers, working with them, and taking advantage of work, did not change significantly once the communicative aspects of the test environments were established. The professional interactions of teachers who used the City Limits, Bush Telegraph, and similar Bulletin Boards were not unlike those kinds of work taking place in the various mailing lists, and video-capable systems that followed.

Research by Honey and Henriquez (1995) in their study of online communities made observations about the educators involved in telecommunications which are similar to the general experiences of users with advanced technologies. They state that the empowered individuals tend to become a resource person and are often the only one in a school using the technology (Honey, 1995:26). It can be seen then that the educator using advanced technology seems likely to remain in this almost isolated but strategic position while the technologies that they are dealing with continue to advance. The author's research saw several examples of a kind of personal growth where participants who had been the pioneers of professional development using bulletin boards and email became the pioneers of online professional development databases, users of MOO, video and other sophisticated

communications systems. They were also observed to be continuing to act as agents of change in their workplaces.

While the actual professional development processes did not appear to be much different over the duration of the research, a dramatic change was observed with the range of educators who felt able, and were motivated to explore these methods. Obviously the improved software and lower cost of technology (modems and personal computers), and the widespread acceptance of home and school machines which were able to be connected to networks allowed greater access. Similarly, these improvements meant that educators' needs for technical support, and educational guidance in the use of these systems could be gained from a much larger selection of individuals and organisations, whereas previously the support could only be obtained from a small number of (possibly unapproachable) experts. Wider community use, and particularly recreational use of home and other computers to networks, significantly improved the number and range of assistants who could be called upon. The use of one's own children and students as technical advisors became a common and indeed acceptable method.

14.4 Methodological issues

14.4.1 The author

As the system operator or system administrator of all of the early projects in this research, I observed changes in my role from being highly technical and working in a largely predictive mode, to one where more attention could be placed upon project design and educational discourse. Fear of system failures, which would

have brought about almost catastrophic impacts on teachers' projects caused me to recognise at an early stage that this reliance upon weak technology (see Chapters 6.3.5 and 6.3.8) was not supportable beyond the scope of this research. There are two important reflections that remain at the conclusion of this research with respect to my role in this, and the general role of supporters and agents of change. The first of these relates to permanence: for some reason, I had been concerned at the early stages of the research that my impact on the projects ought to diminish as each one proceeded. This might have been an interpretation of 'successful' project becoming self sufficient, and consistent with critical mass theories (Chapter 2.6). It is clear to me now that in these circumstances, the highly technical nature of most projects meant that my role would not diminish, and that in certain cases, efforts to train certain participants to take up system operator roles for example, were possibly misplaced. In all of these cases, the participants wished to gain those system operator skills, and while I was pleased to provide training and documentation this should not have been with any assumption that the systems would ever operate without my intervention.

The second reflection relates to my view that this kind of work is worth pursuing: Although some of the projects were highly dependent upon skilled individuals such as Elizabeth, Peter, Reg, Jack and myself, the work resulted in some quick appraisals of new technologies, detailed assessments of others, and significant motivation to involve technology into the teachers' professional world.

This document has described and analysed certain technology applications for the benefit of participating teachers and their colleagues and students. While each of

these innovations was able to create new possibilities, the real findings of this work are within the persistent social, methodological and strategic plans, their developments and discoveries.

14.4.2 The study and recommendations

The purpose of this research was to implement and study computer communications systems introduced to the professional world of practising educators. From a technological point of view, there were mixed successes in that certain 'weak technologies' were found to place heavy demands for user and system support. Nevertheless, all were perceived to be valuable in themselves or at least indicative of applications worth some attention in the future. The way in which this study was carried out located the researcher in highly visible and influential roles. This was considered to be appropriate and necessary so that the required level of support could be attained. It is important to recognise that similar studies could be undertaken with a similar expectation of success while this visibility and support were available. New work that investigates the relationships between highly visible researchers and their colleagues in similar technology dependent situations would be very useful to add to our work and to the current body of research.

This thesis has been able to implement several 'first instances' of technology into educational environments that would otherwise not have been possible. This can be attributed to the technology provided by the study but moreover to the dynamic community of the participants who joined in all aspects of the work. This includes the evaluation, celebration and recording of each others' and of my work. The

implementation and analysis model that developed could not really be regarded as formal or highly structured, and while this can be seen to be a limitation, my own view is that the limitation is only with respect to the presentation of findings. The ways in which the participants worked and communicated as individuals and small group were active, changing, and visible. Systems were used to create their own reports and testing was conducted 'live' while people tried to use them on a day-to-day basis. There is scope, I believe, for further work that uses this approach, and certainly some value in a study that explores the potential of electronic communications and documentation systems to produce journals and other research instruments.

Appendix 1.2 Bulletin Board and other Operational Software referred to in the text

Package	Developer and Distributor Information	Purpose
OPUS 1.03	Wynn Wagner III http://www.juge.com/bbs/Opus.Html	Bulletin Board software capable of supporting FidoNet network protocols
DESQView 2.62	Quarterdeck systems Symantec Corporation 175 West Broadway Eugene, OR 97401	Switching software to provide multitasking capability for IBM compatible 286/386/486 computers running DOS Operating System.
Remote Access	Andrew Milner http://www.rapro.com	Bulletin Board software supporting FidoNet network protocols and suitable for multiple telephone lines installation.
EzyCom	Peter Davies No longer supported but available at http://archives.thebbs.org/ra122c.htm	Bulletin Board software optimised for multitasking (multiple line) FidoNet systems.

Appendix 1.3 Server Software

Package	Distributor Information	Purpose
CuSeeMe Reflector	Unix source code available from Cornell University. ftp://ftp.cit.cornell.edu/pub/windows/CU-SeeMe/Reflector/	Software to create a host for multiple desktop television users to create a conference where all could be visible at once.
Cold Fusion	Allaire / Macromedia 275 Grove Street Newton, MA 02466 (617) 219-2000 (617) 219-2100 http://www.maromedia.com	Software to enable HTML documents (web pages) to be served from databases.
MOO Server	ftp://lambdamoo.sourceforge.net/pub/lambdamoo/	Source code to generate the software for a MOO server. Originally authored by Pavel Curtis (Curtis, 1996) at the Xerox Research Centre PARC.

Appendix 2 Examples of Primary Documents

Appendix 2.1 Poem sent by staff at Second Primary School

Date: Thu, 24 Aug 1995 11:30:08 +1000

To: b[redacted]

[redacted]

Just thought I would say "Hi" with this little poem.

Bernard is our Internet tutor,

On both DOS and Mac computer.

He may be sorry he took us on,

Most of us are too far gone.

We'll try his patience and test his nerve,

And send his blood pressure on an upward curve.

Email was our first big test,

So far we've done our very best.

So Bernard, don't give up your hopes,

'Cause maybe we are not such dopes.

Your project isn't doomed just yet,

We may just master the Internet.

Margaret

Appendix 2.2 Message describing change of workplace and the research project

-POP3-Rcpt: bernard@edx1
Date: Thu, 31 Aug 1995 22:32:14 +1000
X-Sender: (Reg's email)
X-Mailer: Windows Eudora Version 1.4.4
[redacted]
From: Reg
Subject: News

Hi Bernard,

Things are going well at First. Both Kate and Christine are spending hours on Internet.

I have been successful in my application to become principal of Seventh Primary. I have only just found out. Thanks for your letter earlier this term! I know this will mean change for First Primary but the staff are committed to computer education. I will be starting again but it is not the first time. The appointment starts next term. I'm looking forward to maintaining my involvement both with First and you. I will be surfacing (with Seventh) soon!

Regards Reg.

Appendix 2.3 Message : Attempting to solve a technical problem beyond reasonable expectations for educators

X-POP3-[redacted]
Date: Thu, 16 May 1996 11:50:24 +1000 (EST)
X-Sender: (Michael's email)
X-Mailer: Windows Eudora Version 1.4.4
To: Bernard Holkner [redacted]
From: (Michael)

Subject: Re: On-line!!!

G'day Bernard,

Sorry for the delay in replying. There's a good reason but I'll tell you later.

Yes, Netscape works fine. The only glitch is that I can't get the internet computer to join in with the rest of the machines in our computer network - the error essage I get is that the IFSHLP.SYS file can't e loaded and Windows won't open with support for the etwork.

I have a couple of ideas which I will try this afternoon.

Yes, I believe that WE (?) were going to set up a gateway for the network.

I'll get back in touch as pronto as is possible when I get the network problem sorted out.

Regards,

(Michael)

Appendix 2.4 Technical Support response posted on the "charlotte" mailing list (1)

Date: Sat, 2 Sep 1995 09:35:57 +1000

To: [redacted]

From: {Peter}

Subject: Re: Submitting Forms

G'day Freida,

I've used forms before
(http://edx1.educ.monash.edu.au/~Peter/plsc/aus1x.html),
so I hope I can be of some help to you.

>Because I know next to nothing about Unix, I have the form submit the data to my email account.

In your form, did you use the form tag attributes as such ? <FORM METHOD=POST ACTION="mailto:your_email@address">
Well, you can direct the data in your form to the cgi-bin directory using the tag;
<FORM METHOD=POST ACTION="/cgi-bin/name_of_the_script_that_handles_your_data">

>Pmail (my mail browser) can not handle the output file because the form sends the file without line breaks and the program deals with this by cutting >off about half of the data.

So, do you get a string that looks something like (this will vary depending on the content of the data in your form).

name=Fred+Smith&age=78&gender=male ....

and so forth ?

Well you then need a program called "cgiparse". (This comes with the CERN httpd) Cgiparse will get rid of the + and ampersand signs so that the above example will look like this;

$name=Fred Smith
$age=78
$gender=male

These variables can then be used in your script (located in your cgi-bin directory). To use the above variables in your script, you will need to have this line;

eval `cgiparse -form -prefix $`; (if the script is in perl).
This line assigns the above variables into your script.

>2. I can have the form output sent to the cgi-bin (or something similar) directory and have it processed so that it converts any submitted forms onto a text file.

A good idea, so that the client knows that something is happening to the data that they've submitted. And if the text file has the HTML tags, you can then output a "web" page back to your clients. For this, you'll need to write the following in your scripts;

```
print <<EOM;
Content-type: text/html
```

followed by your usual html tags, and finally ending by

```
EOM
```

>The problem is that I do not know how to write or implement such a program. I have a feeling that this is a very basic function and I wouldn't mind finding the solution as an >introduction to the world of Unix.

Yes, it's not that difficult when you have examples to look from. I'd highly recommend a book called "Running A Perfect Web Site" by D.M Candler (Que Publishing). It has some good examples of the syntax required for your scripts. See chapters 11 and 12. (Available at the Technical Book Company 295 Swanston St, Melbourne.)

>If anyone has any advice I would certainly appreciate the help. If not, am told that there are 40 million >complete strangers connected to the net who might have some ideas.

...oh yes. Sorry, forgot to introduce myself... I'm one of the 40 million strangers...{Peter}... Maths/Science and try hard Info-Tech teacher at {Third Secondary College}... How do you do, Freida ? ;-)

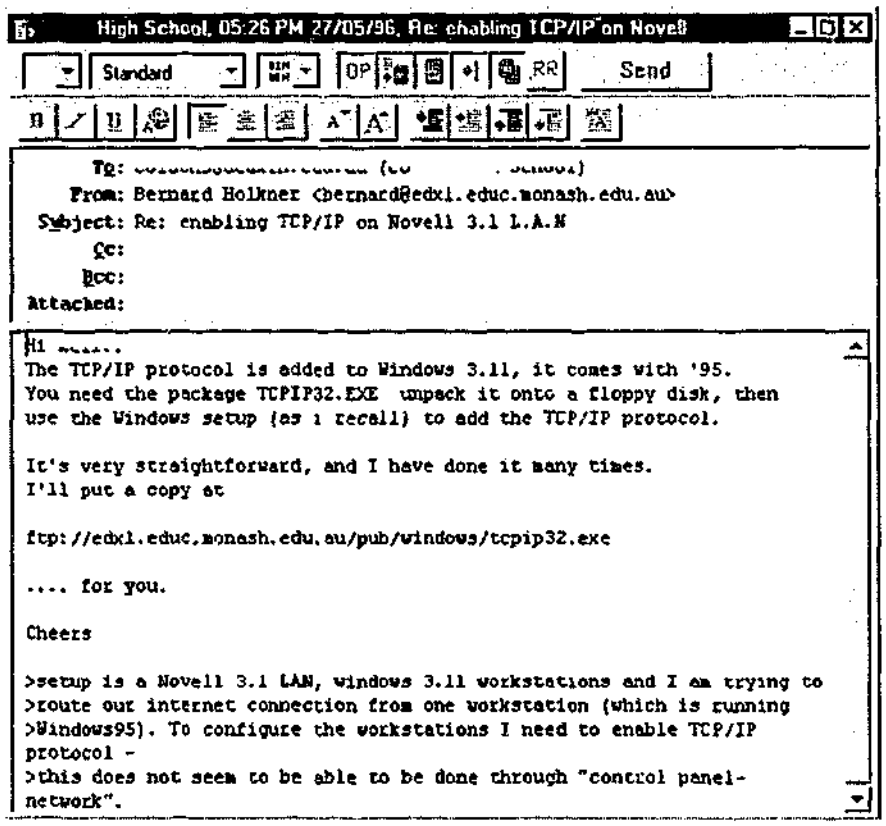
>On another note, I would love to set up a video conference. I think I have all of the hardware, but I am not available until mid November. Is anyone else interested?

Yep, I'll be trying out one of these as well in late September. You might be able to "lurk" . Please ask Bernard Holkner (bernard@edx1.educ.monash.edu.au) for details.

Hope this is helpful.

Best wishes, ...

Appendix 2.5 Technical Support response posted on the "charlotte" mailing list (2)



Appendix 2.6 CuSeeMe planning

Date: Tue, 5 Sep 1995 01:25:10 +1000

X-Sender: Peter77@pyromania.apana.org.au

To: bernard@edx1.educ.monash.edu.au (Bernard Holkner)

From: Peter77@PYROMANIA.APANA.ORG.AU (Peter Robbins)

Subject: Re: Another example for using CuSeeMe.

>When will this take place ?

Thursday 21st September. 6:30 to 8:30pm. You'll be able to see it from home, if you're not lecturing.

BTW, someone has suggested the Video Spigot as a good capture card. Have you tested this ?

I assume the Video galaxy can handle all video cameras ? I've got a Hitachi Hi 8.

****

****

Peter Robbins

Appendix 2.7 Message describing responses to the CuSeeMe broadcasts

Date: Tue. 3 Oct 1995 23:19:32 +1000
X-Sender: Peter@edx1.educ.monash.edu.au (Unverified)
To: bernard@edx1.educ.monash.edu.au (Bernard Holkner)
From: Peter@edx1.educ.monash.edu.au (Peter Robbins)
Subject: CU-Seeme Mailing list

It's HOT !! Something like 12 messages eachtime I check my mail (3 times a day). It's good quality stuff though, most of the time, but be prepared to "get rid of the finger from pressing the delete button".

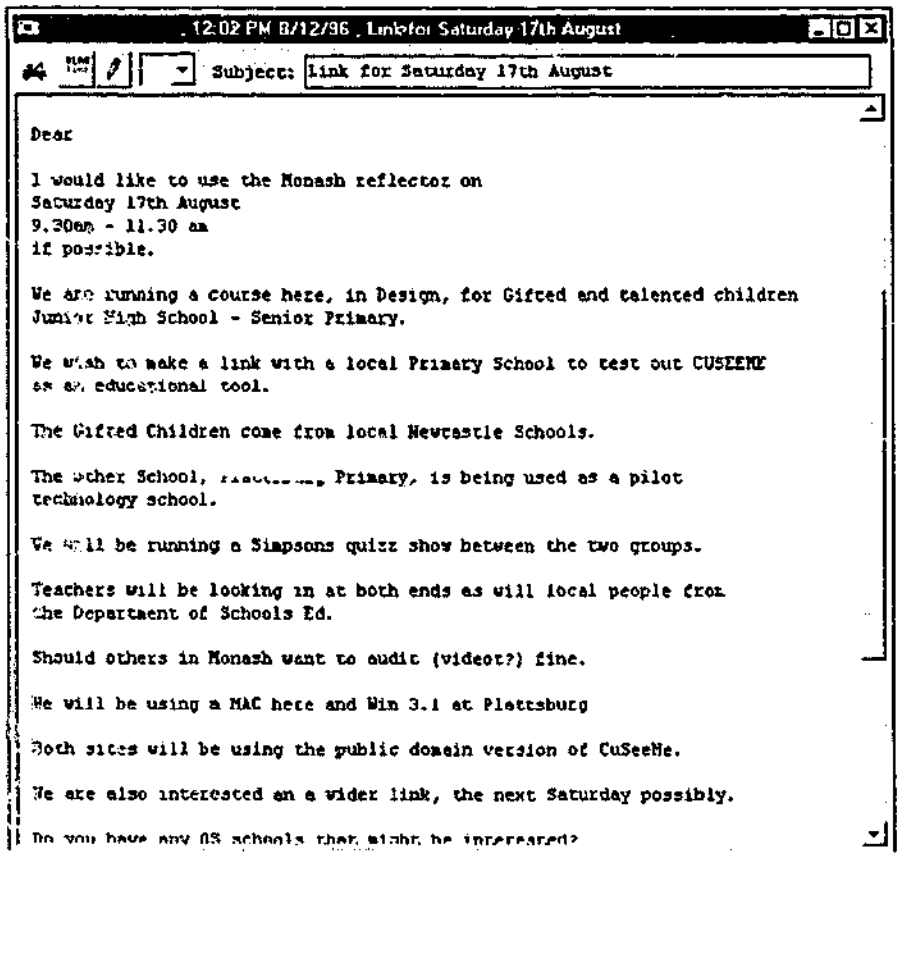
In my mail to the list, I've made references to the edx1.educ.monash.edu.au/CEGV/ page as an example of the picture quality through the 14.4K modem. (Hope you'll keep this page for a while).

Cheers,

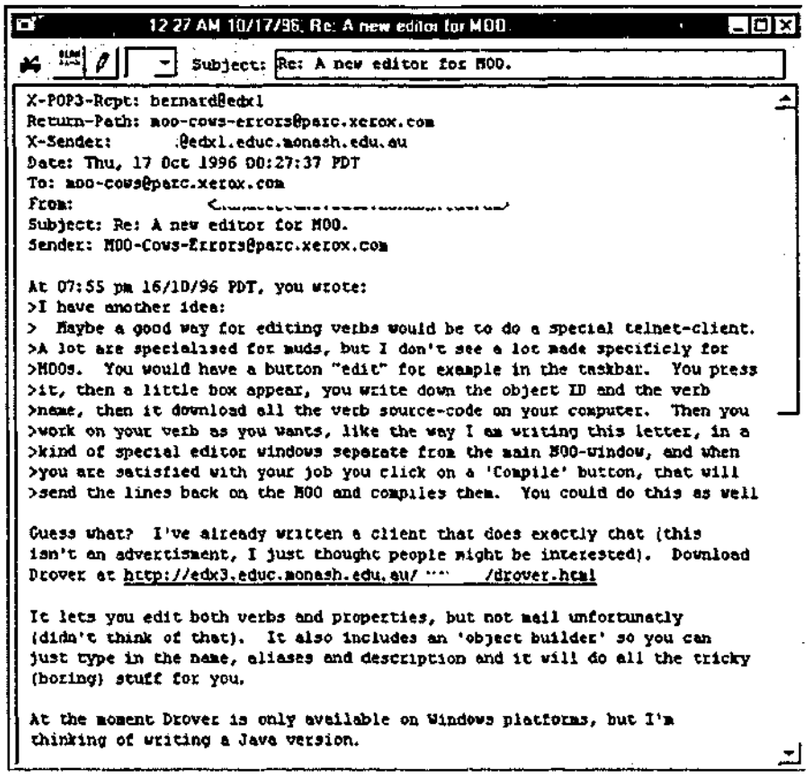
Peter.
****
Peter Robbins

A MAG-NET school: http://www.vicnet.net.au/vicnet/stav/mag2.htm

Appendix 2.8 Message Booking the CuSeeMe Reflector



Appendix 2.9 Message describing development of Drover software

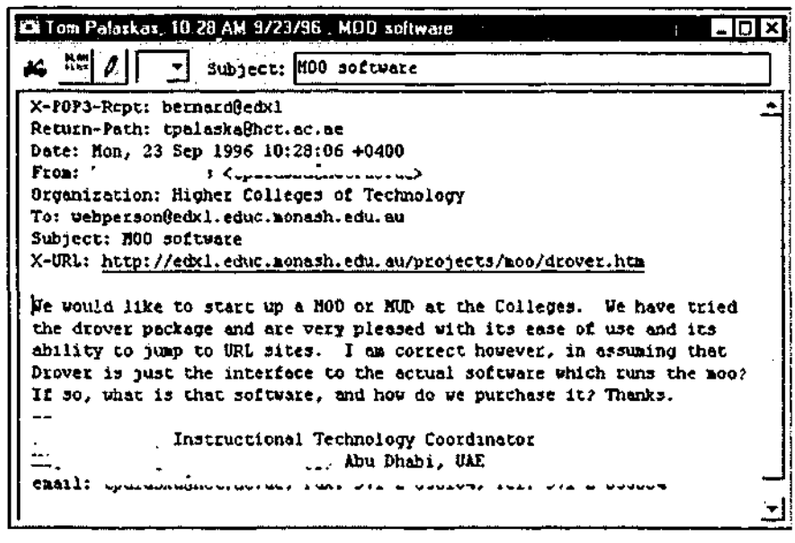


12:27 AM 10/17/96, Re: A new editor for MOO

Subject: Re: A new editor for MOO.

```
X-POP3-Rcpt: bernard@edx1
Return-Path: moo-cows-errors@parc.xerox.com
X-Sender:       @edx1.educ.monash.edu.au
Date: Thu, 17 Oct 1996 00:27:37 PDT
To: moo-cows@parc.xerox.com
From:
Subject: Re: A new editor for MOO.
Sender: MOO-Cows-Errors@parc.xerox.com

At 07:55 pm 16/10/96 PDT, you wrote:
>I have another idea:
>  Maybe a good way for editing verbs would be to do a special telnet-client.
>A lot are specialised for muds, but I don't see a lot made specificly for
>MOOs.  You would have a button "edit" for example in the taskbar.  You press
>it, then a little box appear, you write down the object ID and the verb
>name, then it download all the verb source-code on your computer.  Then you
>work on your verb as you wants, like the way I am writing this letter, in a
>kind of special editor windows seperate from the main MOO-window, and when
>you are satisfied with your job you click on a 'Compile' button, that will
>send the lines back on the MOO and compiles them.  You could do this as well

Guess what?  I've already written a client that does exactly that (this
isn't an advertisment, I just thought people might be interested).  Download
Drover at http://edx3.educ.monash.edu.au/      /drover.html

It lets you edit both verbs and properties, but not mail unfortunately
(didn't think of that).  It also includes an 'object builder' so you can
just type in the name, aliases and description and it will do all the tricky
(boring) stuff for you.

At the moment Drover is only available on Windows platforms, but I'm
thinking of writing a Java version.
```

Appendix 2.10 Message requesting purchase of Drover



Tom Palaskas, 10:28 AM 9/23/96, MOO software

Subject: MOO software

```
X-POP3-Rcpt: bernard@edx1
Return-Path: tpalaska@hct.ac.ae
Date: Mon, 23 Sep 1996 10:28:06 +0400
From:                 ;
Organization: Higher Colleges of Technology
To: webperson@edx1.educ.monash.edu.au
Subject: MOO software
X-URL: http://edx1.educ.monash.edu.au/projects/moo/drover.htm

We would like to start up a MOO or MUD at the Colleges.  We have tried
the drover package and are very pleased with its ease of use and its
ability to jump to URL sites.  I am correct however, in assuming that
Drover is just the interface to the actual software which runs the moo?
If so, what is that software, and how do we purchase it? Thanks.
--
                Instructional Technology Coordinator
                                Abu Dhabi, UAE
email:
```

Appendix 2.11 City Limits closing down broadcast

(387) Tue 12 Mar 96 10:28p

By: Bernard Holkner

To: {colin}, Princes Hill SC Mail System (3:635/727)

Re: Closing Down

St: Pvt Local Kill

@MSGID: 3:633/369@Fidonet 2415dd59

@PID: FM 2.02

<Addresses removed>

Hi everyone.

This is a first notice of City Limits closing down.

You will not be surprised to hear that the number of calls has dropped

dramatically over the last 6 months from around 80 calls per day to less than

20. Few callers are subscribers, and the prospects don't look like changing.

Downlinks (all of you) take K12 and minimal Internet gating.

I am sorry that this means that other K12 arrangements might have to be made,

but I believe that the traffic is falling quickly in there as well.

Interesting to note, that possibly the biggest strength of this (and similar)

systems would be the ability to cheaply provide email for students via point

setups. However the running costs and falling traffic means that I don't
regard it as feasible any longer.

Now that schools are working so hard, and teachers' Internet literacy is
probably the biggest issue facing them, another system (which is difficult to
explain and implement) doesn't look very attractive.

Enough rambling...
At this stage I am planning to close down in 4 weeks.

I am planning to move STEM-L to the larger Unix server at Monash, and any other
projects which need maintenance will be moved to other systems as required.

Regards.... (suggestions ?)

bernard@edx1.educ.monash.edu.au

Appendix 2.12 Public Message in response to the closure of City Limits

From : Terry Bowden

To : Bernard Holkner

Subject : Closing down

Bernard Holkner wrote a message to All:

BH> This system (City Limits) is closing on the 29th of March.

BH> Thanks to all who have been in contact over the past seven

BH> years.

BH> Downlinks of this system are either closing, or being

BH> adopted by 3:633/155 (and others - thanks people)

BH> * Origin: City Limits -Education, Australia 3 lines

Bernard,

Thank you for all the effort you have put into providing your valuable services in the interests of the education community over the past years. It is greatly appreciated.

Terry Bowden K12Net Council

--- timEd-B9

* Origin: Test Point, Devonport, Auckland, New Zealand (3:772/20.201)

Appendix 2.13 Message announcing closures of the K12-Net System

Date: 27 Mar 96 16:56:30

[redacted]

Subject: Backbone shutting down!

X-Listname: EduNet Education Sysops

[redacted]

Looks like Bernard is not the only one shutting down.

* Copied from area : K12.SYSOP (Area K12.SYSOP)
* Original date : Sunday March 24 1996 08:48
* Originally from : Jack Crawford, 1:260/620
* Originally to : All
* Subject : Backbone shutting down!

To all K12Net sysops, worldwide:

```
+-------------------------------------------------+
| 1:260/620 and 260/621 will be shutting down at the |
|     end of June. As these are Level 1 K12Net     |
| backbone distribution hubs, THIS AFFECTS EVERYONE! |
+-------------------------------------------------+
```

Like everyone else, I am now devoting all of my time, energy and enthusiasm to bringing Internet to my schools. I now regard K12Net in the same light as the

Apple IIe: a venerable, older technology that served its purpose admirably and honorably in its day but which has now been replaced by newer, better technologies. K12Net is a "horse 'n buggy" in a new age where our kids should now be learning how to drive "automobiles".

It's time to move on...

If you wish to continue with FIDO-based K12Net, I wish you well. However, you'd better get started in collaborating on the development of an alternative distribution backbone immediately because June is not that far off. As my BBS's are now set up strictly for mail distribution in an "auto-pilot" mode and I do not read the echoes any more, please do not expect me to be part of your conversation. You are on your own. I suggest you begin your conversation here in K12.SYSOP--and begin it very soon. Start by looking for leadership.

IMPORTANT! Please forward this message to all of your downlinks and uplinks, preferably via netmail so that they will be sure to see it. Do not assume they read K12.SYSOP!!

Goodbye, K12Net. It's been fun...

=jack=

K12Net Founder

-+- FreeMail 1.09

+ Origin: K12Net is trademark of Jack Crawford {NY,USA} (1:260/620)

@PATH: 260/620 321/110 270/101 712/515 628 633/369 635/727

==========

Appendix 2.14 Writing a BBS message to an Internet address

From : Bernard Holkner

To : {user}

Subject : Long addresses

The mailer gave me an error so I noticed a mail failure due to a long email address (at least that's what it looks like!)

Anyway, if you have this problem use the following method to send email.

Go to the Internet email area

E Enter a message

To : uucp (that's the mailer robot)

Subject : Anything

The FIRST LINE of the message should be typed EXACTLY as follows (put your

contact's address in place of the sample !)

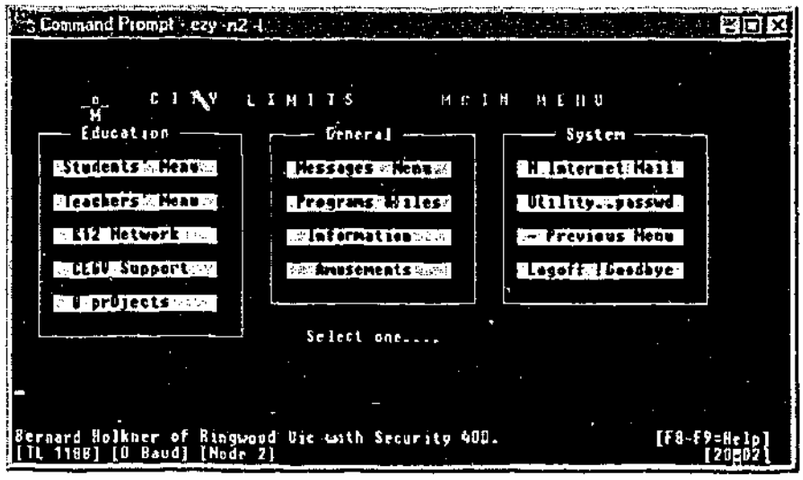
The a clear line, then the message itself.

Good luck, and tell me what happens !

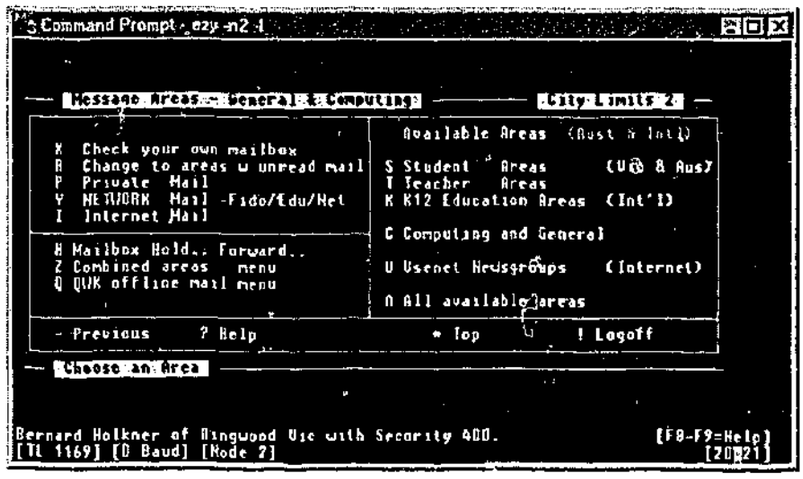
Regards.

Appendix 3 City Limits Screens

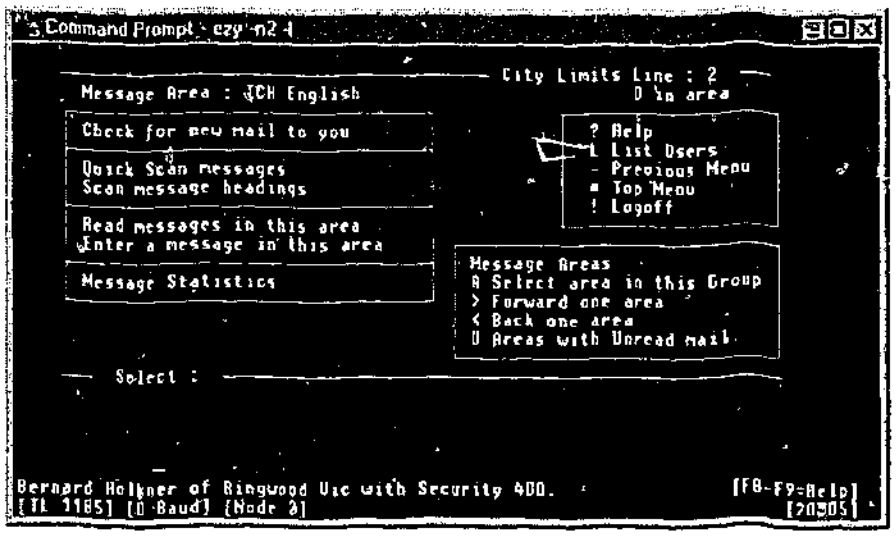
Appendix 3.1 Welcome Screen



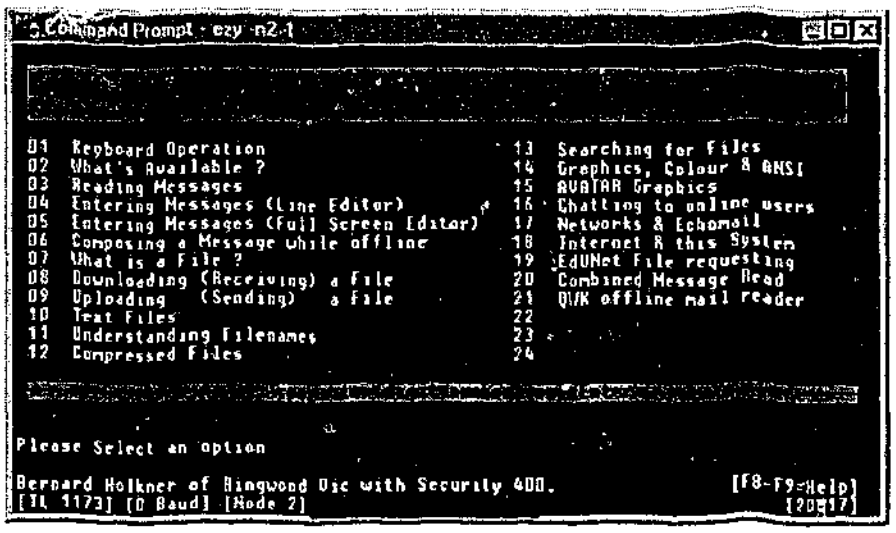
Appendix 3.2 Message Areas



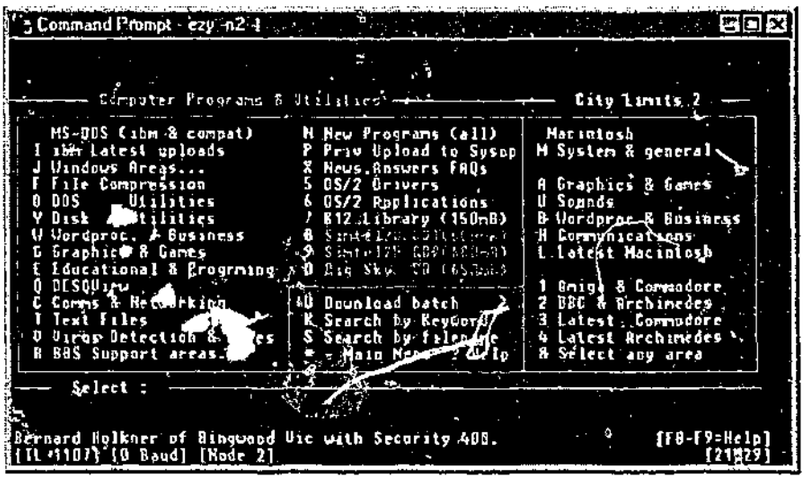
Appendix 3.3 Message Menu (typical)



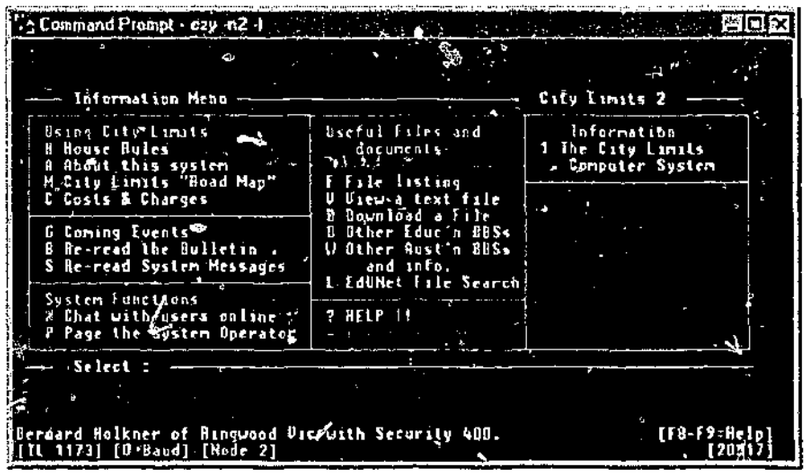
Appendix 3.4 Help Menu



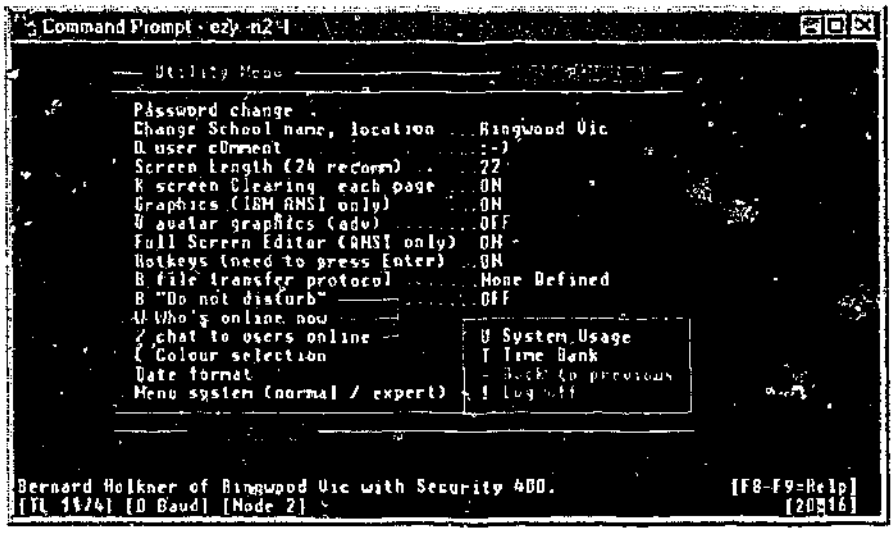
Appendix 3.5 File Areas



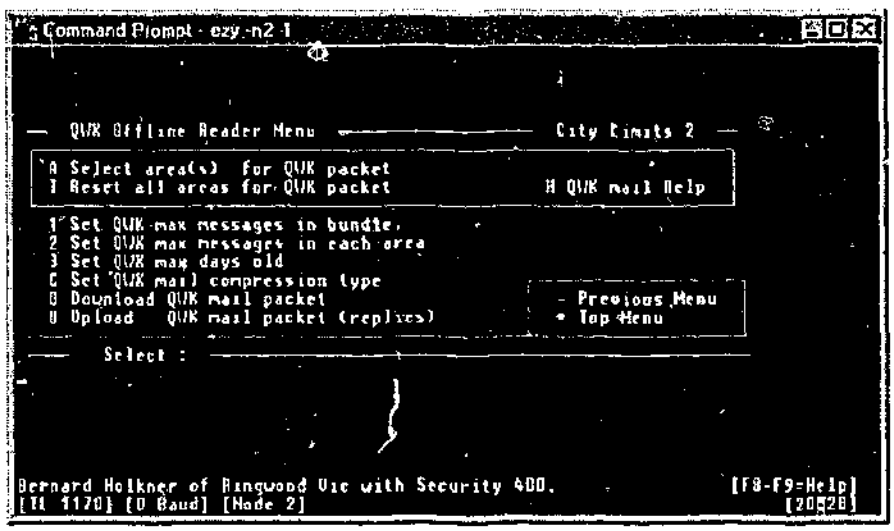
Appendix 3.6 Information Menu



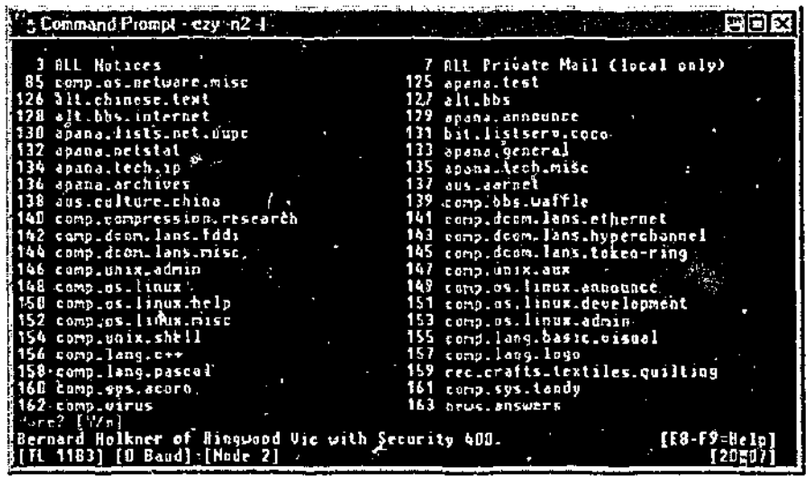
Appendix 3.7 Utility Menu



Appendix 3.8 Offline Reader Menu



Appendix 3.9 Usenet Menu



Appendix 4 City Limits System Documents

Appendix 4.1 BBS (Bulletin Board System) Software development timeline

This timeline can be read alongside the research milestones timeline in Chapter 5.6.2.

July 1987	Installed Opus 1.03 software at Kinglake Primary School	System comprised an IBM XT clone computer. 640k RAM, 40Mb disk, One modem capable of 1200bps communication.
September 1987	Minister of Education opens the "Bush Telegraph" BBS system for schools in the Goulburn Region	Repeated attempts to have the Bush Telegraph software network with other world systems were not successful.
June 1989	Installed "RA Remote Access" software at Eastern metropolitan region (Boronia)	System comprised an IBM 286 clone computer. 1 Mb RAM, 70Mb disk. One modem capable of 2400bps communication.
June 1989	Launched the "City Limits" BBS for Eastern Region teachers and students.	Networked City Limits to the FidoNet backbone with daily calls to Sydney Australia or Oregon, U.S.A.
July 1989	"Point" system built in Ballarat Region installed. The Ballarat system provided predominantly files resources to local teachers.	System was networked to City Limits, and polled for mail forwarding each day.
September 1989	Upgraded software to EzyCom to support multiple lines	Upgraded hardware to 80386 clone, 2Mb RAM,

		100Mb disk. Two modems capable of 2400bps communication.
November 1989	Satellite system at Benalla Region installed. (EdNED) Attempts to network EdNED to City Limits were not successful, but EdNED was able to provide BBS services for teachers in the NE region until 1992	System was not networked to City Limits.
April 1991	Continued software upgrades, City Limits becomes a Beta test site for EzyCom. Major hardware upgrade.	System comprised 80486/33 clone computer. 8Mb RAM, 600Mb disk. First telephone line upgraded to 9600bps.
June 1992	System upgrade to cover large traffic requirements. Over 100 callers per day made the City Limits sytem one of the busiest in Australia, and one of the largest educational BBS in the world.	Telephone lines upgraded to support 6 concurrent users. Two lines of 9600bps were provided to make calls to the networks. Typical traffic of the system was 1000 inbound messages per day in general interest areas, carried in two daily calls to Sydney or Oregon.
February 1993	Gateway software installed to permit "email" to the Internet. System closed at Eastern Region Boronia, and moved to the researcher's home. System permits BBS users to have an Internet capable email address in the form: john.bloggs@lecity.edu.au	"lecity.edu.au" domain registered for Internet traffic. Fax capable gateway installed for users to generate outbound faxes from BBS messages. Operating system changed to OS/2 to cope with heavy

		multitasking demands.
March 1994	Satellite system established for the TAFE National Curriculum Project at Outer Eastern TAFE. This system was networked through the Internet gateway of City Limits and provided email to the Internet, fax, and a document archive for project authors. Holkner 1995	System comprised two 386 clone computers with 8Mb RAM. A 1800 "freecall" telephone number was installed on the first of two lines for project officers around Australia to dial in without cost.

Appendix 4.2 EDUNET School based Points

(subnetwork systems of City Limits)

System Name	Location (in Victoria, Australia)	Purpose
City Limits	Boronia, Ringwood	Hub Mail and File services for Teachers Mail and File Services for Students Internet Gateway
EdNed	Benalla	Services for North-Eastern Region
Eureka	Ballarat	Services for Central Highlands Region
Bayswater South Primary School	Bayswater, Vic	Services for local school(s)
Southwood Primary School	Ringwood	Services for local school(s)
OECT	Wantirna	BBS services for National IT project
Tempest	Templestowe	Services for Science and Technology teachers
Bush Telegraph	Kinglake	Services for local school(s)
Heathmont	Heathmont	Services for local school(s)
Comet	Ringwood	BBS for PC Education User Group
Syndal	Glen Waverley	Services for local school(s)
Preston North-East Primary School	Preston	Services for local school(s)

Appendix 4.3 City Limits "Polling Schedules"

Author's note: This document list lists all of the systems, addresses and automated dialup times used by the author's "EduNet" Bulletin Board network. This network operated between various educational institutions and the City Limits System. The author established the EduNet addresses, registered the FidoNet addresses, and configured the systems to meet this schedule. Systems without listed poll times were new connections at the time of closure. Not that the complete network included educational bulletin boards which were installed and managed by others.

EduNet	FidoNet	Name	Polltime	Summer
401	633/369	City Limits	Host	Host
402	633/369.5	Comet	6:15	7:15
403	633/209	Spare Parts	5:30	6:30
404	633/369.7	Bayswater South	5:00	6:00
405	633/369.5	Branchline	Manual	
406				
407	633/369.6	Outer Limits	7:00	8:00
408		Mirage		
409		Datastorm	Manual	
410				
411	633/369.3	Eureka	Manual	
412				
413		The Schools Connection	5:45	6:45
414		CauSec	Manual	
415				
416	633/369.4	EdNed		
417		Offline	3:30	4:30
418	633/155.3	Syndal SC	Manual	
419		Jeff's Point		
420	633/369.8	Heathmont Sc	Manual	
421				
422	633/369.9	Heidelberg SSC	Manual	
423		Bairnsdale BBS		
424	633/369.10	Westcom		
425	633/369.11	Albany Rise Primary	7:15	8:15
426	633/155.7	Mt Scopus		

427	633/155.20	Bennetswood PS		
428		Rosebud SVC	Manual	
429	633/369.12	OECT Curriculum	9:15	10:15
430	633/369.13	Rowan's Point	8:00	9:00
431		ACCEL VUT		
432	633/369.14	Preston NE PS	6:00	7:00
433	633/369.15	Princes Hill SC	6:30	7:30
434	633/369.16	Frontline	6:45	7:45
435				

Outbound	Inbound	System	EduNet	Fido
2:45		Sydney Database		
	3:30	Offline	417	633/374
	4:45	Bayswater South	404	633/369.7
	5:00			
	5:15	Outer Limits	407	633/369.6
	5:30	Spare Parts	403	633/209
	5:45	Schools Connection	413	633/155
	6:00	Preston NE	432	633/369.14
	6:15	Comet	402	633/377
	6:30	Princes Hill	433	633/369.15
	6:45	Frontline	434	633/369.16
	7:00			
	7:15	Albany Rise Primary	425	633/369.11
7:30		Dark Crystal		633/104
	8:00	Rowan's Point		
	9:15	OECT Curriculum	429	633/369.12

Appendix 4.4 City Limits Education and General Files Areas

Area	Title
1	Latest IBM
2	Latest Mbee
3	Latest Apple ii
4	Latest Macintosh
5	Latest Commodore
6	IBM DOS
7	Microbee
8	Apple ii
9	Macintosh
10	Commodore
11	Latest Documents
12	Info Tech
13	Teacher
14	Consultants
15	Students Stories
16	Thematic
17	Australian Studies
18	BBC Programs
19	Latest BBC
20	BBS Utilities
21	Mathematics
22	Private File Attach
23	Telematics
24	Uploads BM
25	IBM Comms
26	IBM WP
27	IBM Virus
28	IBM Graphics & Games
29	IBM Education & prog
30	IBM Windows & DV
31	Transient
32	Tempest
33	VCE Students
34	English
35	Environmental
36	Edsysop
37	Schools Admin
38	System Help

Appendix 4.5 Principal systems operation "Batch" files

Batch File Name	Purpose
1.BAT	Starts Phone Line 1
AUTOEXEC.001	Backup of main Batch
AUTOEXEC.BAT	Main Batch file controlling all others.
B-WAFF.BAT	Waffle batch to move incoming Internet email into the Bulletin Board
CHGCD.BAT	Alert system of a new file CDROM loaded.
CHGCD.OLD	Backup of above
CHGCD2.CMD	Alert system of second CDROM loaded
COMET.BAT	Process address book for the Comet Bulletin Board point
DO_HELLD.005	Backup Unix read processor
DO_HELLD.BAT	Process Unix mail into a readable form for the researcher.
EXEBBS.BAT	Start the BBS when a user connects.
EZYBACK.001	Backup of BBS startup
EZYBACK.BAK	Backup of BBS startup
EZYBACK.BAT	Backup of BBS startup
EZYNET.A07	Backup of the network address processor
FILEBACK.BAT	Process lists of new files on the system for news.
FIXLOG2.BAT	Process system log files into a readable form for the researcher

FIXLOGS.001	Backup log processor
FIXLOGS.BAT	Process Line 1 logs
FMBACK.BAT	Backup of file forwarding processor to send new files to other BBSs in EduNet
GIGOMAIL.BAT	Process Unix mail into BBS readable form.
INGATE.BAK	Backup gateway dialler
INGATE.BAT	Dial the Internet Unix gateway computer.
INT-FBB.BAT	Hold inactive phone lines while processing takes place.
KILLDV.BAT	Shutdown multitasking software so that the whole system can process mail.
LINE1.BAT	Start the First phone line
ML.BAT	Create mailing lists for other EduNet BBSs.
NEWEZYB.BAT	Alert system of new BBS online
NEWEZYN.BAT	Alert system of new address book
NEWNODE.BAT	Process a new address book.
OFFLINE.BAT	Alert users that the system is closing for mail processing.
OUTEMAIL.BAT	Gather mail destined for other BBSs
OUTGATE.BAK	Gather mail for the Unix gateway to the Internet
OUTNEWS.BAT	Gather echomail and process as internet newsgroups.
RUN.BAT	Initiate all batch processes
SECAP.BAT	Process address book for the Secap Bulletin Board

STORE.BAT	Compress and archive all log files
TSP.BAT	Process address book for the TSP Bulletin Board
UGIGO.BAT	Process Unix to BBS email.
UPDLIST.BAT	Update mailing lists
UUM.BAT	Process Unix email into Unix email for other destinations local user
UUMAIL.BAT	Process Unix email into Unix email for other destinations on line 1
UUMAIL2.BAT	Process Unix email into Unix email for other destinations on line 2
UUMP.BAT	Unix message compressor
WAFFBACK.BAT	Backup of the Waffle processor
Z_CHCD.BAT	Update the CDROM loaded so that file lists are correct.

Appendix 4.6 Explanation of principal Batch file

Call	Purpose
@echo off	
REM LINE 1 #####################	
REM RUN.BAT	
REM C I T Y L I M I T S 633/369	
REM	
REM Line 1 Batch file modified 26th June 1993	
REM _---- with Line 2 shut down procedure...& Waffle	
REM #########################	
\dv\dvansi	Start Multitasker
set WAFFLE=C:\WAFFLE\SYSTEM\STATIC1	Set variable : Unix mail location
set DSZPORT=100,3	Set variable : Serial ports
set FD=C:\FD	Set variable : Mailer location
set TZ=EST5	Set variable : Time zone
if exist c:\active\go-uucp del c:\active\go-uucp	Check for processing still running
:start	
if exist c:\ezy\newuser.1 call c:\ezy\line1\newuser1.bat	Process new users
if exist c:\ezy\ezyex*.* del c:\ezy\ezyex*.*	Process new software for the BBS
if exist c:\active\go-uucp del c:\active\go-uucp	Check for processing still running
cd\FD	
Fd	
if errorlevel 210 goto bbscall	Normal: Ready for next call
if errorlevel 209 goto bbscall	"
if errorlevel 208 goto bbscall	"
if errorlevel 207 goto bbscall	"
if errorlevel 206 goto bbscall	"
if errorlevel 205 goto bbscall	"
if errorlevel 204 goto bbscall	"
if errorlevel 203 goto bbscall	"

if errorlevel 202 goto bbscall	"
if errorlevel 201 goto bbscall	"
if errorlevel 200 goto bbscall	"
if errorlevel 191 goto scanecho	Echomail received
if errorlevel 190 goto unpackmail	Mail packet received
if errorlevel 185 goto mailrobot	Process inbound mail
if errorlevel 184 goto fileup	Process inbound documents
if errorlevel 181 goto uucico	Dial Internet gateway
if errorlevel 180 goto uumail	Process internet mail
if errorlevel 51 goto localbbs	Log in the system operator
if errorlevel 50 goto cleanup	Delete old files
if errorlevel 10 goto end	Shut down
if errorlevel 9 goto dropcarrier	User suddenly disconnected
if errorlevel 6 goto fossil	Problem with serial ports
if errorlevel 5 goto modeminit	Problem with modem initialise
if errorlevel 4 goto modemresp	Problem with modem response
if errorlevel 3 goto fulldisk	Hard disk is full
if errorlevel 2 goto external	Run another program
if errorlevel 1 goto internal	Normal
Goto start	
REM ---- A Human has called ----	
:bbscall	
cd\fd	
Dobbs	Send user into the BBS
REM ----- Local Login -----	
:localbbs	
cd\ezy\line1	
ezy -l -n1	Let researcher into the BBS locally
Goto scanecho	
:unpackmail	
cd\EZY	
Ezymail -toss -verbose	Process FidoMail
Ezynet -import -echoarea	Process Fido echomail
if exist c:\fd\file\nodediff.*	Process address lists

c:\dos\command.com /c c:\batch\newnode.bat	
if exist c:\fd\file\ezynet.arj c:\dos\command.com /c c:\batch\newezyn.bat	Process address lists
if exist c:\fd\file\ezynode.* c:\dos\command.com /c c:\batch\newezyb.bat	Process address lists
rem if exist c:\fd\file\offline.arj c:\dos\command.com /c c:\batch\offline.bat	
if exist c:\fd\file\tsp-*.* c:\dos\command.com /c c:\batch\tsp.bat	Process address lists
if exist c:\fd\file\cometlst.lzh c:\dos\command.com /c c:\batch\comet.bat	Process address lists
rem if exist c:\fd\files\secap.txt c:\dos\command.com /c c:\batch\secap.bat	Process address lists
rem cd\ticket	
rem tick	
cd\filemgr	
Filemgr mgr scan	Take BBS mail and compress into packets
cd\ezy	
if exist c:\files\ibm_vir\files.bbs ezyutil -filesbbs -a27 - lc:\files\ibm_vir	Update lists of files for BBS users
if exist c:\files\fido\files.bbs ezyutil -filesbbs -a52 - lc:\files\fido	Update lists of files for BBS users
if exist c:\files\ezycom\files.bbs ezyutil -filesbbs -a53 - lc:\files\ezycom	Update lists of files for BBS users
if exist c:\files\ibm_comm\files.bbs ezyutil -filesbbs -a25 - lc:\files\ibm_comm	Update lists of files for BBS users
if exist c:\files\ibm_pgm\files.bbs	Update lists of files for BBS

ezyutil -filesbbs -a6 - lc:\files\ibm_pgm	users
if exist c:\ezybeta\files.bbs ezyutil -filesbbs -a60 -lc:\ezybeta	Update lists of files for BBS users
if exist c:\files\systems\files.bbs ezyutil -filesbbs -a48 - lc:\files\systems	Update lists of files for BBS users
if exist c:\files\netnet\files.bbs ezyutil -filesbbs -a8 - lc:\files\netnet	Update lists of files for BBS users
if exist c:\files\nets_fil\files.bbs ezyutil -filesbbs -a36 - lc:\files\nets_fil	Update lists of files for BBS users
if exist c:\files\utils\files.bbs ezyutil -filesbbs -a20 - lc:\files\utils	Update lists of files for BBS users
cd\mcfreq	
Mcfram \mcfreq	See if users are reqesting files from other BBSs and generate request
if exist c:\files\freqs\files.bbs c:\ezy\ezynet -import	Update lists of files for BBS users
if exist c:\files\freqs\files.bbs ezyutil -filesbbs -a49 - lc:\files\freqs	Get requested files
cd\ezy	
Eimport -a33 -lc:\mcfreq\msg -delete	Put requested files into the BBS and alert users
Goto start	
REM --Day : ALL *** Cleanup *** --	
REM ---- Time : ----	
REM ---- Daily Maintenance Event ---	
:cleanup	
cd\EZY	
Ezymail -scan -verbose	Process mail
Ezynet -export	Package mail
Ezypack	Compress mail

rem LINEBUSY 2 3 4 5 6	
Linebusy 2	Shutdown phone line for mail processing
if errorlevel 1 goto start	
rem copy c:\hold\ezyex19.* c:\ezy	
copy c:\hold\ezyex19.2 c:\ezy	Hold phone line down
ticker 60	Wait a minute
ezyff -c -n1	Process new files
ezymaint -i -p -c	Compress file lists and delete old entries
ezyff -I	Index file lists
ezyutil -sortmsg	Index messagebase
usercomp -b20 -p -s1	Update user lists
msgcomp -LINKALL	Compress message base and link subject lines
Ebanner	Create new advertisements
ezcaller -u	Make list of recent callers
call c:\batch\fixlogs.bat	Process system logs
rem ezyutil -STRIPLOG -TEZY1.LOG -D21	
cd\dv	
dvcomand open C2,H	Restart Line 2 (and 3,4,5,6)
rem ticker 30	Wait
rem dvcomand open C3,H	
rem ticker 30	
rem dvcomand open C4,H	
rem ticker 30	
rem dvcomand open C5,H	
rem ticker 30	
rem dvcomand open C6,H	
rem ticker 30	
goto start	
REM ---- Function key command to scan echomail, toss netmail	
:scanecho	
cd\ezy	
ezymail -scan -verbose	Sysop processing mail
ezynet -export	Sysop processing mail

Ezypack	Sysop processing mail
goto start	
REM - Day : Monday ** Big Housekeep ***	
REM ---- Time : ----	
REM ---- Weekly Maintenance Event-	
:weekly	
cd\ezy	
REM SHUT OTHER LINES !	
rem LINEBUSY 2 3 4 5 6	
linebusy 2	Close phone lines
if errorlevel 1 goto start	
rem copy c:\hold\ezyex19.* c:\ezy	
copy c:\hold\ezyex19.2 c:\ezy	
ticker 60	
ezyff -c	
rem ezymaint -d	
daynbr lharc a -m c:\hold\userbase.@### c:\ezy\userbase*.*	Make a weekly backup of the userbase
cd\dv	
dvcomand open C2,H	Restart the phone line(s)
rem dvcomand open C3,H	
rem dvcomand open C4,H	
rem dvcomand open C5,H	
rem dvcomand open C6,H	
goto start	
:sysopnext	
echo Your LOGON NOW!!!	
goto start	
REM - Day : Mondays MAILROBOT----	
REM ---- Time : 02:20 pm ----	
REM Start Robot to send out CL File List --	

:mailrobot	
c:	
cd\ezy	
Ezymaint -d	Perform maintenance and indexing
call c:\batch\updlist.bat	Update the address books of other BBSs
rem xr send c:\files\hbk_fil\cityfile.lzh 374, 155, 209, 377, 634/380 /t cityfile.txt	
Daynbr copy c:\fd\nodelist\edunet.pvt c:\fd\nodelist\edunet.@###	Backup the address books
rem cd\ticket	
rem daynbr hatch /aedlist /fedunet.@### /dEduNet nodelist for day @### >> logfile.log	
cd\filemgr	
filemgr hatch -acityfile -fcityfile.lzh -dCity_Limits_file_list	Create a list of files on the systems and send it to other BBSs
daynbr filemgr hatch -aedlist -fedunet.@### -dEduNet_nodelist_for_day_@###	Create a list of address books for other systems and send it.
filemgr announce	Alert the sysops of other systems
goto start	
REM ---	
REM Updates filebase if new files have been added during the day	
REM Runs each evening @ 1700hrs	
:fileup	
cd\ezy	
ezymaint -d	
goto start	

REM For Waffle dail-out and mail pack, starts dvexit	
REM and closes this window. DV exits and drops to batch file (AUTO)	
:uucico	
cd\waffle\bin	
uucico -sbushwire -r8	Ring the Unix host and exchange mail
:uumail	
if not exist c:\spool\bushwire*.* goto start	
cd\ezy	
linebusy 2	
if errorlevel 1 goto start	
rem Otherwise drop everything and toss the Internet mail	
copy c:\hold\ezyex19.2 c:\ezy	
copy c:\hold\go-uucp c:\active	
cd\dv	
dvcomand open KK	
exit	
:setuperror	
echo Setup Error!	
goto end	
:dropcarrier	
echo User dropped carrier	
goto start	
:runtimeerror	
echo Runtime Error! Consult Errors.Log	
goto start	
:modeminit	
echo Modem Init Error!	

goto start
:fossil
Echo Wrong Fossil Version!
goto start
:modeminit
Echo EZY Unable To Initialize Modem!
goto start
:modemresp
Echo FD Modem NOT Responding!
goto start
:fulldisk
Echo Insufficent Disk Space TO Proceed!
goto end
:external
Echo External FD Error - System File Missing!
goto end
:internal
Echo Internal FD Error!
goto end
:end
Echo Ezycom Is Down!

Appendix 4.7 User Information autoreply

Greetings !

Your access to City Limits has been set.

-> Please read the "House Rules" from the Information Menu.

A couple of suggestions to ensure your enjoyment of the system.

o You must ensure that no other person uses your 'account'.

o Do not give your password to anyone else.

Security issues are serious, and can create problems if mail is sent under your name, or costs incurred.

We hope that you find this system helpful and useful.

Please leave a message if you have any questions or suggestions.

-Bernard

Appendix 4.8 User Information Failure

Robot Message Follows ...

Your access to City Limits has not been set.

This is most likely because the information you provided could not be verified, or you gave your number as "unlisted".

To gain access, please post a message as you logoff giving information which will assist. We are not is a position to telephone-verify new users as this would send the system broke very quickly!!

Many people prefer to verify by mail.

Post to : Fax : (03) 876 3353

City Limits
Box 831
Ringwood 3134

-Sysops

Appendix 5 City Limits Documentation

Appendix 5.1Users' Manual

Author's note: The Manual was produced in "raw text" form to enable it to be used across the widest range of computers.

CITY LIMITS - ELECTRONIC MAIL and DOCUMENT EXCHANGE

About the City Limits Project
"City Limits" is a remote access computer system. Systems like this one are otherwise known as Electronic Mail Services, Bulletin Boards, Remote Databases etc. depending on the exact style.
The purpose of the system is to allow teachers, education consultants, and groups of students to make use of electronic message and file handling for curriculum purposes. At its inception, the kinds of uses could be summarized as follows:

Teachers:
Electronic Mail Policy Document Sharing
Group discussions Subject Area Networking
Computer Programs, Graphics, Techniques
Students:
Experiencing Electronic Mail
Developing shared experiences with remote schools.
Exchanging projects and work samples
Consultants:
Electronic Mail Document Sharing
Interest Discussions Joint Document Development

Hardware

City Limits is basically a computer system connected to a modem for access by other computers. The computer at the user's end can be of almost any type as long as it supports basic communication "rules". System users typically employ IBM, Apple, Commodore, Microbee, and many other computer types.

City Limits can be accessed with almost any terminal hardware and software combination. The terminal settings should be standard to:
8 bits, No Parity, 1 Stop. Baud rates supported are 300, 1200, 2400 and 9600.

Terminal Settings :
Baud 9600,2400 Line 1
2400,1200,300 Line 2,3,4,5
Data Bits 8
Stop bit 1
Parity None
Echo Off
Telephone Numbers:
876 3353 879 0982 879 9829 (additional lines will be added when possible)

Setting Up

1. Connect modem to computer and telephone line (not Commander phone, see Appendix C.)
2. Start up the communications software (Works, Red Ryder, Telix, Procomm, Talk is Cheap etc.) and set the baud rate, bit number, etc. as above.

Calling

For automatic modems, program the phone number into the software and instruct the computer to dial (varies with software), or to run a quick test, type ATDP762 7737 and press <Enter>. This instructs the modem to pulse dial the remote system.
If you have been assigned a password, type in your name after the prompt, your password when requested, and explore the system.
If you are calling as a new user, you will be placed into the questionnaire areas and will be required to answer a few questions about yourself. All of this information will remain strictly confidential, and is purely for the purposes of establishing user identity and setting access levels. This information must be correct. It will not be made available to anyone other than the City Limits System Operator.
After the questionnaire screen you will be given limited access to explore the system. User upgrades are normally performed each day.
When you call in after a day or so, your user access will have beed set, and many more features of the system will be evident.
The system is largely self explanatory. You cannot damage the system by "making a mistake".

Suitable hardware and software

Any computer and software capable of terminal emulation such as : ANSI AVATAR TTY VT52 VT220 VT100 etc will suffice.

Typically users operate with IBM compatibles, Macintosh, Amiga, Atari Apple][and other more exotic machines.

Telephone Lines and Considerations

A dedicated telephone line is preferred. PABX systems can be used by typing 0, at the start of the dialling command (see below). Commander systems are NOT suitable but MUST be modified for modem use. Attempting to use an unmodified Commander telephone can damage the telephone system.

Using the System

All users "Log in" using username and password. It is this verification process which determines the access level for a user as Teacher, Student etc.

What is your full name? Susan Harris
Password ? ******

A user's name can be the name of an individual or of a school.

e.g. William McKee North Sunshine SC Emerald Primary

Pseudonyms are not acceptable.

Every connection with City Limits causes a search of the userlist.

If a caller is known (s\he is prompted for a password. Once the password is checked, access to the system is granted. Unknown (new) callers are required to answer the questionnaire before being asked to select a password.

Password access and user verification is a necessary feature of the system to ensure that private mail remains private, and that access to certain areas remains secure. A passord can be a combination of letters, numbers, and other characters. Passwords can be changed from time to time as required. This is strongly recommended to ensure securirt and privacy of your mail.

You MUST NOT give your password to another person ! To do this would enable them to create messages that might appear around the world in your name (and possibly at your expense).

Moving around the System

City Limits operates as a Menu driven system. The range of immediate options available to the user are shown as a "Menu" of options. Choosing from these options is a

matter of pressing the Highlighted letter or digit that indicates your selection.
It is normally not necessary to press the "Enter" or "Return" key after making a choice, single keypresses are usually sufficient.
As every user calls in, the system automatically checks for mail, and displays the most recent system news bulletins.
All functions of the City Limits System begin with the TOP MENU

```
    M A I N    M E N U                          << City
Limits >>

    E D U C A T I O N  G E N E R A L   S Y S T E M

    S tudents' Menu    M essage Areas   I nformation

    T eacher's Menu    P rograms        U tility..passw

    K 12 Network       A musements      H elp ?

    O ther Education   E vents Calendar      L ogoff
!Goodbye
                       Select :
```

From this menu, others are selected to give access to the area(s) of
interest. It is always possible to "backtrack" <-> through the menus to find a previously discovered item, or to go straight to the TOP MENU again <*>.

Summary of Main Options

Students Menu

This area contains a submenu that leads to messages and files which are local (ie remain on City Limits) or networked (transmitted to other systems). The most important of these is probably the students local area which carries messages between Victorian students, and files (poems, stories etc that they have written.
Of particular interest is the VCE students menu which allows VCE students to chat amongst themselves, or transmit files and documents. The VCE students area is networked to other Victorian Bulletin Boards.
Teachers Menu
This area's submenu permits access to a variety of subject oriented message and file areas. Many of these

areas are networked, and so discussions about a particular issue can be joined by teachers calling other bulletin boards from around the state.
Files in these areas contain anything from lesson plans and policy statements to VCE work requirements and samples.

K12 network

The K12 network is a collection of bulletin boards around the world which agree to share a large group of educational message "conferences". There are K12 areas dedicated to specific subjects (French, Maths etc), chat areas for teachers and students from K to 12 and specific project "channels" for exchange of information related to scientific or other
purposes. (e.g. weather data from around the world)

Other Education

The submenu option for Other, contains access to Schools Administration mail and files (VASS, CAAS, CASES material) as well as a question and answer section.

General Message and File areas

These areas are not specifically related to education, but more for the computer user/ educator interested in developments. These areas contain public domain and shareware software, discussion areas for specific hardware and software issues, and some of general interest. Almost all of these message areas are internationally networked.

Typical Menu Displays

```
T E A C H E R S'  M E N U          << City Limits >>
Local Areas    Networks
P  - Teachers' General    G Educator
T  - Telematics Area      Z Design & Problem Solv
     N Victorian  Educ'n
     D Australian Educ'n
     K K12 Areas
VCE & Subject Areas
E nglish  A ustralian Studies
I nformation Technology  S ciences (Chem,Phy,Bio)
M athematics   G eography

? Help     J  Tempest Files
- Back to Previous   ! Log Off
* Back to Main Menu
Select :

City Limits Line :  Message Area : Mathematics

C heck for new mail to you     ? Help
```

```
     L List Users
Q uick Scan messages      - Previous Menu
S can message headings    * Top Menu
     ! Logoff
R ead messages in this area
E nter a message
D elete a message   Combined Message Areas
M essage Statistics 1 Select areas of interest
     2 Read all new messages
---> Select :
```

Areas and Access

There are a large number of areas within the City Limits system, many are protected against unauthorised access. Every user has a unique password and access level which describes which parts of the system they may access, read from, write to, browse etc. For this reason, it is important that passwords remain secret. Unauthorized access to a part
of the system could enable a user to leave mail under your name, or to read private mail addressed to you.

Some parts of the system are not available for general access, but can be "switched on" if you require. Discuss your needs with the System Operator.

Messages

```
K12 International Education Network - City Limits
Area : K12 Mathematics Education
A Select another K12 Area     K12 Information
Q uick Scan Messages          ?   Help  Menu
S can Messages                - Previous Menu
R ead Messages                * Top Menu
E nter a Message              ! Logoff
 ->Select  :
```

Note that the message Area is indicated at the top of the menu. Options are selected by keypress. Help is always available with ?

Entering a Message

Move to the area where you wish to enter the message. Check that the person you'll be writing to has access to that area.

```
Select <E> Enter a Message.
You can address the message to "All" or to an individual
who is a registered user of the system.

Type the person's name and press <Return> or <Enter>.
                    From : Susan Harris
                    To : Joseph Conrad

Enter a message subject, and press <Return> or <Enter>.
                    Subject : Repairing Morris Minors

Now you may begin typing in the text of the message.
There is no need to press the <Return> or <Enter> key at
the end of each line, as word wrapping is automatic.
Line numbers will assist with later editing of the
message if there are changes to be made.
When the message is complete (even with a few errors),
press the <Enter> key on a blank line and the Edit
options menu will appear.

Write your message.  Press ENTER on a blank line for
options.
A maximum of 70 characters per line, with 390 lines
maximum.
(-------T------T-------T-------T-------T-------T----)
1: Hi George ! I wonder if you have heard that the ....
press the <Enter> or <Return> key on a new line to
finish.
Select an Editor option
(L)ist, (E)dit Line, (D)elete Line(s), (I)nsert, (H)elp,
(C)ont, (R)eplace Text,
(M)essage Info,  (S)ave Text, (Q)uit :

At this stage you may make changes to, continue, or save
the message to disk.
NB Use <S>ave Text to send the message. Use <Q>uit only
if you wish to throw it away !


Editing a Message

It's a good idea to <L>ist a message before saving, to
check that it's correct.  To make changes before the
save, the line can be <D>eleted, a line or set of words
can be <E>dited.... or the message can be <C>ontinued.
A message can not be edited once saved to disk.  If
problems become evident after a message has been saved,
it can be deleted, and re-written.
Use <R>ead, <R>everse to see your message saved in its
place.
```

Entering a message that you've saved onto disk.

This option is not available at the moment.

Advanced Users - the Full Screen Editor.

(Only available to ANSI capable computers, see Appendix B)
The Full Screen Editor can be switched on from the <U>tility Menu. This is a more powerful message writing utility similar to the operation of a Word Processor that allows for quoting of original messages if you are in <R>eply mode as well as the ability to move around the screen making changes.
The Help Screen for the Full Screen Editor can be shown by holding down the <CTRL> key and hitting <K> and then <?>.

To save a completed message, hold down <Ctrl> while you strike <Z>.

Reading, Scanning and Quick Scanning Messages

Selecting <R> Read, <Q> Quick Scan, or <S> Scan Messages will bring up an options menu....

Select preferred reading method
(F)orward, (R)everse, (I)ndividual, (H)elp,
(N)ew, (M)arked (S)elected, (Q)uit:
Option: R

This feature enbles the user to read from the most recent, from the oldest, new mail since your last call etc. to speed up the reading and searching process. Quick Scan lists the messages in the area that you may read. Private messages that are not addressed to you, or written by you are not shown. The Quick Scan lists the Addressee, the Author, and the Message Subjects.

Scanning messages, please wait ...

No.	From	To	Subject
___	200 Paul McArthy	All	Amiga Power
199	Paul Harrison	Mark Howells	Chit Chit
198	Daniel Boone	Vince Major	chit chat
197	Richard Starkey	Simon Preston	History of Cars
196	Simon Preston	All	History of Cars

```
More (Y/n), (C)ont :


-    Scan
Scan lists the messages in the area that you may read.
Private messages that are not addressed to you, or
written by you are not shown. Scan gives more
information than Quick Scan, showing the relevant
message dates, whether it has been received etc.

Message #1/200 in Computer Discussion (Local)
From    : Paul McArthy      (POST 09-Apr-1992 11:55)
To      : Daniel Davison    (RCVD 24-Apr-1992 15:13)
Subject: Computer training
Mark Message (yes/No/stop)No


-    Read
The Read option allows the user to read all allowed
messages within an area fully.
Message #200/200 in Computer Discussion (Local)
From    : Paul McArthy    (POST 29-Apr-1992 10:06)
To      : All
Subject: Amiga Computers
Can anyone tell me about the latest Amiga upgrades for
capturing videos ?
(A)gain, (L)ast, (N)ext, (W)rite, (R)eply, (D)elete,
(XUEF!), (S)top:

Note that the options which appear after reading a
message.
```

```
Files
-----

-------------------------------- City Limits Line : 03
--File Area : IBM Education & Programming +-----------
--------------------+           +----------------------
-+  Files Available            ? Help
-------------------------------------------------------
 - Previous Menu     Download Files  -to you
.* Top Menu          Upload Files    -from you
 ! Logoff

---------------------------------          +------------
-+  New files online              +------------------------+
       Keyword  search              List files in the batch
       Search by filename           Add file(s) to the batch

       Contents of Archive or GIF    Remove files from
the batch
      View a text file              T deleTe the entire
batch
+------------------------------ -+ +---------------------+
      ----> Select :
```

Note that the file area is shown at the top of the menu. Help is always available with ?

What is a File ?

A File can be any document, letter, story, or even a computer program that is Uploaded into the City Limits computer for others to read, or to Download and use.

Upload = Send from your computer's disk UP to City Limits

Download = Receive from City Limits - DOWN to your system

Document files (Courses, Work Units, Poems, Stories) will normally be plain text, which allows users of any computer & software to read. (see Uploading Files) It is up to you what kinds of files and programs you send and receive, however the following notes apply.

1. We take no responsibility for the quality of files uploaded by users !
2. All computer programs should be relevant to your machine.

3. Absolutely NO commercial software is to be placed on the system. (Copyright laws etc.)

Finding out what Files are Available
Move to the relevant area:

```
 ---------------------------- << City Limits 01 >>
 File Area : Latest Macintosh
+-------------------------------------------------+
  F iles available                T  Statistics
  D ownload a File (to you)       ?  Help  Menu
  U pload a File (from you       ------------------
  C ontents of Archive .ZIP,,     A  Another Area
  V iew, Re-pack an Archive       -  Previous Menu
  K Locate a file by Keyword      *  Top Menu
  N Locate a file by Name         !  Logoff
+-------------------------------------------------+
                Select  :
Command: F

File Listing of Macintosh Programs
Press S to Stop or P to Pause ------------------------
---
1 FERRET1.1       16384   ( 0) Search disk for SCORES
virus & repair
 2 MOIRE          16384   ( 0) Screen Saver with fancy
graphics
3 S-CLOCK          9088   ( 0) Superclock, Puts a clock &
stopwatch..
End of List : (S)top, (A)dd to Batch :
```

The file list indicates
-Filenumber (for adding the file to your download batch).
-Filename
-Filesize
-Date uploaded
-Times downloaded
-File description
If you wish to download any file(s) note the number and type +2 +3 etc to add them to your download batch.

Viewing a Text File

Text files may be viewed on screen. This is useful if you wish to briefly look at a file before downloading it.
>> Text file normally have the extension .TXT or .ASC

```
Downloading a File - from City Limits to You
--------------------------------------------
Xmodem works with most machines, Ymodem is faster and
allows multiple files per download.
** Zmodem is preferred if your software supports it, as
transfers are much faster, and automatically sensed.

Select Protocol for Transfer
(X) XModem      (1) XModem-1K           (2) XModem-1KG
(Y) YModem       *   (G) YModem-G   *    (Z) ZModem
(?) Help   (*) Indicates Batch Protocol

Select Protocol (Enter=Quit):
(D)ownload, (T)erminate after Download, (H)elp, (Q)uit,
(L)ist Batch, (A)dd to Batch, (E)rase Batch, (S)ingle
Erase :

If you have already placed a file in your download
"batch" then pressing (D) will begin the download,
otherwise you'll need to type in the filename(s).  NB
Use single files in Xmodem !

When the message " Ready to send..." appears,  you will
need to
                instruct your machine to receive the
file.
IBM (Telix)     (Automatic Zmodem receive)
IBM (Procomm)  Press PageDown, choose X or Z as above,
type in filename if required.

IBM (Works  Pull down
                          Communications menu, choose
                          Receive Xmodem, type filename.

Macintosh (Works)   Pull down Communications menu,
choose
                          Receive Xmodem text, type
filename. Macintosh (Zterm)   (Automatic Zmodem receive)

Apple (TIC)     Press Alt-T, choose Receive, type in
filename.


Uploading   a File - to City Limits from You
--------------------------------------------
Sending a file to City Limits is straightforward. The
filename and protocol are required.
Select Protocol for Transfer
(X) XModem      (1) XModem-1K           (2) XModem-1KG
```

```
(Y) YModem    *   (G) YModem-G      *     (Z) ZModem
(?) Help    (*) Indicates Batch Protocol
Select Protocol (Enter=Quit):
```

Xmodem works with most machines, Ymodem is faster and allows
multiple files per download. Zmodem is preferred if your software supports it, as transfers are much faster. You will be asked for the name of the file you wish to send.

HINT !!

File names MUST be in the form:

FILENAME.EXT

/ \

8 letters max. 3 letters max.

When the message " Ready to receive..." appears, you will need to
instruct your machine to send the file.
After the upload, you will be prompted to type a description of the
file.

e.g PKR-POLC.TXT Parkridge Computer Policy statement.
GALAXY24.ARC Galaxy Word Processor

Text files should be given the .TXT extension.

Protocol Options

Regular users should select a "default protocol" from the Utility Menu. In this way, all uploads and downloads will automatically be sent using Zmodem or Xmodem etc as preferred.

Understanding Filenames

The Filename will tell about the file content.

SCANV62.ZIP Virus scan version 62
SCANV72.ZIP Virus scan version 72
ZTERM085.SIT Zterm version 85

The Extension usually tells about the kind of file it is.
e.g.

.TXT Text File	.BMP Bit mapped graphic
.PM3 Pagemaker 3 File	.MAC MacPaint file
.DOC Document	.TIF TIFF graphic
.ASC ASCII file	.PIC Paint file
.ANS ANSI file	.LST List
.ARC Archive	.NEW Latest!

```
     .ZIP Zipfile                .BAK Backup
     .LZH LHarc                  .EXE Executable Program
     .SIT Stuffit (MAC)          .COM Binary Program
     .RSG ReadySetGo! File            .BAT Batch File
     .CPT CompactPro (MAC)
Compressed Files (.ARC .ZIP .LZH .PZK   .ZOO .SIT .CPT)
-----------------------------------------------------
It is very common for programs and data files in MS-DOS
(IBM Compatible) and Macintosh environments to be
compressed or "packaged".
This is normally done to reduce the overall file size
during transmission, or to make the files "fit" on a
disk.
There is an added benefit in packaging files, in that a
group of related programs, files, and documents can be
stored all together to ensure that component parts are
always included.
For Example :
The Archived File: FLUSHOT2.ARC actually contains:
DISCLAIM.TXT FLUSHOT2.COM FLUSHOT2.1NF FLUSHOT.DOC

File Compression Methods in current use: The expressions
"Arced", "Squeezed", "Squashed","Compressed",
"Packed",etc are used to describe the various file
compression methods employed.

In general, it is not necessary to understand these in
normal usage, merely to have an easy method for reliable
"unpacking" for the files to become quickly available.
There are File Utilities to extract the files from any
archive. The procedure is to merely select the
appropriate program, and
to run it.  Every MS-DOS file has a standard filename
format FILENAME.EXT        e.g. FLUSHOT2.ARC The
filename and extension are
separated by a period (.) The extension usually gives a
clue as to which compression mode (if any) is used.
Macintosh programs may be compressed with "Stuffit".

Extension           Utility   Example of Use
----------                    -------   --------------
.ARC            ARCE.COM  C:> ARCE FLUSHOT2.ARC
          or PKXARC.COM  C:> PKXARC FLUSHOT2.ARC
.PAK            PAK10 .EXE     C:> PAK -E  FLUSHOT2.PAK
.LZH            LHARC.EXE C:> LHARC -E FLUSHOT2.LZH
.ARJ            ARJ.EXE   C:> ARJ E FLUSHOT2.ARJ
.ZIP            PKZUNZIP.COM   C:> PKUNZIP FLUSHOT2.ZIP
.SIT            Stuffit  1.5.1 (Mac program, run Stuffit)
.CPT            CompactPro     (Mac program run
Compactpro)
```

The examples are as if typed against the C:> prompt (hard disk) of a typical system. It's a good idea to put the utilities necessary into a subdirectory that is within the DOS path. Distribution of the file decompression utilities. The utility files listed above are presently all in the Public Domain, or are available as "Shareware". Shareware programs should be registered after you have evaluated them. In all cases this represents high quality software at a "must have" price. Invariably, the de-compression utilities are distributed as self extracting
compressed files themselves. Each, when run will extract itself into the relevant program(s), documentation notes and manuals.

What you'll need :

The compression / decompression utilities are constantly being improved. At time of writing the following was up-to-date.
In general, look for these, or their more recent developments.

MS-DOS

LHA213.EXE	(.LZH)
PKZ110.EXE	(.ZIP)
ARJ220.EXE	(.ARJ)
PK36.EXE	(.ARC)
ZOO201.EXE	(.ZOO)
PAK16.EXE	(.PAK)

Macintosh

Stuffit 1.5.1	(.SIT)
Compactpro	(.CPT)

Each of these "distribution archives" is compressed, and when run.. e.g. you type LH113C ... the package will unfold into the
component programs and manuals.

Echo Mail - the shared " common interest" bulletin boards. ----------

A number of City Limits' areas are "echoed" across other Bulletin Boards on a daily basis. In this way, a message entered or a reply can appear on similar bulletin boards all over the world.
For example, messages in the K12 Net areas are moved around the world nightly to over six hundred other systems. By posting a message to a friend or a new acquaintance in K12 you become a part of the network or "conference". Naturally all echomail is public only and

its use monitored. Users must be careful to avoid leaving private or trivial messages in echo/K12 areas !

NetMail - access to people who use other systems.

Netmail or "Fido Network Mail" defines messages sent automatically to users on other BBS systems around the world. To use netmail requires a knowledge of the other person's Netmail Address.
Messages are addressed as other types, but the address must be included e.g. 3:712/620

A netmail address identifies the computer system being mailed.
The first digit indicates the zone..
1: North America 2: Europe 3: Pacific & Australasia
4: South America 5: Africa
The second number indicates a network of systems in that zone.
633/ Eastern Melbourne 635/ Western Melbourne 712/North Sydney etc. The third number identifies the actual system. So City Limits is identified in the network as 3:633/369.
Netmail allows private mail to be sent direct to a person. It's use must be controlled however since costs of transmitting mail can become prohibitive. Few fido systems charge for their services.
Netmail access is restricted to advanced users. Users may request access to netmail if required.

Utility Functions

U T I L I T Y M E N U << City Limits >> -----

P - Change your Password
S - Alter your Screen Length
G - Change Graphics Mode (ANSI only)
V - Change Avatar Graphics (IBM only)
C - Change your School name, location
T - Your Time online, statistics
E - Switch Full Screen Editor (ANSI only)
R - Select File Transfer protocol
H- Toggle Hotkeys (need to press Return)
N - Other Lines' Activity (Who's online ?)
M - Chat with user(s) on other lines
U - System Usage Graph

```
      B - Toggle "Do not disturb"
      D - Change Date format
      - Back to Previous   L - Change colours
      ! Log Off, Hang Up  ----------------------
Select :
```

The utility menu allows users to alter their profile in many ways, to set colour, reset passwords, and view settings. System information is held within the Information Menu.

User Chat

By pressing M at the Utility menu, or % at any menu, users may type to others who are online at the same time. Within chat several functions are available :

```
/who            see who is online
/channel          see which chat channels are operating
/msg            send a message to an online user
(interrupt them)
/bye            finished with chat
```

All typing is prefaced with the Users' initials in chat. Note that chatting is a two-way activity. Keep discussions useful to all parties!
You may set "Do Not Disturb" from the Utility Menu if you do not wish
to be disturbed by people wanting to chat.

Information functions

```
Information Menu
-----------------------------
Using City Limits             Useful Files
H House Rules                 Information
A About this system
M City Limits "Road Map"      F File listing
B Re-read the Bulletin        V View a text file
----------------------------- D Download a  le
4 The City Limits
? HELP !!                      O Other Educ'n BBSs

Computer System
-------------------------------------------------
Questions & Answers % Chat with users online
File Request
P Page the System Operator
-------------------------------------------------
Previous Menu                  W About File Req.
! Logoff                       Q Request a File
```

The information menu provides functions for searching other computer systems, help files and support.

Page the System Operator rings a bell at the main system to alert the System Operator that someone requires attention. This should only be used when absolutely necessary.
File Request is a powerful function which allows authorised users to request City Limits to bring in a file or document from some other computer automatically.

The EdUNet Network

City Limits hosts a small number of education related Bulletin Boards within this network. By this means, teacher and VCE discussions taking place at one of the below sites will automatically be shared to the other systems within a day.

Comet	(Yarra Valley AS)	876 0108
Secap	(Deakin/ Rusden)	544 1513
Eureka	(Ballarat SSC)	053 378 039
Offline		808 4510
Spare Parts		850 5516

Future Developments

In the future, it is expected that more Educational Systems will be connected to City Limits, and that more telephone lines will be provided. Suggestions are always welcome.

Appendix 5.2 Software Instructions (Gateway)

Boronia School Support Centre
Computer Education
267 Dorset Road, Boronia 3155

.Using "Gateway" with Bulletin Boards

The Gateway program is the "engine" behind Desklink. It can be used to call Bulletin Boards, City Limits, Keylink, Nexus, and many other services.

Running the Program on a "VASS" computer.

From the DOS prompt type

\desklink\gateway

Use the arrow keys to choose the Edit menu.
Select Dial Directory. This contains a list of the systems that Gateway is set up to call.

Choose **Add** to add a system.
Under "Connection Details", press Enter to start typing, and type in the details...

Name City Limits

Phone 762 7744

NB press the right arrow key to alter the remaining settings...

Speed 2400

Data Size 8

Parity None

All other settings should be left as they appear.

All other systems & phone numbers should be entered in a similar fashion.

Teachers must register on City Limits using real names and correctly answer the questionnaire for full registration.

NB When downloading files from Bulletin Boards, always select Zmodem transfer, as this is much faster and more reliable.

Selecting a Download drive/directory. The files you receive (download) ca n be placed in a pre-determined drive or subdirectory.

Choos the Setup menu, move to "Download Dir" and enter the desired path..

e.g. A:\ or C:\files etc.

(It is a simple procedure to install Gateway into the Star Menu if this is required.)

Appendix 5.3 City Limits: New User Welcome

Fax Transmission

To	:	**Helen _____**

From	:	**Bernard Holkner**
Date	:	**12 Marc 1996**
Subject	:	**City Limits Enquiry**
Pages	:	**3 (including this one)**

Return fax	:	03 9876 3353
Voice	:	03 9876 3048
Data	:	03 9876 3353 / 03 9879 0982 / 03 9879 9829

GreetingsHelen,

Thanks for making contact with us..
Attached is a flyer outlining the City Limits system, what to expect, and enough information to get you started.

Your name wasn't found in the registered users list, so I am assuming that you have not yet called the system.

Use the attached instructions to login, use your real name : Helen _____
and answer the questionnaires. This information will remain secure and is only for verification and to setup your account.

I will upgrade your access the same afternoon or evening of your first call. This is more secure than me setting up the system for you since I don't have the required information about your computer and modem. If you follow the instructions, and give brief answers, the setup should be quite painless.

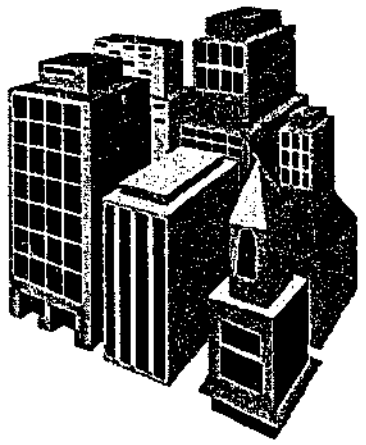
Your Internet email address will become :
helen.____@lecity.apana.org.au

Once connected, it will be easy to communicate, upgrade software, and generally gain support.

Please don't hesitate to contact us if you have any further queries. If possible respond via the system, or return fax to the number above.

Regards, Bernard

City Limits



A dynamic use for computers in education

What is it ?

City Limits is a computer system which provides mail, chat and "conference" discussions for teachers and students to others all over the world. By attaching to the City Limits system, your students can become involved in projects with students from Mooroolbark to Washington, Canada to Europe and so on.

What do I need ?

Your school may attach to City Limits with almost any computer, Macintosh, IBM compatible, or Apple II.
You will need a modem , and access to a telephone extension, or fax line. Many schools are now installing computer lines specifically for this purpose. Suitable modems can be purchased for around two hundred and fifty dollars.

Only 25c. to Canada ?

City Limits takes care of all of the message forwarding. After subscribing, your access will allow you almost unlimited mail to other places for the cost of a local call.

What else is available ?

Conferences...
City Limits users additionally will have automatic access to a wide variety of teacher and student "conferences". Here is a small selection :

Information Technol	V,T	English	V,T	Mathematics	V,T
Networking help	V,T	Macintosh help	I	Internet help	A,T
K12 net (40 areas)	I	Windows help	I	Modem help	A
Higher Education	I	English	V,T	Mathematics	V,T
Students (8 areas)	S,V	Environmental	S	French	I
German	I	Sciences	V,T	Educator	I

(V=Victoria, A=Australia, I=International, T=Teacher area,, S=Student area)

Internet Mail and News

City Limits subscribers can also register an Internet mail address if required. This permits very powerful and rapid "person to person" communications to other Internet and academic users across the world. Our address is *lecity.apana.org.au*

Files and Documents

There is a massive collection of education and general files available for "download" from City Limits. By downloading, the files of interest are transmitted to your computer for immediate use. There are over 300 files areas including :

Student stories & files	S	Teacher Files	T	Computer Networking	A
K12 Education (100areas)	A	Macintosh (8 areas)	A	IBM (20 areas)	A
Amiga (2 areas)	A	Windows files	A,I	Graphics & Games	A,I,M
Simtel Archive (180areas)	A	Telematics files	T	VCE Teachers Files (6areas)	T

(S=Student, T=Teacher, A=All, I=IBM, M=Macintosh)

In all there are more than 22000 files on City Limits. With very few exceptions, teacher and student document files are "text", which allows them to be used on almost any computer with your preferred Wordprocessor or Database. The "Sysops" (System Operators) will be pleased to assist you in retrieving files if required.

Getting Started

If you require further information, write to :

City Limits
PO Box 831
Ringwood
3134

If you already have a modem, it is very simple to get started :
Use a communications package with your computer (Telix, Zterm, Works, Procomm, Gateway etc) and set it up for your modem speed, 8 bit, no parity, 1 stop bit, echo off.
(Typically 9600/n/8/1 for a 9600 bps modem). Type ATZ to see that the modem responds 'OK' then type ATDP9876 3353 and press <Enter> or <Return> This will force your modem to dial City Limits. Once connected, your will find the City Limits system helpful and friendly. Your access will be set by the Sysops within hours of your first call.

Subscriptions

Teachers and students who intend to make serious use of the system are asked to subscribe. Payment of the small fee allows greater access to the system and more online time per day. Single user subscription is $40 pa. Subscription for a school is $100 pa. Subscription permits internet access, increased download priviledges, and much greater online time.
The system operates privately on a cost -recovery basis, and is dedicated to education support.

SAMPLE K12 Message

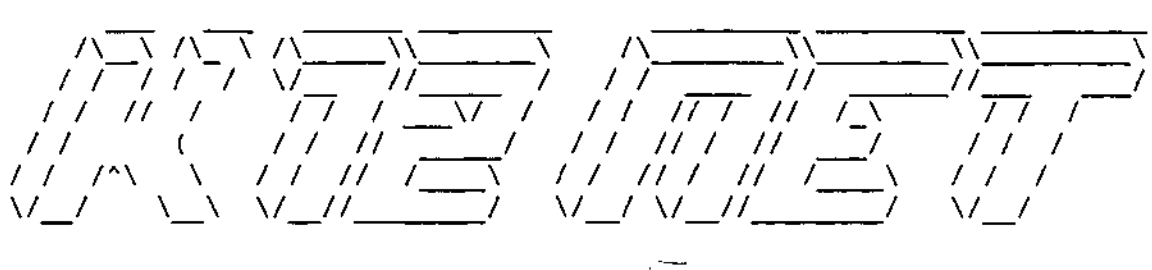
Message #6198 - K12 Elementary Schools' Chat K-6
From : Kathy Olsen (Phoenix High School)
To : Fourth Primary
Subject : Hi from Pheonix !

Dear John,
We received your package and the children really enjoyed it (april 4) we are getting a package together for you now and we will be sending it out in the next day or so. We thought you wrote awfully well for a sixth grader but we have always heard that British and Australian schools are far ahead of us in writing skills. You and your class are becoming famous. We've made a large hall display of your letters and reports and everyone in the building has been stopping by to read them. We've sent an article in to the Syracuse Newspapers about all of you and we're hoping that it will be published. I'll be sure to send you a copy if that happens. If you and your family can ever get to the states we'd love to have you stay with us.
Kathy Olson

* Origin: Phoenix High School BBS - Phoenix NY

Appendix 6 K12 Net Documentation

Appendix 6.1 What is K12Net



I N T E R N A T I O N A L E D U C A T I O N A L N E T W O R K

01 Apr 92

Access to K12net is absolutely free to anyone. Just call the nearest K12net BBS! K12net echoes are available to any FidoNet sysop who is willing to carry ALL of them as a package and abide by the K12net policies.

If you are a sysop in another network such as USCATCOM, RBBSNet, EGGNet, AlterNet, SIGNET, etc and would like information about K12net contact Jack Crawford as outlined in the next paragraph. We have some gateways already existing and can easily set others up if need be!

For information about becoming part of K12net contact Jack Crawford at W-FL Teacher Resource Center BBS 1:260/620 14.4K HST/V32 (716-526-6495) or call him in person at 716-526-6431 between 9am and 4pm Eastern. Or you can download or FREQ any of the files listed in the K12net Membership Info section below.

For information regarding the K12net File Library, contact Rob Reilly at The SchoolHouse BBS 1:321/218 14.4K HST (413)443-6725.

CONTENTS OF THIS (K12_LIST.xxZ) ARCHIVE FILE INCLUDE:

K12LIST.NAM - A listing of participating BBSs sorted by Country, State, and City.

K12LIST.SOP - A listing of SysOps sorted by Country, State, and City.

K12LIST.FED - A listing of participating BBSs and the Net/Node address of its FEED. This list is sorted by the Feed's Net/Node address.

DEFINITIONS: A BBS is short for Bulletin Board System, ie. the place you obtained this file from.

A PARTICIPATING BBS is one that carries all of the K12 'core' echoes. At this writing there are 37 core echoes.

A SYSOP is short for System Operator, ie. the person responsible for running the BBS system.

A FEED is the BBS system from which the K12 Echoes are obtained.

K12net's policies and procedures are spelled out in the file called K12_INFO.ZIP. After reading that over and agreeing to abide by the few rules, you may contact any SySop listed herein, or Jack Crawford at the phone numbers listed above to see about joining the K12net.

So that these files may be kept current, please inform the LISTMASTER of any additions or corrections at the following address:

Terry Dun
FidoNet 1:321/152
U.S.A.

Thank you in advance for your cooperation.

Ross Calloway, 1:267/41

("K12net" is the servicemark and trademark of Jack Crawford)

Appendix 6.2 Description of K12 Channels

K12 PROJECT CHANNELS-

How to get one!
How to use one!

K12 Net offers 12 conference areas that can be assigned to different people at different times to pursue individual projects. Anyone, teachers and students alike, can request and use a channel by following the following guidelines.

WHAT QUALIFIES AS A PROJECT?

This is a very big question... Basically, any idea that requires telecommunications to succeed, and deals with a specific topic or activity on which the user wishes to focus. For example, there are currently coordinated weather readings that are posted weekly - the data collection is to be global in nature, potentially covering the breadth of the network. In addition, while this might be considered a "science" project and could possibly be conducted in the K12_SCI_ED echo, the intent of this project is to focus exclusively on weather reading, warranting a dedicated channel for that specific purpose.

Other projects have included compilation of Top Ten lists, cookbooks, Global Village News, Composition critiquing, Physics challenges, and private educational sessions for specific groups.

WHO PARTICIPATES IN PROJECTS?

There are two classifications of projects: Open and Closed.

Open projects will be available to all users of K12Net. If you design a project in which you want as many people as possible to participate, then you want an Open project.

Closed projects are limited to only a selected set of participants. If, for example, you want to conduct an online class specifically for Jr. High Phys. Ed. teachers, and don't want anyone else posting, then you would want a
Closed project.

HOW DO YOU START?

Start with an idea. Engage other users of the net in conversation about your idea, and see if anyone would like to join you in the project. You can "advertise" your idea in the Teacher Chat echo, Projects echo, or any of the appropriate curricular conferences. Make sure that your idea would require its own channel, and cannot be carried out in the existing conferences.

When it seems you have a few others interested in your project ("critical mass"- enough to make it work), apply for a channel. Given the limited number of channels available, and the growing interest, new projects should demonstrate that there at least several other points in the net that wish to participate in the project.

Send channel requests to Helen Sternheim, Channels Coordinator, at 1:321/109.

Your request can be made in the Projects echo, or via netmail. Include the following:

1. Name of the Project
2. Name and FIDO address of the Moderator (see below)
3. Project type- Open or Closed
4. Requested start time and duration of the project (see below)
5. A brief project description (see current project guides for samples)
6. A list of participants (so we can see the size of the group)
7. If your project is to be Closed, a list of participants who are to be granted access to the channel.

When this information is received, you will be assigned a channel when one is available. Please note: changes are slowly being made to the channel allocations to minimize the extra work required of Sysops throughout the net.
To that end, new projects will be assigned to Channels 1-12.
Your project will be assigned an appropriate channel when and if a channel is available.

WHO IS IN CHARGE OF THE PROJECT?

The person designated as the Moderator will have control over the conduct of the project channel. It is s/he who will make decisions about appropriate posting and participation, set whatever rules are required, and generally conduct the business of the project. The Channels Coordinator will offer advice and assistance if asked for, and help with technical problems if possible. However, the Moderator is responsible for setting up, advertising (beyond the projects listing), and running the project.

HOW LONG CAN I USE A CHANNEL?

Unless unusual circumstances exist, new project channel allocations will be limited to a two month period. You may request a channel for a shorter time.
It is advised that the Moderator schedule the channel activities very carefully to make the most of the two month allocation. A good schedule also will helpyour other participants make better use of your project by being able to plan more effectively their participation. Extensions to projects will be given_only_ if there are no other projects waiting for channels and the Moderator demonstrates a need to continue.

WHAT'S CHANNEL 0 FOR?

Channel 0 is now being used for class letter exchanges (between 2 classes) for batch letter uploads. Channel Coordination will take place in K12.projects.

QUESTIONS?

Please read these guidelines carefully. If you still have questions you may contact the Channels Coordinator, Helen Sternheim at 1:321/109

Appendix 6.3 List of K12Net Echomail conference areas

GENERAL TAGNAME CONVENTIONS: *ALL* echoes with the "K12_" (underscore) prefix are "public" which means they are to be readable by the general public. K12Net System Operators are encouraged to identify their users before granting them "write" access. Echoes with the "K12." (period) prefix are "private" and access is to be restricted as described below.

K12Net "CORE" ECHOES:
General comments:
The "core" echoes are meant to approximately correspond with traditional subject areas typically found in Kindergarten thru senior high schools.

SPECIFIC ORIENTATIONS: (Sysops, please try to reflect the curricular "flavor" of these echoes in your menus as much as possible. We suggest you include the word "education" in your menu options to indicate that, for example, K12_SCI_ED is not for discussing general concepts of science, but, rather, the process of educating students ABOUT science as a curricular area. Also try to emphasize that these echoes are for ALL grade levels from K-12--- some elementary people may feel excluded-)

tagname	Suggested menu description (in upper case)
	--MAIN SUBJECT AREA ECHOES--
K12_ART_ED	ARTS & CRAFTS EDUCATION (excluding music)
K12_BUS_ED	BUSINESS EDUCATION
K12_COMP_LIT	COMPUTER EDUCATION: Technical assistance and exchange for computer educators and students.
K12_HLTH_PE	HEALTH & PHYSICAL EDUCATION
K12_LIF_SKIL	LIFE SKILLS EDUCATION; Home economics, career skills, legal issues, safety education.
K12_LANG_ART	LANGUAGE ARTS EDUCATION: reading, writing, literature, grammar, composition, etc.
K12_MATH_ED	MATHEMATICS EDUCATION
K12_MUSIC_ED	MUSIC & PERFORMING ARTS EDUCATION
K12_SCI_ED	SCIENCE EDUCATION
K12_SOC_STUD	SOCIAL STUDIES EDUCATION: History, Civics, Social Sciences, etc.
K12_SPEC_ED	COMPENSATORY EDUCATION: learning disabled, etc.
K12_TAG	TALENTED & GIFTED EDUCATION: challenges specific to educating intellectually and/or artistically gifted students.
K12_TECH_ED	TECHNOLOGY EDUCATION: Robotics and engineering, industrial & manufacturing technologies, drafting, design, CAD/CAM, and Vocational Education.
	--FOREIGN LANGUAGE ECHOES--
	ASCII only for all echoes--keyboard characters only: emphasis on communication in non-native language.
K12_FRANCAIS	French-only discussion for level 1 students.
K12_RUSSIAN	Russian language discussion.
K12_SPAN_ENG	Spanish-English "practice" echo. Native Spanish speakers are urged to correspond in English and native-English speakers are urged to write in Spanish providing exciting, interactive

"practice" for beginning and intermediate-level students.

K12_GERM_ENG Same format as K12_SPAN_ENG but for German language

--ANCILLARY PUBLIC ECHOES--

K12_ELE_CHAT ELEMENTARY SCHOOL CHAT: All-purpose chat echo for K-6

K12_JR_CHAT MIDDLE SCHOOL CHAT: All-purpose chat echo. Grades 7&8

K12_SR_CHAT SENIOR HIGH SCHOOL CHAT: All-purpose chat echo. 9-12

--RESTRICTED ACCESS ECHOES--

K12.SYSOP K12.SYSOP: **This is for sysops-ONLY**. For discussion of network operation, coordinating echo installation and distribution, technical problems with system software & hardware, etc. THIS IS SOLELY FOR PEOPLE DIRECTLY INVOLVED WITH SYSTEM OPERATION. Do NOT allow non-sysops in here! Direct all other conversation to K12.TCH_CHAT.

K12.TCH_CHAT TEACHER CHAT: **For ALL professional educators ONLY** This is an all-purpose CHAT echo with emphasis on the design and evolution of K12net. I suggest you provide access through "flags", or security levels in individual user accounts.

K12.PROJECTS TELECOMMUNICATIONS PROJECTS: **for ALL professional educators.** For the discussion of various curriculum-driven, classroom projects, advertising for "partners" for specific projects, etc. Suggest user account level access. Note that K12.CHO is for administration of projects currently in progress.

K12_NEWS K12Net NEWS (all should read): A place for announcements at the network level.

****Configure this for READ ONLY****

The Editor of the K12news is the ONLY person authorized to post in this echo. This is the only echo in K12net which is not open to discussion. Please direct all discussion to another echo.

(Note: please see the separate file which describes the "Channel" echoes.

You must carry ALL of the above echoes to be eligible to carry the "Channels". See also the file "moderate" for a list of individuals who are responsible for each of these conferences, as well as the general guidelines for "echomail etiquette".)

Appendix 7 EdMOO Documentation

Appendix 7.1 EdMOO command reference card

EdMOO Reference card - Command Summary

Command	What it does	Example
Create	Create a new character	cr edgar password
Connect	connect a character to the MOO	co edgar password
Look	See what's in a room	look
look <object>	See the description of an object or character	look henry
@who	Find out who is in the room	
@who <name>	Find out about that person, and which room they are in.	@who edgar
help wizard-list	Get a list of all of the wizards	help wizard-list
Get	You take something, pick it up	get chair
Drop	You put something down	drop chair
Open	Open an object (container)	open cupboard
Close	Close an object (container)	close cupboard
Give	Give an object to another player	give coffee pot to henry
n (s,e,w)	Move in that direction.	
say (")	Talk to everyone in the room.	say Hi everyone
Whisper	Whisper to just one person	whisper "really ?" to bill
Emote (:)	State an emotion or movement In the example, the text *<yourname> laughs loudly* would be displayed.	: laughs loudly
@audit	Returns list and Ids of all things you own.	
@create $thing	Make some object	@create $thing named "chocolate frog"
@create $container	Make some oject that others can be put into	@create $container named "glass jar"
@describe	Write text that others will see when they type "look..."	@describe chocolate frog as "one with a yellow

		wrapper"
@recycle	Remove something	@recycle chocolate frog
@dig	Create a room	@dig "kitchen"
@move	Move (e.g. to a newly dug room)	@move me to #304

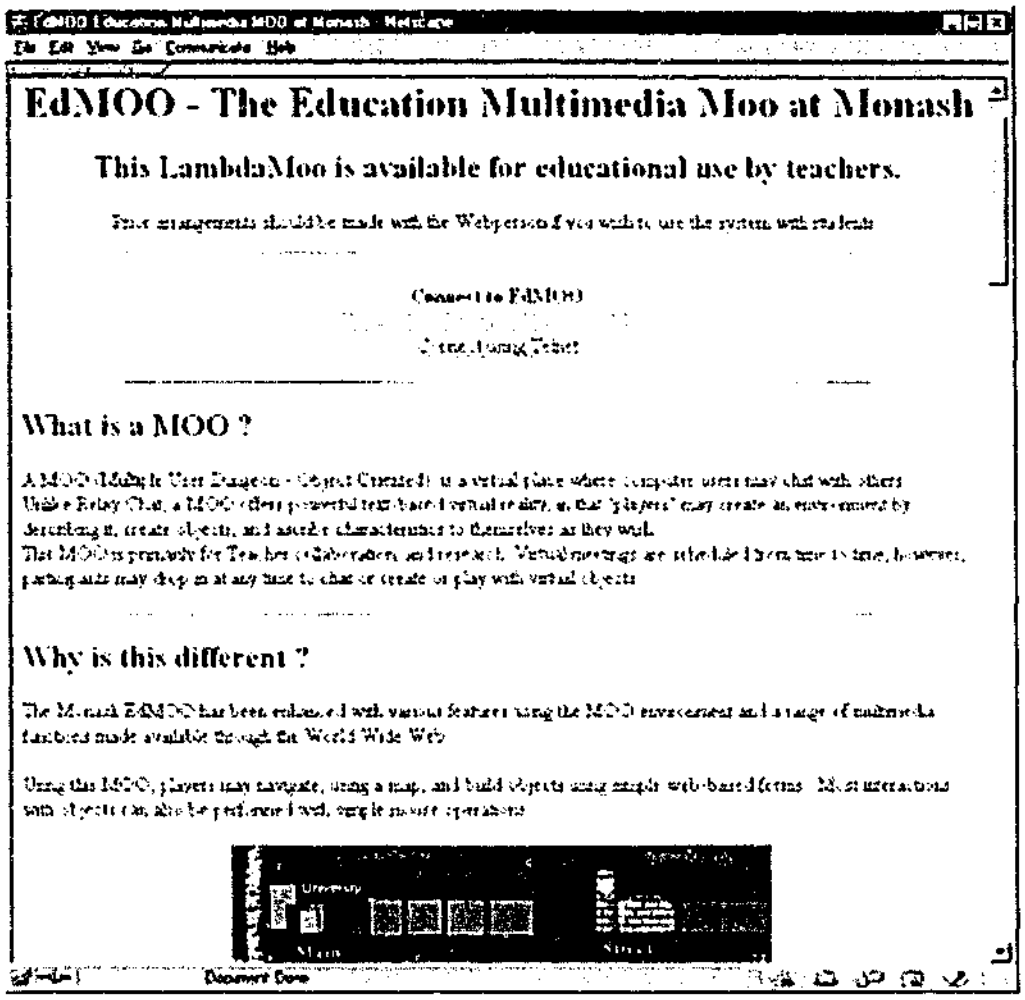
Some commands are only available to "builders". To become a builder, email the webperson. Security in the MOO is an important issue, and so the capabilities of players in strictly controlled.

Bernard Holkner, Monash University

613-9905-2767

bernard@edx1.educ.monash.edu.au

Appendix 7.2 EdMOO Information



HTML document (web page) describing the EdMOO project's objectives, responsible groups, procedures, and technology.

Appendix 7.3 EdMOO Quick Start Help

Quick Start Help for EdMOO

Bernard Holkner

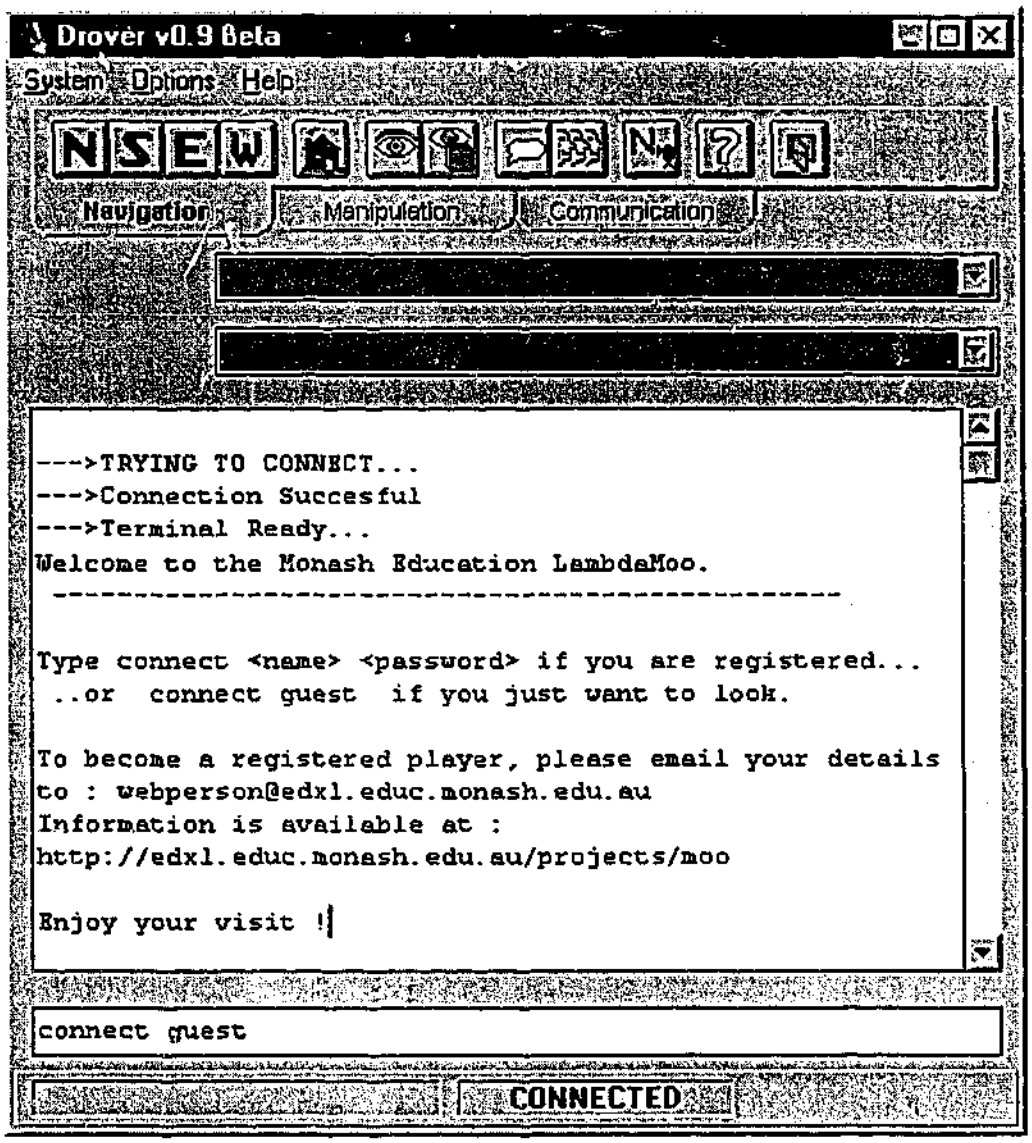
Monash University

bernard@edx1.educ.monash.edu.au

Use Drover, Mudwin, GMud or Muddweller as a Telnet client to connect to the MOO.

The address of the MOO is 130.194.180.169 port 7777 or (edx2.educ.monash.edu.au port 7777)

With Drover, use the menus *System* > *Connect*



You may connect as a guest, or email the webperson@edx1.educ.monash.edu.au if you wish to have a character for yourself to use.

Navigation

The Monash EdMOO starts off in the lobby. From there you can go to the Atrium by typing atrium and

so on. You can use read notice or read directory for help in moving around and learning about various events!

Make certain that you have plenty of coffee at hand. This environment can be very engaging.

Feel free to talk to others online, but under no circumstances should you give personal information whilst in the system unless you are quite certain of the audience.

Things to Try

Have a drink and cakes in the coffee shop !

From the lobby you might type …

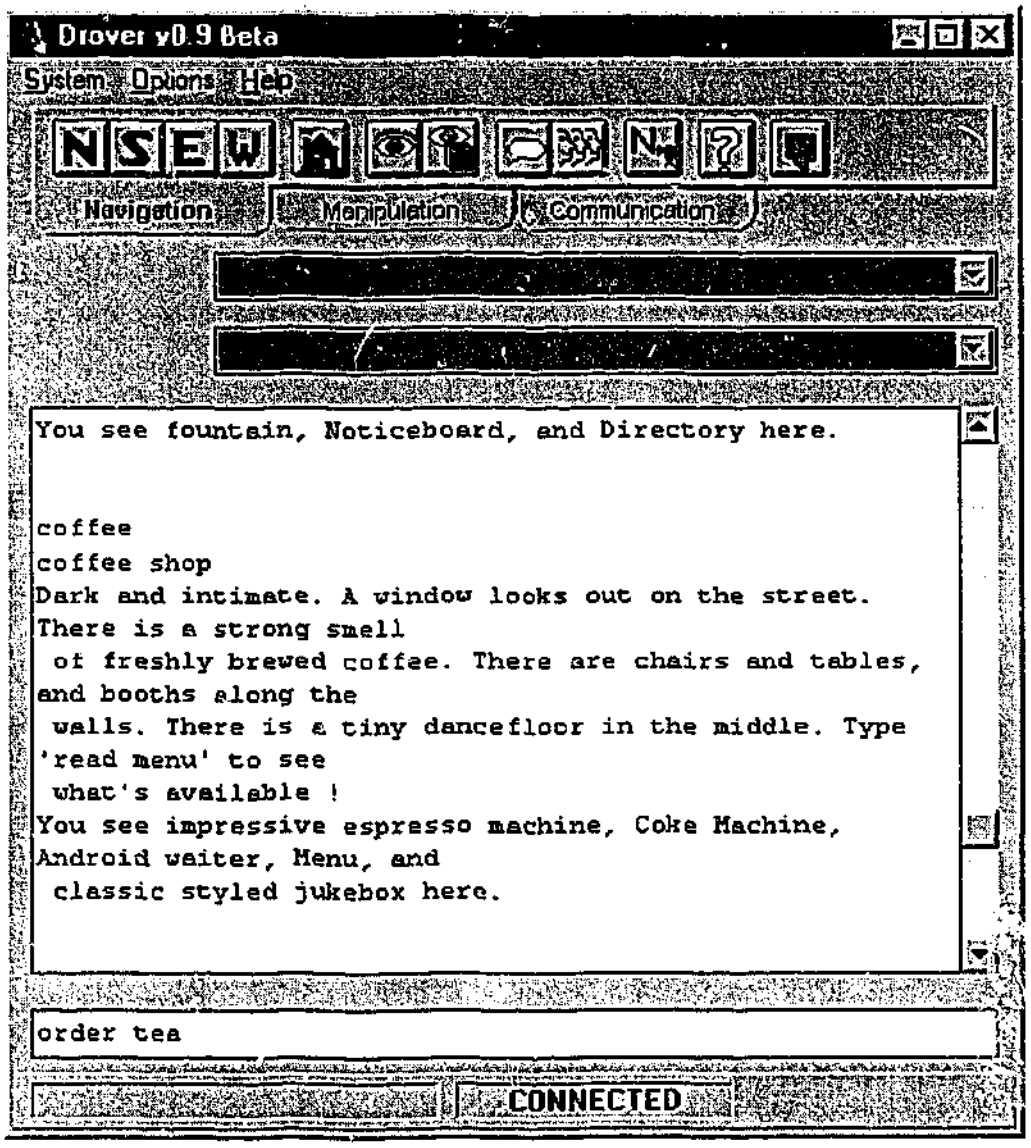
atrium (to go to the Atrium)

coffee (to go to the coffee shop)

order 4 lattes

order selection of chocolate cakes

There is a programmed object (a waiter) to take your orders.



Command Summary

Command	What it does	Example
create	Create a new character	cr edgar password
connect	connect a character to the MOO	co edgar password
look	See what's in a room	look
look <object>	See the description of an object or character	look henry
@who	Find out who is in the room	
@who <name>	Find out about that person, and which room they are in.	@who edgar
help wizard-list	Get a list of all of the wizards	help wizard-list
get	You take something, pick it up	get chair
drop	You put something down	drop chair
open	Open an object (container)	open cupboard
close	Close an object (container)	close cupboard
give	Give an object to another player	give coffee pot to henry
n (s,e,w)	Move in that direction.	
say (")	Talk to everyone in the room.	say Hi everyone
whisper	Whisper to just one person	whisper "really ?" to bill
emote (:)	State an emotion or movement In the example, the text	: laughs loudly

	<yourname> laughs loudly would be displayed.	
@audit	Returns list and Ids of all things you own.	
@create $thing	Make some object	@create $thing named "chocolate frog"
@create $container	Make some oject that others can be put into	@create $container named "glass jar"
@describe	Write text that others will see when they type "look..."	@describe chocolate frog as "one with a yellow wrapper"
@recycle	Remove something	@recycle chocolate frog
@dig	Create a room	@dig "kitchen"
@move	Move (e.g. to a newly dug room)	@move me to #304

Some commands are only available to "builders". To become a builder, email the webperson. Security in the MOO is an important issue, and so the capabilities of players in strictly controlled.

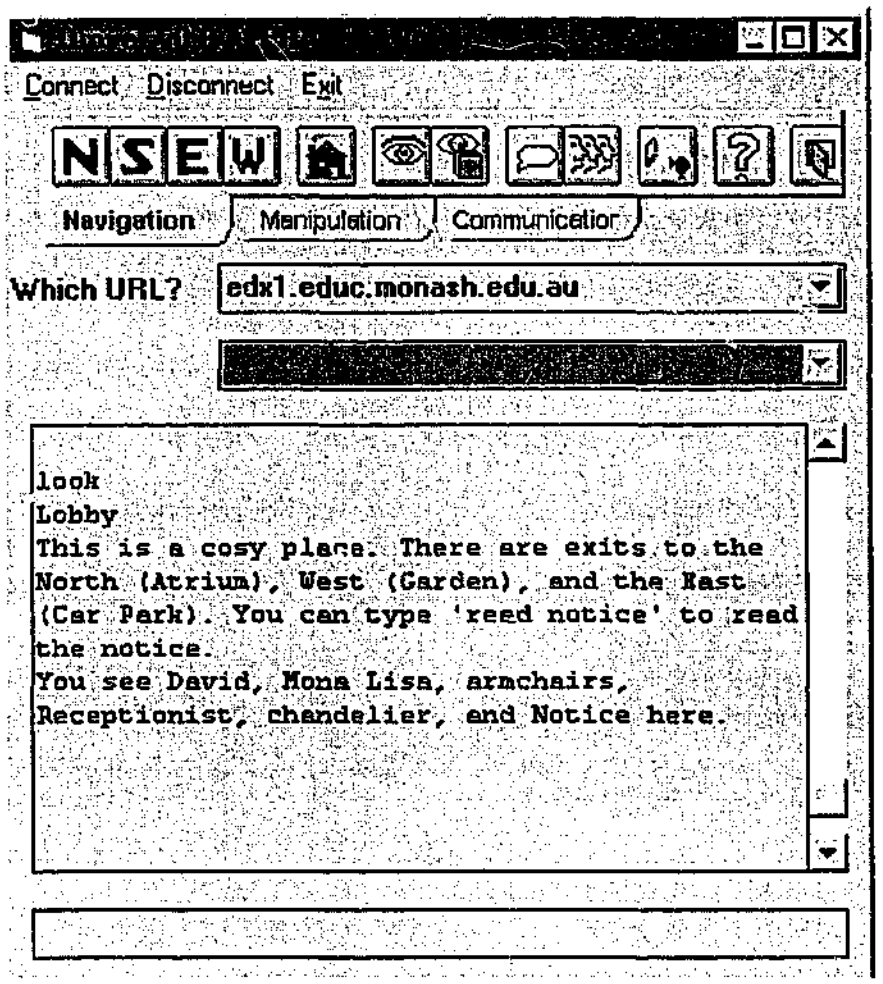
Bernard Holkner, Monash University

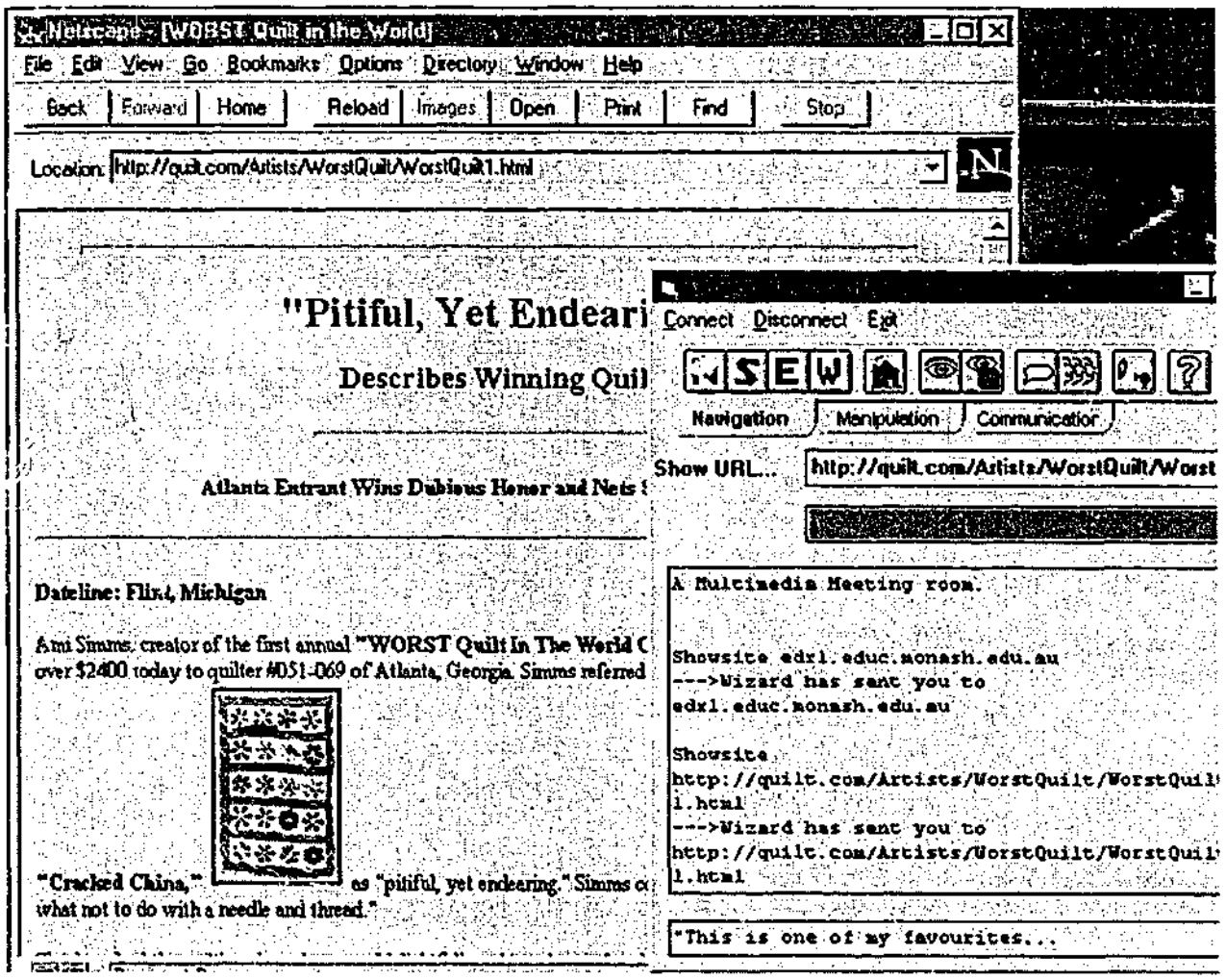
613-9905-2767

bernard@edx1.educ.monash.edu.au

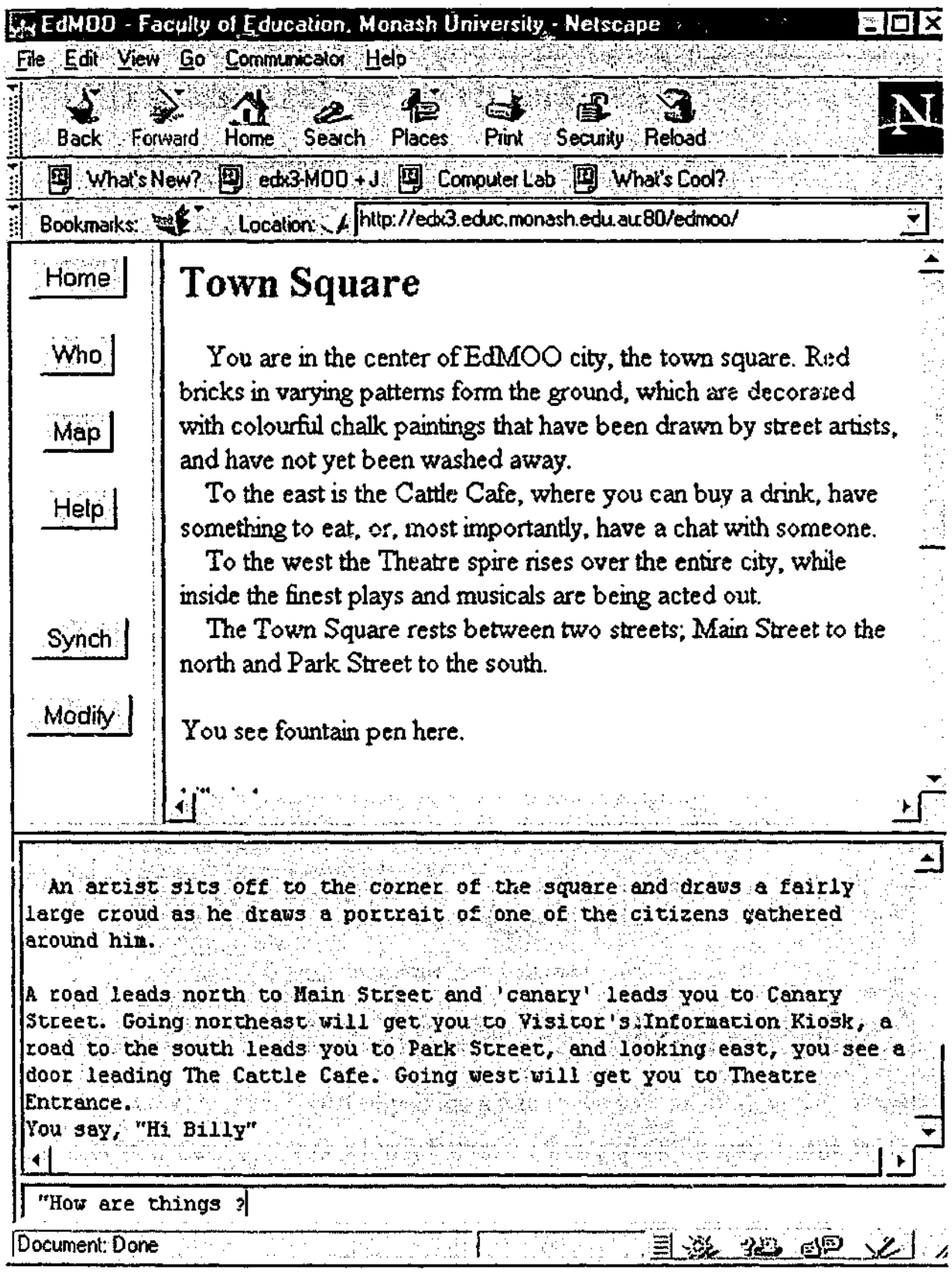
Appendix 8 EdMOO Software

Drover Version Two Screens

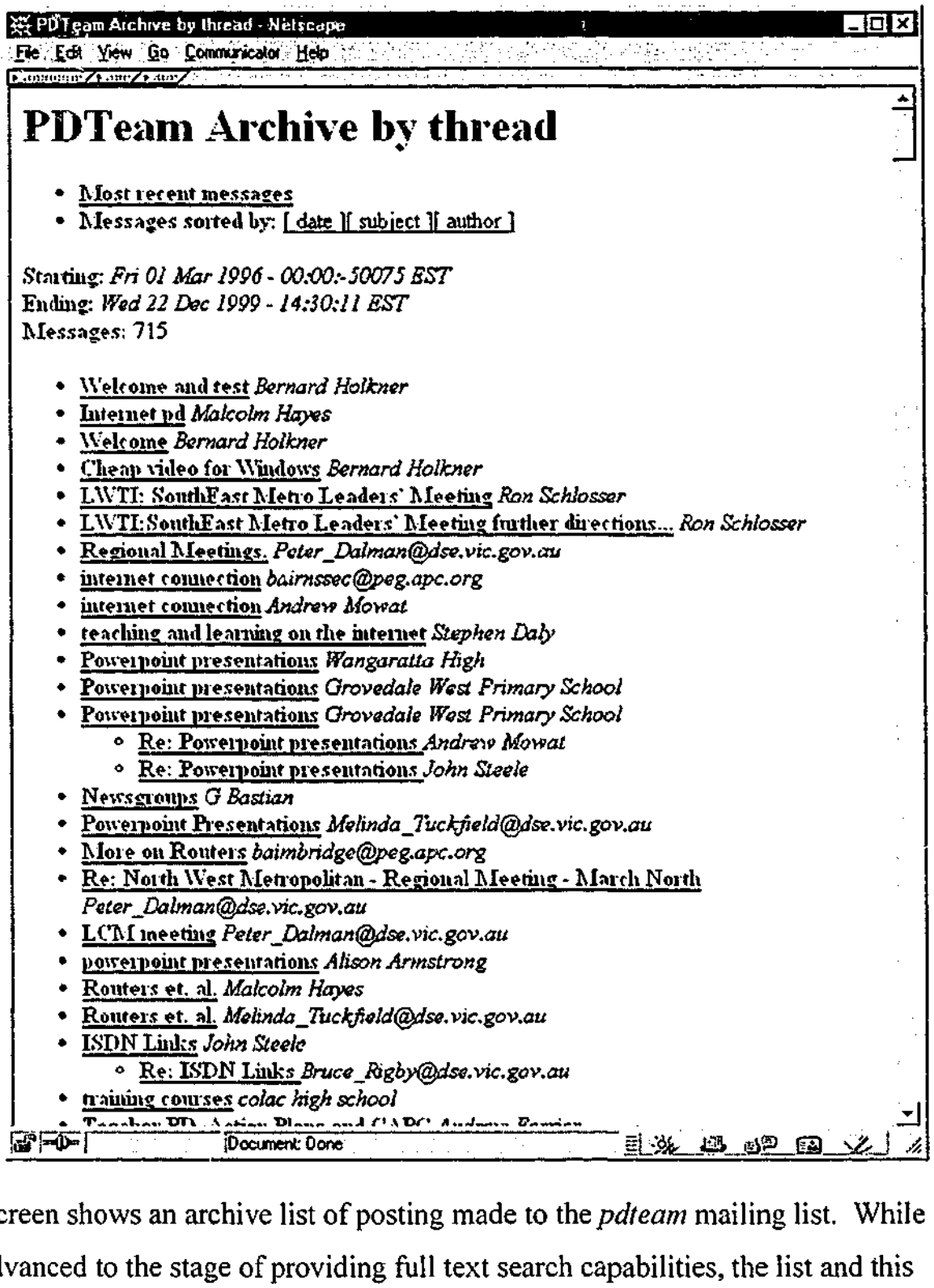



Netscape - [WORST Quilt in the World]
File Edit View Go Bookmarks Options Directory Window Help
Back Forward Home Reload Images Open Print Find Stop
Location: http://quilt.com/Artists/WorstQuilt/WorstQuilt1.html
"Pitiful, Yet Endeari
Describes Winning Quil
Atlanta Entrant Wins Dubious Honor and Nets
Dateline: Flint, Michigan
Ami Simms, creator of the first annual "WORST Quilt In The World C
over $2400 today to quilter #051-069 of Atlanta, Georgia. Simms referred
"Cracked China,"
as "pitiful, yet endearing." Simms c
what not to do with a needle and thread."
Connect Disconnect Exit
Navigation Manipulation Communication
Show URL... http://quilt.com/Artists/WorstQuilt/Worst
A Multimedia Meeting room.
Showsite edx1.educ.monash.edu.au
--->Wizard has sent you to
edx1.educ.monash.edu.au
Showsite
http://quilt.com/Artists/WorstQuilt/WorstQuil
1.html
--->Wizard has sent you to
http://quilt.com/Artists/WorstQuilt/WorstQuil
1.html
"This is one of my favourites...

EdMOO Interface using Cup-O-Mud Java applet



Appendix 9 PDTeam Electronic Archive



The screen shows an archive list of posting made to the *pdteam* mailing list. While not advanced to the stage of providing full text search capabilities, the list and this archive were an attempt to make systematically effective use of the group wisdom.

Appendix 10 Sample Training Materials

(Developing HTML documents with a Macintosh Computer)

Bernard Holkner, Monash University 1995

Background

The creation of "World Wide web" home pages is simply the process of creating pages of code and loading them onto a suitable server. These notes give a quick start method for creating WWW pages using the Macintosh package "HTMLEdit.

Glossary

HTML (Hypertext Markup Language)	The language or code required for Web servers to publish pages.
URL (Uniform Resource Location)	An "address" of a page or site or other resource somewhere on the internet.
GIF, JPG	Graphics standards common for small pictures on Web pages.

Quick Start

Create a document containing the required text and headings.

Once created, certain parts of the text can be selected (highlighted) and given links to bookmarks or other pages, URLs as required. Similary, pictures, sounds and movie files can be incorporated.

Start HTML Edit.

Select File > New and choose the file you are working on, or *StartPage*.

Save the new file immediately giving it a **new name**.

The HTML Edit Toolbar :

The toolbar is slightly different with the HTML template. An icon or will indicate that the program is in HTML edit mode or WWW browse mode. Pressing this button changes mode.

Once text has been entered or loaded, the Styles option may be used to create heading levels and various styles. Other formatting options, although not as powerful as Word 6 itself operate as you would expect : (Select text by dragging, select format option from button or menu.)

Creating a Link Select the text which will become the word(s) to be pressed.

Press the Link button. This will bring up a dialogue box where you may type in a link to a URL, Bookmark, or local Document.

e.g. http://www.monash.edu.au

A separate document must be created for each page, and this method for creating links for local documents is very useful. Avoid building very large pages with a lot of pictures, as these can be very slow to receive. This is particularly so for users who connect via modem.

Creating a Bookmark

"Bookmarks" option can allow the page to have links to specific points in the text. For example an index at the top of a long page could link to a bookmark below.

To create a bookmark, first place the cursor into the text which is to be "jumped to". Press the Bookmark button, and give this bookmark a name.

Select the word(s) to be pressed which will call this bookmark, and use the Link button (above) to make the jump to the bookmark instead of a URL or site.

Saving the File

Save the file frequently. Use different names from time to time in case something goes wrong.

Inserting Graphics

Graphics should normally be created by scanning or otherwise digitising. The standard file formats used on Web pages are GIF and JPG. Converters exist which would permit other file formats to be changed to GIF or JPG.

Place the cursor into the location where the graphic should appear.

Press the graphic button, and a dialogue box will appear requiring the filename. In the initial stages of work with WWW pages, it's a good idea to keep all files (pages and graphics) within the same directory. This will also assist when they are to be exported to the web Server computer for publishing on the Internet..

Conclusion

Use the additional information button to create a title for the page. Save your work frequently, and back it up onto a floppy disk at the end of the session. Completed pages and graphics can be emailed to the

Webmaster who will host your pages, or if you have permission, you may load them yourself onto the Web server.

Bernard Holkner

Monash University

Voice : 9905-2767

Fax : 9905-2779

eMail : bernard.holkner@education.monash.edu.au

Appendix 11 Registration of "lecity.edu.au"

MIRA networking
Pty Ltd. ACN 063 992 209

Application

for a uucp

Internet Connection

Introduction

Use this form if you wish to purchase a uucp Internet connection from Mira Networking. When you return the completed form, we will configure your connection then contact you regarding connection testing and verification.

More information

For more information about this or any of our other Internet services, please contact Mira Networking.

Internet e-mail	info@mira.net.au	Phone:	(03) 882 8100
Modem:	(03) 888 1726	Fax:	(03) 888 1826

Postal Address: PO Box 782
Mount Waverley
Victoria, 3149
Australia

Contact Details

Organisation Name: City Limits

Contact person: Bernard Holkner

Phone: 876 3048

Fax: 876 3353

E-mail: bernard.holkner@education.monash.edu.au

Postal address: Box 831 Ringwood Vic 3134

System Details

Operating System (Unix/DOS/NT/?)	OS/2
Operating System version (if known)	3
Version of uucp (if known)	fxuucico 0.4b

Connection Details

1.	Do you have uucp software installed?	Yes
1a.	Do you need assistance with installing uucp?	No
1b.	Host name of your calling system:	bushwire

2.	Do you require e-mail access via uucp?	Yes
2a.	Do you need assistance with installing e-mail software?	No

3.	Do you need a domain name registered for your mail?	Yes
3a.	Preferred domain name:	lecity.edu.au
3b.	A.C.N.	

4.	Do you require Internet news delivered via uucp?	Yes
4a.	Do you need assistance with installing news software?	No

Note to applicants

1. Most Unix systems have uucp software distributed as standard. With most other platforms you are typically required to purchase uucp separately.

1a. If you choose to configure your uucp software, please contact Mira Networking for the appropriate chat-script and login details for your uucp connection.

1b. All mail to your domain will be routed via this system, including mail addressed to just the domain.

You can choose any name you like, though most people use a name which reflects the nature of their primary mail relay system. Note that most uucp software only recognizes the first 7 or 8 characters of the name you select.

2. Mail software consists of two components, the User Agent and the Transfer Agent. Most Unix systems have an adequate Transfer Agent and a rudimentary User Agent. More sophisticated software is available commercially and on the 'net'. Most other platforms do not distribute mail software as standard; instead it must be purchased for an additional fee.

3. A domain name is the name by which e-mail will be addressed to your organisation. E.g. our domain name is mira.net.au.

Most organisations that are connecting to the Internet for the first time will need to register a domain name. Mira Networking can register and manage your domain name entry for you.

Organisations which have a domain name registered elsewhere may wish to continue to use that entry, in which case they will need to arrange for the MX records to be changed to point to a Mira mail server.

3a. AARNET have a set of conventions regarding domain name usage. If you are a commercial organisation then your domain name will be *SOMETHING*.com.au If you are a government organisation, then your domain name will be *SOMETHING*.gov.au. If you are an educational institution then your domain name will be *SOMETHING*.edu.au. Private individuals or families use a domain name of *SOMETHING*.YYY.id.au (where you choose *SOMETHING*, but it must be unique and preferably reflect the name of your organisation in some way). If you need assistance with selecting a domain name, please call us.

3b. To register in the .COM.AU domain you will typically need to supply your A.C.N or other company registration number.

4. Internet News software is readily available from Mira Networking for Unix platforms. Software is also available for other platforms such as DOS and MS-Windows.

15 Bibliography

Aboba, B. (1993). The online user's encyclopedia : bulletin boards and beyond. Reading, Mass., Addison-Wesley.

Akrich, M. (1992). The De-Scription of Technical Objects. Shaping Technology / Building Society. W. E. Bijker and J. Law. London, The MIT Press: 205-224.

Anderson, J. (n.d.). yduJ's MOO Programmer's Tutorial. Retrieved 3 June 1999, from http://www.cs.reading.ac.uk/people/mkh/virtual_worlds/MOO/tutorials/ducktutorial.html.

ANTA (1999). National Strategy. Planning for the New Millenium., Australian National Training Authority.

Atkinson, P. and Hammersley, M. (1998). Ethnography and Participant Observation. Strategies of Qualitative Inquiry. N. K. Denzin and Y. S. Lincoln. Thousand Oaks, London, Sage.

Bakun, A. (1996). E_MOO. Thwarted Efforts Retrieved 1 August 1997, from http://tecfa.unige.ch:4243/.

Bijker, W. E. (1987). The Social Construction of Bakelite: Toward a Theory of Invention. The Social Construction of Technological Systems. W. E. Bijker, T. P. Hughes and T. J. Pinch. Cambridge, MIT Press: 159-187.

Blankenship, L. (1993). The Cow Ate My Brain or A Novice's Guide to MOO Programming, Part I. Retrieved 3 June 1999, from http://www.hayseed.net/MOO/mootutor1.txt.

Bruckman, A. (1992). Identity Workshop: Emergent Social and Psychological Phenomena in Text-Based Virtual Reality. Retrieved 3 August 1998, from ftp://ftp.lambda.moo.mud.org/pub/MOO/papers/identity-workshop.ps.

Bruckman, A. and Resnick, M. (1993a). Gender Swapping on the Internet. INET'93, San Francisco, CA.

Bruckman, A. and Resnick, M. (1993b). Virtual Professional Community: Results from the MediaMOO Project. Third International Conference on Cyberspace, Austin, Texas.

Bruckman, A. a. R., M. (1995). "The MediaMOO Project: Constructionism and Professional Community." Convergence 1 (Spring 1995).

Carlson, W. B. (1992). Artifacts and Frames of Meaning: The Cultural Construction of Motion Pictures. Shaping Technology / Building Society. W. E. Bijker and J. Law. London, The MIT Press: 175-198.

Cherny, L. (1994). Gender Differences in Text-Based Virtual Reality. Berkeley Conference on Women and Language.

Christine (1997, January 19). The Cafe: Don't talk to the Waiter! *EdMOO.* http://edx5.educ.monash.edu.au:7000 (20 Jan. 1999).

Connelly, M. F. and Clandinin, D. J. (1990). "Stories of Experience and Narrative Enquiry." Educational Researcher **19** (5): 2-14.

Contractor, N. S. and Eisenberg, E. M. (1990). Communication networks and new media in organizations. Organisations and communication technology. J. Fulk and C. Steinfeld. Newbury Park, Sage Publications: 143-172.

Curtis, P. (1996) LambdaMOO Core. MOO server software, Available: ftp://lambdamoo.sourceforge.net/pub/lambdamoo/.

Curtis, P. (1997). Mudding: Social Phenomena in Text-Based Virtual Realities. Reinventing Technology, Rediscovering Community. P. E. Agre and D. Schuler. Greenwich, CT, Ablex: 143-163.

Deerfield (1996) Wingate Deerfield Communications. Internet connection sharing software, Available: http://www.wingate.com.

Denzin, N. K. and Lincoln, Y. S. (1994). Handbook of qualitative research. Thousand Oaks, Sage Publications.

Dibbell, J. (1993). "A rape in cyberspace." Village Voice (Dec 21): 237-261.

DiMauro, V. and Gal, S. (1994). "Use of Telecommunications for Reflective Discourse of Science Teacher Leaders." Journal of Science Education and Technology 3 (2): 123-135.

Eichmann, D. (1994). Ethical Web Agents. Second World Wide Web Conference '94: Mosaic and the Web, Chicago.

Elizabeth (1999). Reflections of Cyberlab.

Fanderclai, T. L. (1995). MUDs in Education: New Environments, New Pedagogies. Retrieved 7 August 1999, from http://www.december.com/cmc/mag/1995/jan/fanderclai.html.

Feenberg, A. (1989). The Written World: On the Theory and Practice of Computer Conferencing. communication, computers, and distance education. R. a. K. Mason, Anthony. Oxford ; New York, Pergamon Press.

Feenberg, A. and Bellman, B. (1990). Social Factor Research in Computer-Mediated Communications. Online education : perspectives on a new environment. L. M. Harasim. New York, Praeger: xxiii, 279.

Feldman, M. (1987). "Constraints on communication and electronic mail." Office: Technology and People **3** (2): 83-101.

Fullan, M. (1993). Change Forces Probing the Depths of Educational Reform. London, Falmer Press.

Fullan, M. (1999). Change Forces The Sequel. London, Falmer Press.

Gibson, W. (1993). Neuromancer. London, Harper Collins.

Giddens, A. (1979). Central problems in social theory : action, structure and contradiction in social analysis. Berkeley, University of California Press.

Glusman, G. (1996). BioMOO. Retrieved 2 August, from http://bioinformatics.weizmann.ac.il/BioMOO/.

Glusman, G. (1997). BioMOO, the biologists' virtual meeting place : Purpose Statement. Retrieved 1 August 2000, from http://bioinfo.weizmann.ac.il/BioMOO/purpose.html.

Granovetter, M. (1978). "Threshold models of collective behaviour." American Journal of Sociology **83** (6): 1420-1443.

Grundy, F. (1996). Women and Computers. Exeter, Intellect Books.

Hagel, P. (2000). Learning to Choose: Questioning the Use of Multiple Delivery Technologies by Australian Universities. Learning to Choose: Choosing to Learn, Proceedings of the 17th Annual ASCILITE Conference. Lismore, NSW, Southern Cross University Press.

Hall, K. (1996). Cyberfeminism. Computer-mediated Communication Linguistic, Social and Cross-Cultural Perspectives. S. Herring, C. Philadelphia, John Benjamins: 147-170.

Harasim, L. (1986). "Computer learinng networks: Educational applications of computer conferencing." Journal of Distance Education **1** (1): 59-70.

Harasim, L. M. (1990). Online education : perspectives on a new environment. New York, Praeger.

Harasim, L. M. (1995). Learning networks : a field guide to teaching and learning online. Cambridge, Mass., MIT Press.

Haraway, D. J. (1991). Simians, cyborgs, and women : the reinvention of nature. New York, Routledge.

Hawkes, M. (1997). Employing Educational Telecommunications Technologies as a Professional Development Structure for Facilitating Sustained Teacher Reflection, Collaboration, and Inquiry. Draft. American Educational Research Association Conference, Chicago, IL.

Helmers, S., Hoffman, U., et al. (1997). "(How) Can Software Agents Become Good Net Citizens?" CMC Magazine 4 (2).

Herring, S., C. (1996). Two Variants of an Electronic Message Schema. Computer-mediated Communication Linguistic, Social and Cross-Cultural Perspectives. S. Herring, C. Philadelphia, John Benjamins: 81-106.

Herring, S., Johnson, D., et al. (1992). Participation in Electronic Discourse in a Feminist Field. Second Berkeley Women and Language Conference, University of California, Berkeley.

Hesse, B., Werner, C., et al. (1988). "Temporal aspects of computer mediated communication." Computers in Human behaviour 4: 146-65.

Higgins, R. (1998). Computer-Mediated Cooperative Learning: Synchronous and asynchronous communication between students learning nursing diagnosis., University of Toronto.

Hiltz, S. R. (1992). Constructing and evaluating a Virtual Classroom. Contexts of computer-mediated communication. M. Lea. New York, Harvester Wheatsheaf: 232-261.

Hiltz, S. R. and Turoff, M. (1978). The network nation: Human communication via computer. Massachusetts, Addison-Wesley Publishing Company, Inc.

Holkner, B. (1997). Virtual Reality Environments as vehicles for delivery and support of tertiary teaching. CAUSE in Australia '97, Melbourne.

Honey, M. (1995). "Online Communities: They can't happen without thought and hard work." Electronic learning **14** (4): 12-13.

Ismail, J., Richards, L., et al. (1998). Mag-Net projects. Retrieved 3 April 1999, from http://mag-nify.educ.monash.edu.au/projects98/.

Jenkins, A. M. (1985). Research Methodologies and MIS Research. Research Methods in Information Systems. R. H. E. Mumford, G. Fitzgerald, and A. T. Wood-Harper. Amsterdam, Elsevier: 103-118.

Jennings, T. (1999). Fidonet 2:422 - Texty - Tom Jennings. Retrieved 14 May 1999, from http://www.fido.sk/texty/tom_jennings.html.

Jennings, T. (n.d.). TomJ's personal, miscellaneous stuff. Retrieved 3 August 1999, from http://www.wps.com/personal/index.html.

Jonassen, D. H. (1996). Computers in the classroom : mindtools for critical thinking. Englewood Cliffs, N.J., Merrill.

Katz, J. (1997). Media rants : postpolitics in the digital nation. San Francisco, Hardwired.

Katzman, N. (1974). "The impact of communications technology: promises and prospects." Journal of Communication 24: 47-58.

Kearsley, G. (1998). Online Education: New Paradigms for Learning and Teaching. Retrieved 6 February 2001, from http://horizon.unc.edu/TS/default.asp?show=article&id=73.

Kemmis, S. and McTaggart, R. (1988). The Action Research Planner. Victoria, Deakin University Press.

Kemmis, S. and Wilkinson, M. (1998). Participatoty Action Research and the Study of Practice. Action Research in Practice. B. Atweh, S. Kemmis and P. Weeks. London, Routledge: 21-36.

Kerr, J. (1986). Computers and Communication. Moorabbin, State Computer Education Centre and Warragul Education Centre.

Kerr, J. (1987). Access Comput-About Teacher Support Materials: Computer Communication. Moorabbin, State Computer Education Centre and Warragul Education Centre.

Kiesler, S., Siegel, J., and McGuire, T. (1984). "Social psychological aspects of computer-mediated communication." American Psychologist **39** (10): 1123-1134.

Latour, B. (1992). Where Are the Missing Masses? The Sociology of a Few Mundane Artifacts. Shaping Technology / Building Society. W. E. Bijker and J. Law. London, The MIT Press: 225-258.

Lazarsfeld, P. (1971). Radio and the printed page. New York, Arno Press.

Lotus (1995) Lotus Notes Lotus Development Corporation. Organisational and Group Management tool.

Loughran, J., Corrigan, D., et al. (1996). Researching the Mag-Net Virtual Science and Technology Centre. Melbourne, Monash University.

Lynch, K. (1997). A Lesson learned from Ausweb '96 : Web databases. Ausweb '97, Brisbane, Norsearch.

Marjanovic, O. (1999). "Learning and teaching in a synchronous collaborative environment." Journal of Computer Assisted Learning **15**: 129-138.

Markus, M. L. (1990). Toward a "Critical Mass" Theory of Interactive Media. Organizations and Communication Technology. J. Fulk and C. Steinfeld. New York, Sage: 194-218.

Markus, M. L. and Benjamin, R., I. (1996). "Change Agentry – the Next IS Frontier." MIS Quarterly **20** (4): 385-407.

Mason, R. and Kaye, A. (1989). Mindweave : communication, computers, and distance education. Oxford ; New York, Pergamon Press.

Matheson, K. (1992). Women and computer technology. Contexts of computer-mediated communication. M. Lea. New York, Harvester Wheatsheaf: 66-66.

McAfee, M. and Eustace, K. (1995). Beyond the WEB and the MOO in education. Learning without Limits, Perth, ECAWA.

McIntyre, H. (1988). Anyone out there?

McKeown, L. (1998). What is the Forum? Retrieved 1 Nov 1998, from http://rite.ed.qut.edu.au/oz-teachernet/forum/index.html.

Merseth, K. (1990). Beginning Teachers and Computer Networks: A New Form of Induction Support. Michigan, National Center for Research on Teacher Education: 26.

Miles, M. B. and Huberman, A. M. (1994). Qualitative data analysis : an expanded sourcebook. Thousand Oaks, Sage Publications.

MOO-Cows-L (1996). MOO Cows Mailing List. Retrieved 17 March 2001, from moo-cows@parc.xerox.com.

MOO-ed-L (1996). MOO-ed Mailing List. Retrieved 14 August 2000, from moo-ed@ucet.ufl.edu.

Morritt, H. (1997). Women and computer based technologies : a feminist perspective. Maryland, University Press of America.

Oliver, P., Marwell, G., et al. (1985). "A Theory of the Critical Mass I. Interdependence, Group Heterogeneity, and the Production of Collective Action." American journal of Sociology **91** (3): 522-556.

Orlikowski, W. (1996). Evolving with Notes: Organizational Change around Groupware Technology. Groupware and Teamwork. C. U. Ciborra. Chichester, John Wiley & Sons.: 23-59.

Orlikowski, W. and Hofman, D. (1997). An Improvisational Model of Change Management: The Case of Groupware Technologies. Massachusetts Institute of Technology, Sloan School of Management.

Orlikowski, W. and Robey, D. (1991). Information Technology and the Structuring of Organizations. Mass, Center for Information Systems Research.

Orlikowski, W. J., Yates, J., et al. (1994). Shaping Electronic Communication: The Metastructuring of Technology in Use. Massachusets, MIT.

Poole, M. S. and DeSanctis, G. (1990). Understanding the Use of Group Decision Support Systems: The Theory of Adaptive Structuration. Organizations and Communication Technology. J. Fulk and C. Steinfeld. New York, Sage: 173-193.

Quarterdeck (1994) DESQView Symantec Corporation. Multitasking software.

Raggett, D. (1997). HTML 3.2 Reference Specification. World Wide Web Consortium Retrieved 12 August 1998, from http://www.w3.org/TR/REC-html32.html#map.

Reason, P. (1998). Three Approaches to Participative Inquiry. Strategies of Qualitative Inquiry. N. K. Denzin and Y. S. Lincoln. Thousand Oaks, London, Sage.

Reid, I., C. (1999). "Beyond Models: Developing a University Strategy for Online Instruction." Journal of Asynchronous Learning Networks 3 (1).

Rice, R. E. (1992). Contexts of research on organizational computer-mediated communication. Contexts of computer-mediated communication. M. Lea. New York, Harvester Wheatsheaf: 113-144.

Richardson, L. (1994). Writing: A Method of Inquiry. Handbook of qualitative research. N. K. Denzin and Y. S. Lincoln. Thousand Oaks, Sage Publications: 517-529.

Riel, M. (1993). Learning Circles: Virtual Communities for Elementary and Secondary Schools. Retrieved 7 September 1998, from http://lrs.ed.uiuc.edu/Guidelines/Riel-93.html.

Riel, M. (1998). Professional Development. Retrieved 1 November 1999, from http://www.iearn.org/circles/lcguide/p.intro/a.profdev.html.

Rogers, E. M. (1995). Diffusion of innovations. New York London, The Free Press.

Rogers, E. M. and Shoemaker, F. F. (1971). Communication of innovations; a cross-cultural approach. New York, Free Press.

Scardamalia, M. and Bereiter, C. (1994). "Computer Support for Knowledge-Building Communities." The Journal of the Learning Sciences **3** (3): 265-283.

Schneider, D. K. (1998). TecfaMOO Projects. Retrieved 3 June 1999, from http://tecfa.unige.ch/moo/projects.html.

Schrum, L. (1995). "Educators and the Internet: A Case Study of Professional Development." Computers and Education **24** (3): 221-228.

Schrum, L. (1996a). "Rural Telecommunication for Educational Professional Development and Instructional Improvement: Two Federally Funded Models." Journal of Technology and Teacher Education **4** (3/4): 247-262.

Schrum, L. (1996b). Teaching and learning in the information age : a guide to educational telecommunications. Boston, Mass, Allyn and Bacon.

Shears, L. W. and Dale, E. C. (1983). Computers in Education. Melbourne, Office of the Co-ordinator General: 95.

Simpson, C. (1999). Internet Relay Chat. Syracuse, ERIC Clearinghouse of Information and Technology.

Sofoulis, Z. (1994). Computers: The Mythic Dimension. apitite 94, Brisbane, APITITE 94 Council.

Sofoulis, Z. (1995). Cyberfeminism: The world, the flesh and the woman-machine relationship. ACEC '95 : Learning without Limits, Perth, ECAWA.

Spender, D. (1995). Nattering on the net : women, power and cyberspace. North Melbourne, Spinifex.

Spitzer, W. and Wedding, K. (1995). Shaping On-line Communication Tools for Purposeful Use. American Educational Research Association Annual Meeting, San Francisco, CA.

Sproull, L. and Kiesler, S. B. (1991). Connections : new ways of working in the networked organization. Cambridge, MIT Press.

Stacey, R. (1996). Strategic Management and Organisational Dynamics. London, Pitman.

Stephenson, N. (1992). Snow crash. New York, Bantam Books.

Stewart, A. (1997) Cup-O MUD Client. MUD/MOO (Telnet) Client, Available: http://www.du.org/java/CupOmud/.

Tognotti, S., Schneider, D. K., et al. (1995). Analysis of MOO and WOO environments. TECFA Retrieved 2 August 1998, from http://tecfa.unige.ch/moo/VMDL/VMDL-1.html.

Turkle, S. (1984). The second self : computers and the human spirit. New York, Simon and Schuster.

Turkle, S. (1995). Life on the screen : identity in the age of the Internet. New York, Simon & Schuster.

Wagner, W. (1998). History of Echomail. Retrieved 4 April 2001, from http://www.fido.sk/texty/echomail.html.

Wajcman, J. (1991). Feminism confronts technology. University Park, Pennsylvania State University Press.

Weiry, C., C. (1996). Linguistic and Interactional Features of Internet Relay Chat. Computer-mediated Communication Linguistic, Social and Cross-Cultural Perspectives. S. Herring, C. Philadelphia, John Benjamins: 47-63.

Wiener, N. (1948). Cybernetics; or, Control and communication in the animal and the machine. New York,, J. Wiley.

Williams, F., Rice, R. E., et al. (1988). Research methods and the new media. New York, Free Press ; Collier Macmillan.

Williams, M. (1994). Telecommunications and Australian schools: retrospect and prospect. APITITE 94, Brisbane, Apitite 94 Council.

Williams, M. (1995). Learning without limits? Negotiating an online community for Australian teachers. Learning without limits, Perth W.A., ECAWA.

Yetton, P. and Forster, A. (1997). Managing the Introduction of Technology in the Delivery and Administration of Higher Education. Canberra, Evaluations and Investigations Program, Department of Employment, Training and Youth Affairs.

Zuboff, S. (1988). In the age of the smart machine : the future of work and power. New York, Basic Books.