ECO-NETTING

A Critical Evaluation of the Internet as a Delivery Channel of Environmental Community Information

A thesis submitted in fulfilment
of the requirements of

the research degree of

MASTER OF ARTS

at

James Cook University of North Qeensland

by

PATRICE BRAUN

College of Music, Visual Arts & Theatre

November 1997

Statement of Access

I, the undersigned, the author of this thesis, understand that James Cook University of North Queensland will make it available for use within the University Library and, by microfilm or other means, allow access to users in other approved libraries. All users consulting this thesis will have to sign the following statement:

In consulting this thesis I agree not to copy or closely paraphrase it in whole or in part without the written consent of the author; and to make proper written acknowledgment for any assistance which I have obtained from it.

Beyond this, I do not wish to place any restriction on access to this thesis.

2/6/98

(signature) (date)

Statement of Sources

Declaration

I declare that this thesis is my own work and has not been submitted in any form for another degree or diploma at any other institution of tertiary education. Information derived from the published or unpublished work of others has been acknowledged in the text and a list of references is given.

2/6/98

(signature) (date)

Acknowledgments

Many people have generously contributed time, advice, information and assistance to this study and I am indebted to all. Special gratitude goes to:

Professor Diana Davis for her many content and structural suggestions, patience and encouragement in supervising the work; Dr. Paul Turnbull for his insights into the use of new media; Loretta Saunders and the Great Barrier Reef Aquarium for assisting with the survey; Marianne Brown for her online survey programming; Gavin Ryan and David Cumberbeach for their cool website work; Bridget McGraw for her artistic inspiration and the painstaking details; Allan McDonald and the staff of Ultranet for putting and keeping it all online; the diverse people in the JCU library and computer centre for their helpful dispositions when bombarded for information; Dr. Roger Wilkinson and Caroline Fisher for editorial assistance; Michelle Lasen and Victoria Quade for their unfailing help in clarifying ideas; and my parents without whom this endeavour would not have been possible in the first place.

Abstract

This study explores the nexus between information technology and information delivery by ascertaining the potential benefits of a community Internet website as a delivery channel for environmental information. In the broader sense this study examines computer-mediated communication for pedagogic community use.

Results from a community questionnaire designed to identify the scope and nature of a community's environmental information needs, environmental information gathering methods, satisfaction level with the current environmental information flow, computer literacy and online interest were used as the content and design basis for a prototype environmental community website. Subsequent website evaluation by focus groups indicates that when an online environmental database is tailored to a community's environmental information and online needs, it is potentially an effective means of disseminating environmental community information. In addition, if the environmental website's interface design targets a community's online user profile and related technological expections, it has the potential to enhance the dissemination of online environmental community information.

Implications of the study are that audience sophistication, diversity of information, tentacularity (to coin an appropriate term) and hybridity are crucial considerations in community website design.

Table of Contents

Chapter Ten - Reflections & Directions

List of Figures

In the technological systems of tomorrow - fast, fluid and self-regulating - machines will deal with the flow of physical materials; men with the flow of information and insight.

Alvin Toffler, Future Shock (1970)

Chapter One
Introduction

1.1 Access to Knowledge: from Oral Tradition to the Internet

Possession and control of information have always been linked to knowledge and power. "It is as true today as it was in the Middle Ages" (Provenzo 1986:8) or in ancient Greece, where mastery of words or recitation was equivalent to intellectual sovereignty. There have been a number of pivotal developments in communication, which have not only changed how we relate to one another, but have revolutionised the way we gather and process information.

1.1.1 Print Media

In the history of communication, print is universally regarded as the primary agent of modernisation and mass media consciousness. Up to the middle of the fifteenth century the only written texts available were handwritten manuscripts, which had been dutifully copied by monks and were thence exclusively in the control of the church, scholars or the very wealthy (Provenzo 1986).

Gutenberg's (1450) invention of the printing press made books both accessible and affordable, giving the general population the impetus to learn

how to read and write, thus transferring knowledge and power into the hands of the people. It was, for example, through the use of the printing press that Martin Luther (1483-1546) was able to publish his theological views and supersede the censorship and control of the omnipotent church. Until Gutenberg, people had no alternative but to rely on the oral knowledge vested in the community. The knowledge was generally in the hands of community members with good memories and linguistic abilities, who carefully guarded their knowledge and handed it down from generation to generation. One attitude ethnologists have had to adopt in studying the past of peoples without writing is that it is impossible to assess the level of veracity attributable to oral tradition. As Vansini (1961) states

> All such anonymous oral traditions share the common characteristic of being transmitted spontaneously from one person to another, and during this process the original form is lost and the content becomes fluctuating and blurred (Vansini 1861:10).

Hence rumours, myths, sagas, legends and anecdotes may well have been concocted for propaganda purposes or personal aims.

It was not until the mid nineteenth century's expansion into large-circulation newspapers that the printed word began to reach a mass audience.

The Industrial Revolution was well established, extending the people's power over the environment through the use of new and complex machines. A succession of technological developments such as photo-engravure for picture presentation and linotype machines which used a keyboard for page composition (Ward 1989) were instrumental in bringing about drastic changes in both print form and content. Newspapers reflected the changing character of society and created an intellectual ideological framework for its readership.

"What hath God Wrought?" These famous words were telegraphed by Samuel F. B. Morse in 1844. By the start of the Civil War (1861) telegraph communications spanned the United States, and in 1866 the first trans-Atlantic cable was laid between the US and France (Hall 1995). The spread of the telegraph across Europe and America offered an efficient form of information exchange and by the eve of World War I

> the air was crackling with codes, voices and music
>
> (Barnouw 1990:17).

Initially much of the transmission concerned military communication, but wireless soon became a popular medium to transmit news (Barnouw 1990). News agencies were founded to collect and distribute international news. But while, as Ward (1989) points out, these news agencies assumed an apparent apolitical stance; they, in fact, became

> ... pre-selectors and pre-processors of news (Ward 1989:24)

which not only affected the style and content of news, but had

> ... significant ramifications for the transmission of information in society and the understanding of political messages (Ward 1989:24).

Notable indeed, as it made the press the organiser of public opinion.

The relationship between advertising and print media goes back to the Industrial Revolution when the media became the link between manufacturers and consumers. The struggle for survival has always been a fact of life for newspapers but with the advent of advertising, first made popular by stage-coach operators and railway companies, newspapers gained a new survival technique (Westmancoat 1985).

Work on a national public telephone network was well under way by 1878 when the first commercial telephone exchange was brought into service in New Haven, Connecticut (Hall 1995). Although the invention of the telephone is not unanimously considered a mass communication milestone (Stevenson 1995), it is included here because telephone networks play an integral role in latter day mass media developments. Used in its original form, the telephone is a participatory oral communication device, potentially allowing users to

decentralise knowledge, modify the relations of power, change the conceptions of the public and private, and democratise the formation of opinion (Stevenson 1995).

1.1.2 Motion Pictures

At the turn of the century a second form of mass communication, the cinema, became pivotal in changing social and political life. In 1893 American inventor Thomas Edison developed the kinescope, a machine which could portray motion. Silent film was born, portraying images of everyday American life to an audience of mainly working class, often illiterate, immigrant communities (Ward 1989). Some minor films of the 1920s, e.g., *Uncle Sam of Freedom Ridge* and *Empty Arms* were used for social and political purposes (Everson 1978). As a result, the medium was quickly condemned as a propaganda vehicle by moral arbiters who's underlying motive was the prevention of political mobilisation of the lower classes. In truth it was not until the second decade of the twentieth century that film producers began to exploit the medium to portray events of the real world through film (Everson 1978).

During World War I (1914-1918) it became clear that control of information was the key to political control in the future. Newspapers and films offered the channels to communicate views and values to a large number of the population. Whereas during the early 1920s silent newsreels had been movie-goers' visual source of information about their world, the introduction of sound

in 1927 changed the role of the newsreel from providing a visual background for the issues of the day to reinforcing the information the public received through print (Ward 1989).

By 1920 the first radio broadcasts tests were conducted. Until then wireless radio had been for those with technical knowledge only (Barnouw 1990). However, with the separation of transmitters from receivers and the birth of listening devices to hear the messages emanating from transmitters, the radio market transformed into one

> ... not of electrical wizards, nor of military forces, but of *everyone* (Barnouw 1990, his italics).

World War II saw major information manipulation by radio, cinema and print for political ends. Using historical dramas to present current issues, Germany produced numerous newsreels and feature films to get its propaganda message across. Hollywood produced films like Mrs Miniver to convince the American public of the need of war, while the British cinema made films such as The Cruel Sea and The Dambusters, focusing on individual war contributions for the common good. Short-wave radio was a medium that could cross frontiers and the BBC took on the role of international broadcaster to the masses to counteract German propaganda (Ward 1989).

As peace came, the existing mass media not only had to adjust to different ideologies, but were faced with a new peril: the development of television (Barnouw 1990). The advent of cinema and radio broadcasting had already had major implications for the print press. Cinema was visual, while radio could reach people nationwide, transmit news directly into their homes and was creaming off already scarce advertising revenues. The visual character of television with

> ... its immediacy, universality, and placing with the domestic environment (Ward 1989:168)

was a looming threat to all three. As a 1945 committee report about the role of the BBC bluntly stated "television was here to stay" (Ward 1989:176).

1.1.3 Television

By 1950, adequate technology for a television industry capable of gaining a mass audience was in place and that same year cheap television sets came on the market (Halberstam 1995). It was to be the breakthrough point for mass consumers and the first sign that television was to transform society both culturally and politically. By the late 1950s entire nations were gaining information by nightly sitting down in front of their television sets watching news and entertainment (Halberstam 1995). Though it remained fashionable, and possibly still is, among the intelligentsia to claim that they did not watch television, by the 1960s owning a television set was imperative for an engaged

citizen (Halberstam 1995). While the competition of commercial television had major implications for print, radio and film, it also presented new opportunities for the latter industry. Live television was expensive to produce and film studios were able to provide cheaper, reliable programming by making their film libraries available to television stations and by producing 'made for television' serial programming (Ward 1989).

Television stations discovered early on that news was hugely profitable and that broadcasts such as the first Kennedy-Nixon debate (1960) or controversial Vietnam War footage (1965) helped legitimise the medium as a source for information (Halberstam 1995). The advent of satellite technology in the early 1960s brought about a major shift in the transmission and reception of information, allowing live real-time coverage of everything, everywhere, anytime (Halberstam 1995). When the first men walked on the moon in 1969, audiences around the world were witnessing the event from their living rooms.

The growth of cable television in the late 1970s and the inception of niche channels such as the Cable News Network (CNN) in the 1980s brought increased manipulation of news to augment its entertainment value when rival pressures began to seriously encroach on network news (Hallin 1995).

During the 1980s the boundaries between news and entertainment increasingly eroded. Since then, the predominant form of argumentation or

presentation of facts has come to be dramatisation. Spurred on by competition and ratings, theatricality has replaced reasoned analysis. Reporters have turned into hosts presenting live around the clock coverage of such events as the Gulf war, the aborted coup in the former Soviet Union and the massacre in Tiananmen Square (Harden 1995). "Without television you cannot have a war" wrote an Israeli minister of information (cited in Harden 1995:335), a statement exemplified by Harden (1995) who argues that

> ... since Vietnam every country has realised the importance of having television on its side in any conflict, at any cost (Harden 1995:335).

For many people television offers a window through which they can witness revolutionary changes taking place around the globe. For some people television is their only source of information. There have, in fact, been various studies (e.g., Gerbner 1977) indicating that people who rely solely on television for information over-estimate the violence and disorder in the world. Hiebert (1995) argues that war has become a media circus with governments formulating ground rules and guidelines for event coverage, which makes researchers in the field of media communications question if we are viewing history in the making or merely a censored or fictional version of a carefully managed information flow.

The advent of television and cable have brought about numerous other examples of substantial changes to the structure and use of information, a range of which are described below. Historically mass media have been characterised by a high degree of message transience (Levy and Fink 1984). The introduction of home video recorders (VCRs) in the mid-1970s drastically altered the transient quality of television broadcasts. VCRs changed television from a passive to an interactive medium. By using video recorders for program replay at a more convenient time or to build a home library of programs, viewers effectively altered the existing broadcast schedule (Levy and Fink 1984). Since video gives viewers the option of repeatedly playing program segments and circumventing advertising messages altogether, it has also eroded broadcast formats.

Delivery and content of advertising messages have undergone dramatic changes in the electronic media age as well. When consumers began to grow resistant to generalised mass advertising messages in the 1970s and 1980s, advertisers started targeting specific market segments, particular groups of people with spending money. *Niche* marketing led to *niche* magazines and *niche* television programs, where journalism has become a means to keep people interested in a certain range of goods or activities and advertisers have come to exert pressure on editorial content (Hoyt 1995). Lorimer (1994) sums up the change in advertising messages as

> Products that we are meant to purchase for our own enjoyment or for the enhancement of our self-image tend to reflect the image-oriented values of electronic society (Lorimer 1994:11).

Using the example of beer ads which tend to show the beer drinker's image and sensibilities rather than the beer, Lorimer (1994) hence argues that it is the image of the consumer that is sold and not the product itself. Numerous product examples reinforce Lorimer's argument, e.g., to position the soft drink Pepsi-Cola as *the choice of a new generation* the company signed pop music icon Michael Jackson. Similarly, according to Pollay (1995), all

> ... cigarette advertising images, and their intended meanings, are inherently false (Pollay 1995:198).

Pollay argues that, although cigarettes are deadly and cigarette smoke is inseparable from the physical act of smoking, smoking is hardly ever portrayed in cigarette ads, billboards and commercials.

Information campaigns, for example smoking and drugs prevention campaigns, on the other hand, tend to take a reality-based approach toward disseminating messages by relying on a combination of literate reasoning and image-based values (Lorimer 1994). A picture of a skull smoking a cigarette has the immediate draw of a powerful image accompanied by the subtlety of the logical reasoning that smoking kills. Such an image hence engages the

public's imagination and, on first glance, instils cause and effect. Even if the image is incomplete, e.g., in one New South Wales anti-drunk driving campaign the entire image consisted of two disembodied eyes gazing into a rear-view mirror which reflects a police car, cause and effect can be disturbingly clear (Kress1988).

Although the 1960s generation grew up with television, it predominantly received its music, peace messages and lifestyle information via radio. With the birth of cable television and the growth of niche marketing, a new genre of music delivery has come into being: Music Television (MTV). Today songs and their social messages are conveyed to the MTV generation through audio-visual means by way of music videos. It would appear, however, that the focus of most music videos is more on presentation of self, visual ideas and the ability to command the forces of communication than on the message. Whelan (1994) argues that although

> The video clip has emerged as the dominant force in showcasing popular music, culture, image, drama and dance....due to the rigid programming requirements of television sponsors and government censorship, however, the opportunity for video clips to provide a platform for meaningful social

> commentary has diminished due to the pressures of hard edged commercialism (Whelan 1994:8).

While it is true that music videos have taken the place of radio to launch one's rock music career and image, the medium is not entirely devoid of message. Some noted exceptions of content overriding presentation as the foundation of effective communication are music video campaigns such as We Are The World and Farm Aid in which music entrepreneurs clearly bank on youths being a viable political market.

It must further be noted that, in addition to airing music videos, MTV broadcasts news stories on non-music issues such as AIDS and human rights (Katz 1995). In addition, the video culture has also spawned its own print publications, which are equally skilful in blending traditional issues with popular culture (Katz 1995). According to Hiebert (1995) MTV is the fastest growing mass medium in the world. There is no doubt that popular culture and the mass media constitute leading sources from which young people receive the images and ideas they use in their identity and lifestyle work (Rosengren 1994).

Technological developments after World War II which made television and cable possible also greatly expanded the entire world of electronics (Hiebert 1995). In 1946 the first general-purpose electronic calculator was created. Digitisation of telephone signals was in place in the late 1940s and by the late 1950s

> ... transistors were being edged onto tiny pieces of silicon wafer (Provenzo 1986:19).

But, as Hierbert (1995) proclaims,

> Perhaps the most important technological development of all has been the computer, now an essential part of all mass communication (Hiebert 1995:8).

1.1.4 Computers

Although the first computer dates back to the 1930s and was initially the size of a large room, it was the invention of the microprocessor (1971) and the microchip that truly revolutionised the computer. Provenzo (1986) describes the invention of the microprocessor and the capability to build integrated circuits as the reason that

> ... computers could now be miniaturised and mass produced at an affordable price (Provenzo 1986:21).

As stand-alone desktop or laptop workstations, computers began to be used for anything from data processing to entertainment and soon moved from the office environment into the home (Forester 1987).

The full digitisation of telephone networks in the 1980s put an increased emphasis on computer data transmission (Leebaert 1991). This was indeed the beginning of the telecommunications age as

> ... all information henceforth would be carried in a digital format (Leebaert, 1991:344).

Until then we had considered computers powerful information processors. With the arrival of digitised telephone networks and the computer modem, facilitating the electronic retrieval, transmission and exchange of data via those digitised telephone networks, transformed computers into gateways to knowledge and information (Leebaert 1991).

Soon computer networks worldwide started linking and exchanging information by way of the Internet. Initially only computer experts logged onto the Internet, as extensive computer knowledge was required. Today, with the help of digital technologies and powerful multimedia tools, text-only computer languages are rapidly being replaced by software combinations of text, audio, graphics and video. This software, often specifically created for mass computer use in the home, has made both computers and online services infinitely more user-friendly (Forester 1987).

Improved fiber optic telephone lines as well as rapidly changing computer technology and multimedia interface design have not only allowed for

faster and cheaper access to the Internet, they have opened it up as a mass media communications tool. In 1993 there were an estimated 176 million computers in the world (Floridi 1995) each of which theoretically

> ... could have been connected to the Internet (Floridi 1995:262).

In addition, Floridi (1995) supports the notion that the medium is growing at a rate of 20 per cent a month, and that

> ... it has become a vital instrument for the development of research, communication, business and education (Floridi 1995:262).

Electronic mail is replacing conventional mail delivery, online banking may soon eliminate the need for cash and ATM machines, while interactive shopping malls are being set up all over the Internet. Today's technology is virtually portable and geographical isolation no longer means one is cut off from the information flow. Networking has evolved

> ... to the point where, for all practical purposes, people are able to electronically communicate anything (voice, data, image, video) anytime, anywhere in the world (Johnson, 1991:150).

Hence with a laptop computer and a cellular phone one can be on an island beach or in the middle of a desert yet integrally linked to the world at large.

Telecommunications and the Internet have created a global communications village and are bringing about an extraordinary social and intellectual transformation (Floridi 1995). It is affecting our verbal and written communication skills; the way we gather, publish and process information; advertise, buy and sell products; learn and teach skills. Such transformations are of the greatest importance as they will determine our lifestyle in the decades to come. By the year 2001 online technology is likely to be as pervasive as the telephone is today.

1.2 The Shaping of Knowledge: The Medium versus The Message

The role played by each new mass medium in instituting new patterns of culture has been, and will continue to be, an avid subject of research. As McLuhan (1964) wrote in Understanding Media: The Extensions of Man

> Under electric technology the entire business of man becomes learning and knowing (McLuhan 1964:64).

Mankind has recognised at different times that new knowledge can only be successfully amalgamated through the application of new knowledge techniques (Leebaert 1991). Hence the relationship between mass media, knowledge and culture is well established.

In orate societies information was stored in memory, whereby the facts were variable and the truth mutable. Over the centuries oral transmission or *word of mouth* has remained a powerful communication tool. Apart from being utilised for emotional purposes and to relay messages, human language is still used to transfer information, which Tennant and Heilmeier (1991) argue

> ... reduces the need for experience and discovery
> (Tennant and Heilmeier 1991:126).

Today, however, if oral information is considered socially relevant - regardless of whether it is based on fictional or factual information - modern mass communication channels are quick to disseminate it, often without considering the impact on mass attitudes toward fact and truth.

The invention of writing brought the first dramatic change between human beings and information. Once information was written down, it could be retrieved invariably over time and space, changing attitudes toward fact and truth (Kaplan 1986). The ability of the printed word to make fact invariable and truth immutable

> ... resulted in the whole structure of what we have
> come to call *science* (Kaplan, 1986:10, his italics).

With written language came the possibility to comment on texts as well as structures, resulting over the centuries in the quantity of commentary exceeding the quantity of original information. The sheer amount and widespread

availability of information fostered new systems of organising information and knowledge: the file, the catalogue, the index, the bibliography, the library (Tennant and Heilmeier 1991).

Whereas oral culture allowed the rich interplay of all senses, the printed form, according to McLuhan (1962), developed certain human senses, e.g., sight, and hence shaped a particular form of human rationality. While McLuhan viewed print as stimulating to the eye, radio represented the technological expression of the ear. Extrapolating from McLuhan's (1962) theory that each medium has a different effect on the human brain, Greenfield (1984) describes radio as having auditory dynamism, because it can present sound in real time, while film and television have the added quality of visually stimulating the imagination.

In the second half of the twentieth century television became the primary focus of discussions about the role of mass media in society, especially

> ... the ways in which the medium was contributing to shaping the character and scope of society, its economic life, politics and culture (Lorimer 1994:1).

The transition to electronic communication is connected to the experiential nature of modernity, referred to by McLuhan (1964) as the gradual displacement of hot media with cool media and the elimination of time and

space tied to technological advances. McLuhan (1964) regarded speech, the telephone and television as cold media and print and cinema as hot media, given that the latter two spell out meanings and make fewer demands upon the subject in terms of shaping the flow of information. However, McLuhan's (1964) research is based on a generation whose most active medium of expression was writing.

Today there is considerable overlap between technologies such as computing, communications and images, three technology areas that have had a profound effect on society, are integrating into one (Tennant and Heilmeier 1991). Society is no longer reacting to technology as passive end users. With the new multimedia computer systems, we can now at will

> ... read text, view graphics, cut and paste video images, screen photos, go online on the Internet, play audio CDs and interactive games on CD-ROM or use the computer as the household phone, fax and answering machine (The Weekend Australian, March 30-31, 1996:31).

Hence the interactive quality of the medium is not only fundamentally changing the way information is delivered and processed, it is putting the user in control of the information flow. In terms of McLuhan's (1964) hot and cold medium metaphors, the computer could hence be classified as a cold medium.

While McLuhan did not live long enough to classify the computer as either a hot or cold medium, he made much of the notion of a global village (McLuhan 1968). He did not mean that we would all become members of one big happy family but that we would have the information-gathering capability to be intimately aware of the goings-on of all people in every kind of situation around the world. Our linkage with the whole world may always be incomplete but is steadily growing more inclusive as the global electronic village transforms our environment, extends our realm of knowledge and shifts our attitudes to our own local environment.

In his introduction to Impact of Mass Media Hiebert (1995) states that today

> ... information is a commodity which we are willing to pay for (Hiebert 1995:4).

Willing indeed, although Hiebert omits to mention that we sometimes have no choice but to pay for information. Aided by high technology tools such as the radio, television, VCR, cable, fax and computer, an increasingly information-hungry society is feeding on an ever-growing amount of information to maintain and augment its standard of living (Hiebert 1995). These developments have had a profound effect on the activities of the media industries in a variety of domains ranging from

> ... newspaper printing and desktop publishing to the reproduction of music on tape and compact disc, from computerised systems of information recall to the broadcasting of television programs by satellite (Thompson 1990:205).

In addition to the growing amount and concentration of resources, the media industries have undergone widening diversification in recent years, expanding their activities in different domains and product lines. According to Thompson (1990),

> The concentration and diversification of the media industries have led to the formation of communication conglomerates (Thompson 1990: 196),

which have global interests in a variety of information and communications industries. While various countries have designed legislation against cross-media ownership to prevent firms from controlling access to information (Lorimer 1994), other than on the Internet, the mass media information flow seems to be in the hands of a mere handful of corporations. Concurring with Lorimer (1994) Tyner (1994) argues that in a digital society

> ... information is a finite commodity and that those who disseminate information are more powerful than those who receive it (Tyner 1994:online).

Since the Internet is a notionally free environment, anyone can post anything on any subject, making it effectively a dumping ground for a plethora of information ranging from political propaganda to sexually explicit materials. Fearful of being labelled Luddites, corporations, institutions and individuals alike are racing to become a part of the Internet and upload their own information via so-called homepages on the World Wide Web (www). As a result we are encountering a huge "infoglut" (Floridi 1995:271), an immense Internet library which is largely uncensored and unsorted, where the public is left to sort through the

> ... flotsam and jetsam of this digital tsunami to select the information most useful to their circumstances (Tyner 1994:online).

If one has the patience to sift through endless pages of information, the Internet may well be a great information source although, to date, the technological speed with which we can access and retrieve information leaves a lot to be desired.

While it is questionable whether the quantity of information currently available on the Internet can or will foster the growth of knowledge (Floridi 1995), it is clear that organisation of online information will soon become essential. The question then arises if it is up to the individual to access the

information needed to make informed decisions in a democratic technological society (Tyner 1994) or whether it is the concomitant task of information providers to tailor information in niche environments in order to facilitate information access and retrieval and supersede conventional information gathering methods?

At this time, the Internet has not reached television's pervasiveness or level of mass impact, partially because it is less social as a medium and partially because it is still considered by many to be an elitist information access tool. Irrespective of the continuing influences of other socialising factors, the overwhelming character of mass communication media is likely to eventually encompass the Internet. However, until the universal right of access to online information is provided to all without discrimination, we will be unable to study the true impact of the Internet as a mass communication medium.

1.3 Aims and Significance of the Study

While global impact studies on the Internet may be premature, the phenomenal growth of the Internet has already spawned a dramatic shift in electronic information delivery and retrieval.

As we need to be knowledgeable about what new information technologies such as the Internet can offer individuals and communities, this

information needed to make informed decisions in a democratic technological society (Tyner 1994) or whether it is the concomitant task of information providers to tailor information in niche environments in order to facilitate information access and retrieval and supersede conventional information gathering methods?

At this time, the Internet has not reached television's pervasiveness or level of mass impact, partially because it is less social as a medium and partially because it is still considered by many to be an elitist information access tool. Irrespective of the continuing influences of other socialising factors, the overwhelming character of mass communication media is likely to eventually encompass the Internet. However, until the universal right of access to online information is provided to all without discrimination, we will be unable to study the true impact of the Internet as a mass communication medium.

1.3 Aims and Significance of the Study

While global impact studies on the Internet may be premature, the phenomenal growth of the Internet has already spawned a dramatic shift in electronic information delivery and retrieval.

As we need to be knowledgeable about what new information technologies such as the Internet can offer individuals and communities, this

study seeks to critically evaluate the World Wide Web (www) as a means of disseminating community information. It further seeks to investigate the potential benefits of placing niche information in a community online environment, while a related aim of the study is to explore whether innovative website designs have the potential to enhance community information dissemination. In the broader sense, this study examines computer-mediated communication for pedagogic community use.

1.4 Organisation of the Study

Chapters Two through Four review the role of mass media in environmental information delivery, the growth of the Internet and its use as an environmental information source, and creative design issues involved in environmental message delivery in the digital age respectively.

The study itself is divided into three phases. In Phase One, the Environmental Information Phase described in Chapter Five, a data collection methodology is developed to evaluate a community's existing environmental information gathering methods and perceptions of computer/online issues, a questionnaire is designed and implemented, a data management system is defined, a profile of the survey sample is established, and survey analysis

issues are raised. Ensuing community survey results are recorded in Chapter Six.

Chapter Seven outlines Phase Two, the Utilisation of Information in the Website Design, in which a framework for the website's content and graphical interface design is formulated. Phase Three, the Website Launch and Evaluation Phase described in Chapter Eight, incorporates the website evaluation methodology. Website appraisal results are described in Chapter Nine, followed by the study's conclusions in Chapter Ten.

Chapter Two

Environment Messages: Directions from the Research

2.1 Knowledge of Environmental Issues

There is no doubt that the mass media play an important role in all information gathering and dissemination. The impact of newspapers, television and other forms of mass media on environmental knowledge has been the focus of various studies (e.g., Atwater, Salwen and Anderson 1985; Fortner and Lyon 1985; Sharlin 1985; Bowman 1978; Bowman and Hanaford 1977; Rubin, Harris, Jones and Sachs 1977).

The first Earth Day (1970) brought an environmental information explosion in the American media, accompanying, in the words of Bowman and Hanaford (1977),

> ... the spectacular rise in public concern about the environment (Bowman and Hanaford 1977:165).

Having observed this rise in public concern for the environment, Bowman and Hanaford (1977) decided to explore the depth and durability of environmental concern since Earth Day 1970. As their study occurred in an era where the number of American mass publications was greater than that of newspapers,

radio and television stations, they surveyed the number of environmentally themed articles in eight mass circulation magazines over a five year period (January 1971 to December 1975). Bowman and Hanaford (1977) concluded that

> ... readers of most of the leading mass circulation magazines were unlikely to get an adequate exposure to environmental problems (Bowman and Hanaford 1977:163).

Bowman and Hanaford further observed certain trends in environmental reporting, for example in the first half of the 1970s there were more stories on resource management than on any other environmental topics and that environmentally-themed stories would have declined altogether, had it not been for the oil crisis in 1973.

The 1980s and 1990s have brought a remarkable upswing in environmental reporting and public concern for the environment. Yet some of the trends in environmental reporting observed by Bowman and Hanaford (1977) in the 1970s still persist. While today's mass media have the capability to inform the public on all environmental issues, the vigour of mass media reporting on environmental issues is often directly related to either (1) the immediacy of the event at hand, e.g., Chernobyl; (2) the 'bandwagon' effect, e.g., if it is a trendy issue, regardless of whether the topic at hand may be too

abstract or intangible for some people such as non-point source pollution; or (3) because good mileage can be derived from repeated reporting on an issue, e.g., the greenhouse effect.

Other literature in this area (Ostman and Parker 1986/1987) points to newspapers and television being the most frequently used media for environmental information. Ostman and Parker (1986/1987) cite previous studies which indicate that different media appeal to different people (e.g., Carpenter 1960) and that such appeal is directly related to the shape and content of the environmental message (Weis and Knudson 1980; Schoenfeld 1974). In an earlier study Ostman and Parker (1985) had already found that there are

> ... medium-specific audiences and medium-specific effects. Newspaper readers were more oriented toward print media, whereas television viewers used more radio (Ostman and Parker 1985:np).

However, as Ostman and Parker (1986/1987) later point out, there is conflicting evidence

> ... as to the medium which was used most frequently by a general audience (Ostman and Parker 1986/1987:15),

leaving environmental communicators guessing which medium to use in order to get their message across more effectively. To complicate matters further for environmental communicators, an earlier Ostman and Parker (1985) study had already concluded that amongst those surveyed neither television nor newspapers were actually considered reliable sources for scientific information on the environment and that books and pamphlets rated highest as credible sources for scientific environmental information.

Nonetheless Ostman and Parker (1986/1987) concur that there are strong indications that the role of the mass media as environmental information providers, especially newspapers and television, will not only endure but expand as technological advances, e.g., cable television, are adopted by the general public. Other environmental communication research supports the theory that the more a person depends on mass media for information, the more important mass media will be in forming that person's image of environmental policy (Pierce, Lee-Salmos, Steger and Lovrich 1990).

More recent environmental communication studies have focused predominantly on news production in relation to knowledge of and attitudes about environmental issues (Smith 1993; Corbett 1992; Daley and O'Neill 1991; Rossow and Dunwoody 1991). Extensive research revealed no follow-up studies into American media use for environmental information dissemination

since Ostman and Parker (1986/1987) nor any other studies addressing the issue of public environmental knowledge sources.

Results from a survey by the Australian Bureau of Statistics (ABS) (1992) on environmental issues, which includes a profile on the population's environmental views and practices, indicates that 86 per cent of the Australian population uses the popular media (e.g,. television, radio and newspapers) as their most common source of environmental information. Although the study did establish media use by gender, by age, by household type, and by states and territories, data were not correlated on a community basis. Nor was further analysis undertaken by the ABS study as to which of the popular media ranked highest in use or which medium was considered most credible.

Having become increasingly pervasive over the past two decades, television may well rank as the most used medium for environmental information today. Meanwhile, television is rapidly being upstaged by interactive multimedia and the Internet which, with its ability to integrate text, graphics, audio, video and animation, creates an extensive new field of research in content delivery and information retrieval. Use of the Internet as an environmental information source is discussed in Chapter Three.

2.2 Environmental Attitudes and Concern

Environmental communicators take their environmental message to the public on the assumption that increased knowledge about environmental issues will change people's environmental attitudes. While few studies focus on public environmental knowledge alone, a great deal more research has been directed toward the relationship between environmental knowledge and environmental attitudes. Arcury (1990), referring to the existing studies on public environmental knowledge as

> ... severely limited, with scant effort toward integration (Arcury 1990:300),

cites only three studies from the 1970s (Arbuthnot 1977; Ramsey and Rickson 1976; Maloney and Ward 1973) which correlate education with environmental knowledge and subsequent environmental concern.

In the late 1970s Van Liere and Dunlap (1978) developed the New Environmental Paradigm (NEP) Scale to measure the paradigmatic shift in public attitudes toward the environment. The NEP theory holds that as the environmental worldview changes, people will seek to enhance their understanding of nature and redefine their position within nature. Thus the former belief of human domination over nature as a result of technological

developments was replaced by the belief that humans need to adapt their understanding of the limits of nature and find a framework to live within those limitations. Van Liere and Dunlap's NEP scale (1978) was widely adopted and in the 1980s environmental knowledge research shifted from an education to a socio-economic focus (Arcury and Johnson 1987; Arcury, Johnson and Scollay 1986; Council on Environmental Quality 1980) in which researchers started to equate environmental knowledge with worldview, education, gender, residence and income.

As society has become more aware of environmental issues, researchers have started to focus, and disagree, on the background variables, e.g., gender, education, income and worldview, involved in measuring environmental knowledge and concern. Arcury and his colleagues (1987, 1986) approached the variables issue by examining gender and education differences in environmental knowledge by measuring the impact of the NEP (Van Liere and Dunlap 1978) on environmental knowledge (Arcury et al. 1986) and by using a modified version of the 1980 Council on Environmental Quality survey to measure actual environmental knowledge (Arcury and Johnson 1987). They consistently found community type, age, education, income and gender to be the major correlates of environmental knowledge, with males having a greater tendency to be environmentally knowledgeable than females. In a later American study Arcury (1990) concludes that environmental knowledge is

consistently related to environmental attitudes, although the relationship is not especially strong.

In Germany Schahn and Holzer (1990) found women to be more environmentally aware in areas relating to the household, whereas men had more knowledge of general environmental issues. It must be noted that a broader spectrum of environmental issues was covered in the Schahn and Holzer (1990) study than in the Arcury and Johnson (1987) one. Arcury and Johnson (1987) modified an existing questionnaire to measure progress in environmental knowledge, while Schahn and Holzer (1990) constructed a new measurement instrument to simultaneously measure environmental knowledge, attitude and behaviour. Hence the objectives and measuring scales used in these studies vary greatly, making it difficult to extrapolate meaningful results.

Van Liere and Dunlap's (1978) NEP is widely recognised in the literature for its ecologically integrative view. The NEP multi item scale is, however, not extensively used as a measuring scale of people's environmental attitudes as it cannot consistently be used across different populations (Geller and Lasley 1985). In a later study Van Liere and Dunlap (1981) point out that it does make a difference how environmental concern is measured, as studies on environmental concerns can produce considerably different results depending on measurement terms. Moreover, as Van Liere and Dunlap (1981) demonstrate, differentiation between the various components of environmental

concern are important as well. Some researchers will want to measure attitudes towards recycling, while others are more interested in wildlife or pollution. Van Liere and Dunlap (1981) conclude that

> It is unclear, however, whether attitudes toward these various substantive issues reflect equally the broader concept of concern with environmental quality....what constitutes respondents *expression of* environmental concern, and thus what specific strategy should be employed to measure that concern (Van Liere and Dunlap 1981:653).

When Maloney, Ward and Braucht (1975) published their revised scale for the measurement of ecological attitudes and knowledge, based on the concept that

> We must determine what the population knows, thinks, feels, and actually does regarding ecology and pollution (Maloney, Ward and Braucht 1975:787),

it was received with considerable interest, often referred to in the literature, yet only sparingly used by other researchers. Leeming Dwyer and Bracken (1995) report that they follow the recommendation of Gray, Borden and Weigel (1985) that researchers should benefit from the prior measurement efforts of others by

> ... devising a children's environmental and knowledge scale, in part based on the Maloney et al. adult ecology scale, as it contained "acceptable levels of reliability and validity" (Leeming Dwyer and Bracken 1995:23, their quotes).

Most studies focus on particular environmental issues and, in order to tap their different components, researchers resort to devising a project-specific scale (Gray et al. 1985) rather than using a global scale. More often than not, as Leeming et al. (1995) point out, there is very little information about the reliability of researchers' measuring instruments and hence make most measuring scales of little or no benefit to other researchers.

Another fundamental problem one is faced with when comparing environmental attitude results within the literature, is the social-psychological terminology and approach used by different researchers. As interest in environmental research has burgeoned to involve a wide array of academic fields, e.g., education, psychology, sociology, communication, environmental and behavioural sciences, with little or no data exchange between these fields, it is questionable if data from a study on environmental attitude (Arcury 1990) should or can successfully be compared with a study on environmental orientation (Gebhardt and Lindsey 1995) or, for that matter, with a study on environmental concern (Stern, Dietz and Kalof 1993). No attempt was made by

this researcher to correlate of environmental attitude results across a broad academic base.

2.3 Environmental Behaviour

There are a number of variables considered to be influential in motivating individuals towards responsible environmental behaviour. In their meta-analysis of existing research since 1971 on the variables that shape environmental conduct, Hines, Hungerford and Tomera (1986/87) identify knowledge of issues; knowledge of action strategies; locus of control; attitudes; verbal commitment; and an individual's sense of responsibility as the main variables influencing environmental behaviour. One aspect of concern in identifying environmental behavioural patterns (Hines et al. 1986/87) was the validity of people's self-reported behaviour, as previous research (Deutscher 1973; Brickman 1972; Wicker 1971,1969) has shown that

> ... what people indicate on a questionnaire is often inconsistent with their actual behaviour (Hines et al. 1986/87:2).

While Hines et al. (1986/87) illustrate the unpredictability of environmental behaviour, their model based on the above variables is useful for environmental educators and includes such personality and knowledge components as

> An individual who expresses an intention to take action will be more likely to engage in the action than will an individual who expresses no such intention.... Before an individual can intentionally act on a particular environmental problem, that individual must be cognisant of the existence of the problem. Thus, knowledge of the problem appears to be a prerequisite to action. However, an individual must also possess knowledge of those courses of action which are available and which will be most effective in a given situation (Hines et al. 1986/87:6).

More recent environmental behaviour research focuses on personal values with environmental satisfaction and dissatisfaction, e.g., with environmental conditions and environmental government policies, being a potential motivating factor for environmentally friendly behaviours ((Karp 1996; Pelletier, Legault and Tuson 1996). Nonetheless, according to Pelletier et al. (1996),

> Dissatisfaction alone is sometimes insufficient to stimulate more demanding forms of activism, e.g. active involvement with an environmental group (Pelletier et al. 1996:23).

Although self-transcendent, openness to change and universalism are values considered to have a positive influence on environmental behaviour (Karp 1996),

> Individuals who strongly value self-enhancement/ conservation are the least likely to be pro-environmental (Karp 1996:127).

Hence to achieve pro-environmental behaviour Karp (1996) advocates environmental education methods ranging from the coercive to the voluntary, with a preference towards the voluntary.

Considering the wide array of values involved, environmental educators would be well advised to establish local environmental attitudes and knowledge levels before embarking on environmental education.

2.4 Environmental Education

There is wide agreement that education plays an important role in transforming people's values and lifestyles. As Cohen (1986) argues

> The role of environmental education is to increase people's understanding of the environment, their concern for it and willingness to act to protect it. Education builds community awareness of how

> important the environment is to each of us, and of the problems we face in protecting it (Cohen 1986:1).

Based on the values of the NEP (Van Liere and Dunlap 1978), Fien (1993) emphasises the importance for educators to understand that

> Education *for* the environment stands in contrast with education *about* and *through* the environment. Education for the environment seeks to engage students in the active resolution of environmental questions, issues and problems (Fien 1993:5, his italics).

It is generally believed that people change their environmental behaviour after active encouragement. Geller (1995) argues that community-based intervention, e.g., education sessions, television commercials, films, pamphlets, verbal and written messages from parents, friends, etc., is needed to decrease environmentally destructive behaviours and that

> ... behaviour-based psychology offers the technology for changing behaviors and attitudes (Geller 1995:184).

Reviewing a number of such informational and motivational educational techniques, De Young (1993) surmises that, while these techniques may have

positive impact on behaviour, none are optimal in durability. De Young (1993) further argues that there is a compelling need for new techniques with durable effect.

To disseminate environmental information, today's environmental educators by and large still employ conventional mass media techniques, e.g., television campaigns, films, posters, pamphlets, etc. As these media are transitory in nature, they will need to be repeated regularly to achieve enduring behaviour change (De Young 1993). We live in the age of interactive computer technology, a medium which has yet to be explored as an effective means for the delivery of environmental information. By making motivational and educational information consistently available to the public online, the medium can potentially accomplish durable behaviour change.

Chapter Three
The Internet and the Community

3.1. The Information Age

Information technology (IT) and the Internet are terms that seem to be ubiquitous these days. Our televisions, computers, telephones and fax machines are steadily merging into one giant interactive technology commonly referred to as the Information Superhighway. While interactive television and view-on-demand (VOD) programming are still in the experimental stages, computers and the Internet are leading the paradigmatic information transformation.

The Internet is a global network of interconnected computer networks, allowing millions of people around the world to access, contribute and retrieve information, as well as interact with one another online. At the height of the cold war, the American Department of Defense engaged the Advanced Research Projects Agency (ARPA) to construct a network, later known as ARPANET, which could provide a system of communication after a nuclear attack. ARPANET enabled routing of information to its destination through each and any node should one or a series of connected nodes be wiped out by a nuclear attack (Floridi 1995). Initially, access to information via each node

was for research purposes only. However, the latter was soon taking a back seat to researchers' information sharing via such means as electronic mail. Moreover, it quickly became apparent that messages often contained information worth distributing to many users. Thus electronic mailing lists were born (Jones 1995).

The success of ARPANET fostered the 1981 inception of another grandparent of the Internet, BITNET, which was initially set up as an electronic mail distribution network (Floridi 1995) and now connects educational institutions in the United States and at least 32 other countries (Ogan 1993). The growth of these networks led to the 1982 establishment of the Transmission Control Protocol (TCP) and the Internet Protocol (IP), two standards through which different networks could henceforth communicate.

> It was a lingua franca for the entire network, and in more than one sense the new, anarchic state of Internet was "virtually" born (Floridi 1995:262, his quotes).

While these networks have formed the backbone and model for a global network of interconnected networks, the Internet itself is not owned or regulated by any one person, corporation, government or service. This may, however,

change in the future as a main hazard, according to Negroponte (1996), stems from governments who are attempting to control the Internet.

> Usually under the banner of sanitizing the Net for children, people all over the world are trying to censor its contents. Worse, some countries want to make sure that there is some means for them to listen into messages, like wire tapping (Negroponte 1996:233).

As the Internet is not owned by anyone, no entity derives income from the service as a whole. Comparable to borrowing books from a public library, resources and information on the Internet are still predominantly free, although an increasing number of commercial websites are putting a fee structure in place for information retrieval. Access to the Internet as such is, however, not free. While governmental, corporate and educational institutions may provide free Internet access for their staff or students, autonomous users are obliged to pay a commercial Internet Service Provider (ISP) to gain access to the Internet.

3.2 Equal Access

Given the position of the autonomous Internet user, there are still many barriers to universal online access. As Spender (1995) argues, Internet access is a case of digital discrimination, whereby society is split into the information-

rich and the information poor with "the information-poor getting poorer" (Spender 1995:170).

> Whether it is oral, manuscript, print or electronic media, the issues are *access* and *equity* (her italics) if we want the full story. We need to democratise information-production if we want the best possible basis for making up our minds and arranging our community. (Spender 1995:xxvi)

Spender (1995) elaborates on how the printing press changed the course of human history and how the sheer number of books was an incentive for learning to read and write, yet she does not attempt to correlate access to online information and initial access to, or affordability of, books. Nor does Spender compare computer and online trends with the early days of television. As Halberstam (1995) reports, it took close to two decades before television was adopted by the masses.

Negroponte (1996) apparently does not consider affordability of a computer, online training and online time as essential components, since he does not raise these issues at all. He merely illustrates how children anywhere in the world, including children studied in a rural, poor, and underdeveloped West African country like Senegal, have shown no difference in the adoption of and enthusiasm towards computers, despite

> ... the absence of a mechanistic, electronic, gadget-oriented environment in their normal life (Negroponte 1996:204).

As a result, he categorises the young being comfortable with technology as the "haves" and computer-illiterate adults as the "have-nots" (Negroponte 1996). However, children around the world can only appropriate this global information resource if they are privileged enough to access the medium in the first place. As Spender (1995) points out,

> Currently we have the technology enthusiasts who declare that the Internet will be coming soon to every village in the world, at a price that all can afford. But the social and political reality is very different (Spender 1995:251).

One of those realities, according to Spender (1995), is the computer and Internet gender access issue. A 1997 study targeting 16-18 years olds conducted in England reports that domestic use of computers remained highly in favour of the male gender, although the gender gap is gradually declining. Results of this decline may be seen in the rise of non-gender differentiated high level computer use in British schools (Durndell and Thomson 1997:1).

Clearly, McLuhan's (1968) vision of a global village is still elusive, as it may take a decade or more before global computer and online access are a reality. As such Spender (1995) advocates that

> ... we do not have to give up the ideal of the global village, the electronic community where everyone can be consulted (Spender 1995:251),

but rather focus on research and policies which examine the social and political impact of using new technologies first. There is no doubt, as Provenzo (1986) argues, that

> ... the new technology imposed by the micro-computer revolution will redefine humanity's understanding of itself and nature (Provenzo 1986:8).

3.3 Internet Research

3.3.1 Computer-Mediated Communication

While there is a body of research on mass media and communications stretching over four decades (e.g., Hiebert 1995; DeFleur & Ball-Rokeach 1989; Gerbner 1977; McLuhan 1964), few studies thus far have explored the effects of the Internet as a mass medium. Literature in the area is therefore limited. Morris and Ogan (1996) maintain that researchers have not only ignored the

Internet, but the entire field of computer-mediated communication, as it is easier to stay instead

> ... with the traditional forms of broadcast and print media that fit much more conveniently into models for appropriate research topics and theories of mass communication (Morris and Ogan 1996: online).

Morris and Ogan (1996) illustrate their point by citing the attitude of DeFleur and Ball-Rokeach (1989) toward computers at the end of the 1980s thus:

> Even if computer literacy were to become universal, and even if every household had a personal computer equipped with a modem, it is difficult to see how a new system of mass communication could develop from this base alone (De Fleur and Ball-Rokeach 1989:335).

Less than a decade later, computer-mediated communication services such as the Internet, Usenet and numerous other mail, messaging and electronic bulletin-board services (BBSs) are usurping the postal service, the telephone, and even the fax machine (Jones 1995). Morris and Ogan (1996) refer to the Internet as a

> ... multifaceted mass medium, that is, it contains many different configurations of communication (Morris and Ogan 1996:online).

Although Hearn, Anthony, Holman, Dunleavy and Mandeville (1994) acknowledge that there is a shifting media structure, they prefer to call the nature of the emerging communications infrastructure a powerful alternative to mass communication as

> Future media will eventually have the capacity to be more interactive than passive; customised rather than mass; dynamically heterogenous rather than relatively homogenous; and aesthetically more compelling (Hearn et al. 1994:1)

Approaching it from a consumer point of view, Hearn et al. (1994) even suggest that

> ... the era of the dominance of mass communication could potentially be over (Hearn et al. 1994:3).

3.3.2 Cyber Communities

Global linkage with the Internet may always be incomplete, but it is steadily transforming our lifestyles, extending our realm of knowledge, and changing our attitudes toward our own local environment. As information technology becomes commonplace, greater emphasis is being placed on the potential uses of the technology rather than the technology itself.

Downes (1993), author of a thesis on the new communication environment arising from the convergence of computers and telecommunications, concludes that

> ... cyberspace is a set of narrative strategies whose outcome is to aid in the promotion of technologies. The rhetorical struggle in cyberspace concerns definitions advanced by various interest groups attempting to set boundaries for the emergence, social application, and human uses of new communication technologies (Downes 1993: online).

The Internet is bringing about new social formations, which Jones (1994) aggregates in the term 'cybersociety'. Jones's (1994) notion of a cyber community depends entirely on people sharing thoughts and information across vast geographical distances, omitting Internet users in the same geographical location, e.g., bulletin board users sharing community information via the Internet.

While early online demographics research has been, and continues to be, undertaken, resulting in such estimates as 94 per cent of the cyber community being male and 56 per cent being between the ages of 21 and 30 (Carli 1994), few studies thus far have examined either geographically dispersed or local cyber community characteristics, impact on knowledge, or

attitude changes as a result of information retrieval via the Internet. Cyber cynic Clifford Stoll (1996) dismisses virtually all but the local electronic bulletin board communities as useful in addressing social needs or business concerns, yet he omits to address what *does* happen to a person who communicates via the Internet.

There are some studies which have focused on information technology for local community use (Vandermeulen 1995; Guthrie 1991). Examining the development of public information utilities in four cities in California, Guthrie (1991) pays particular attention to the social shaping of these utilities, focusing on the design of information delivery, the locus of information control by the user and appropriate content and management structure for the intended user. Vandermeulen (1995), on the other hand, approaches his research from the information provider perspective, indicating that local governments could benefit from public information technology (PIT) to communicate with citizens about local issues. Measuring the impact of PIT technology on the attitudes and viewpoints of local government officials, VanderMeulen (1995) found strong support for PIT use but suggests that a number of changes and improvement are needed to make PIT a more effective tool for local officials and residents alike.

Although neither Vandermeulen (1995) nor Guthrie (1991) specifically address use of the Internet as a means of public information delivery, both

studies imply that the emerging information technology can sharply increase the amount and quality of information available to the public and that providing interested residents with access to community-specific information can effectively help them participate in community planning processes. Studying public information networks for Bremen, Germany, Yang, Kubicek and Redder (1995) also advocate that citizen information networks should be made available to meet the growing demand from citizens for better information on community matters and to stimulate better communication among citizens about community affairs.

How swiftly users are willing to adopt computer-mediated information technology remains to be seen. Turkle (1984) approaches the use of computers as a subculture, whereby people have to accept computers as a way of life. Once that way of life is adopted, the computer

> ... encourages projection and reflection, functioning as a cognitive medium to influence people's conception of themselves, their jobs, their relationships with other people and their ways of thinking about social processes (Turkle 1984:168).

Approaching the issue from a marketing perspective, the Henrichs (1995) study on the adoption of innovative technology such as the Internet for home use, indicates that existing research frameworks for acceptance of consumer

durable products can also be applied to the adoption of innovative technological services, with emphasis on understanding time and willingness to pay for online services as factors in the adoption decision (Henrichs 1995).

3.4 Community Networks

The first community network system developed in the 1970s in Berkeley, California, was a model to facilitate free exchange of information placed on the network by community members to promote community-oriented information (Schuler 1994). The model was run by volunteers and provided a channel for inexpensive communication and participation within any city (Schuler 1994).

In the years to follow, various community network experiments were held across America. A medical bulletin board constructed in 1986 led to the creation of the first Free-Net, a gathering of community organisations in one electronic city site (Schuler 1994). This model was quickly copied by communities around the globe and led to the establishment of the National Public Telecomputing Network (NPTN), a non-profit organisation that serves as a loose-knit parent company for free-net community networks in locations throughout Europe, America and the Pacific Rim (Schuler 1995). In the late 1980s the city of Santa Monica established a Public Electronic Network (PEN) providing access to city government information, city council agendas, reports, and the library's online catalogue (Schuler 1995).

No matter whether they were labelled community networks, civic networks or public access networks, the core objectives of the developers of each of these networks was to offer free information, engage community members in community life, and facilitate interaction on issues of mutual community concern. As Schuler (1995) argues, community networks play an important part in

> ... understanding issues of electronic democracy as they play out in the real world (Schuler 1995:online).

As the Internet has grown, so has the interest in access to local information. In many ways, community access networks and bulletin board systems (BBSs) could be considered the forerunners of future localised information networks on the Internet. As Stoll (1996) points out, local bulletin boards are only an arm's length from the Internet and specialise in local interests. Not only are they part of every community, but they are the

> ... palettes of local color that generate community identity (Stoll 1996:222).

Hecker (1994) argues that, although public access systems have the ability to create worldwide "virtual communities" of people physically separated but united by common interests, the first priority of a community access system should be to serve its local community. But can a local community be served if

people do not have a computer or the computer skills to access the system? Hecker (1994) equates computer knowledge to a community online system with literacy to a public library, e.g., as a means to derive the benefit thereof, yet he does not consider promoting computer literacy as a primary objective of a community online system.

Minimising the cost to access the system and maximising the availability of access points also rank high on Hecker's (1994) list of primary goals. According to Hecker (1994), the primary objectives of community access computer systems are (1) to facilitate participation in community life by providing open access to public and civic information to anyone in the community; and (2) to promote community awareness of and involvement in public issues and programs (Hecker 1994:online).

For many online users BBS technology has been more appropriate and obiquitous than Internet access. But while numerous electronic bulletin boards have been started on a local level by anyone from government and educational institution to dedicated hobbyists, each group has been concentrating on its niche environment, operating in a void with no electronic mail facility between groups (Cisler 1993). Today a convergence of many of these services and systems has been set in motion through the explosive growth of the Internet.

At a time of widespread perception among the general population that community and civic values are declining (Schuler 1995), computers and computer networks have the potential to provide both the "haves" and "have-nots" (Negroponte 1996) with a participatory information channel and act as the community glue. Brown (1997), the Minister for Information Technology Services in South Australia, argues that information technology is now an intrinsic part of every day Australian life and

> ... community groups are effective agents who can help to nurture confidence in the new economy and broaden the information agenda within the community (Brown 1997:59).

It is, according to Brown (1997), the role of governments and educational institutions to act on information technology initiatives and encourage public participation by enabling broad community access to Internet services. It follows that the next phase of development should be the delivery of niche community information services via the Internet.

Chapter Four
Creative Message Delivery in the Digital Age

4.1. Communication and Culture

As argued in Chapter One, mass media and popular culture act as powerful public pedagogies in shaping worldviews and cultural knowledge in terms of constituting leading sources from which people receive the images and ideas to transform their knowledge into action and purchase power (Luke 1995; Rosengren 1994).

It is therefore difficult to contemplate any form of communication, whether it be speech, literature, music, sculpture, theatre, film or television, without also contemplating cultural context and meaning.

> All cultural practices are significant and they are all endowed with meaning (Kress1988:10).

In fact, most forms of communication not only abound with meaning, they are often specifically engineered for impact. As McLuhan (1967) points out

> All media work us over completely. They are so pervasive in their personal, political, economic, aesthetic, psychological, moral, ethical, and social

> consequences that they leave no part of us untouched, unaffected, unaltered (McLuhan 1967:26).

With the emergence of globalisation as a key cultural and economic phenomenon, McLuhan's theories on the influential character of media communications have been substantiated by researchers such as Meyrowitz (1985) and Giddens (1990).

Toffler (1970) calls these engineered messages highly purposive, image-laden and "consciously designed to maximise informational content" (Toffler 1970:155). Well before the rise of cable television and the computer information age, Toffler (1970) was already pointing to information-overload, the vast number of messages bombarding our senses, and the increasingly widespread use of symbolism for compacting information.

> In an effort to transmit even richer image-producing messages at an even faster rate, communications people, artists and others consciously work to make each instant of exposure...carry a heavier informational and emotional freight (Toffler 1970:157).

The techniques and mechanisms adopted by communicators, artists and others to convey their message depend on the perceived profile of the target audience

and range from games to live entertainment, art, educational materials and advertising campaigns via print, radio and television (Walls 1995). Computer technology and new electronic mediums such as interactive CD-ROMs and the Internet are, however, rapidly changing the way in which messages are being delivered.

Environmental messages are highly purposive, image-laden and designed to educate their target audience, but do they, in fact, succeed in their purpose? Promoting a visual design framework sensitive to cultural differences, Ratner (1990) argues that effective environmental education can only come about when audience characteristics and task requirements are balanced by a visual message.

> A picture is worth a thousand words only if the message maker and the intended audience speak the same language (Ratner 1990:7).

4.2 Environmental Message Presentation

In evaluating the role of the mass media in environmental information delivery (see Chapter Two), the rise in public concern for the environment from the 1970s onwards and the upsurge in environmental reporting by the mass media were discussed (Ostman and Parker 1986/1987; Bowman and Hanaford

1977). Over the years environmental events such as Earth Day and World Environment Day have gained prominence as have a variety of other environmental message presentations.

Environmental matters now touch so many that subliminal and overt environmental images and messages can be found in virtually all media formats, the most common of which are reviewed below. As discussed in Chapter Two, different media appeal to different people (Carpenter 1960) and such appeal is directly related to the shape and content of the environmental message (Schoenfeld 1974; Weis and Knudson 1980).

4.2.1 Visual and Performance Art

Art engages us in confirming or challenging our responses to issues (Diffey 1995), representing as Emile Zola said,

> ... a corner of nature seen through a temperament
>
> (cited in Diffey 1995:206).

Environmental art is not new. In fact, according to Matilsky (1994), environmental art is part of a long tradition. Matilsky (1994) and Cembalest (1991) identify artists from as early as the Paleolithic cave painting era through 19th century landscape painters such as Albert Bierstadt and Thomas Moran as possible environmentalists responding to extreme environmental changes. It was not until the twentieth century, however, that environmental art developed

an international profile. With its emergence a radical new art form evolved, one no longer restricted to traditional materials such as canvas and paint, stone, clay or wood, but one where artists began to experiment with life and nature itself (Matilsky 1994).

In 1908 Australian photographer John Watt Beattie orchestrated a campaign to protect Tasmania's Gordon River by turning his photographs into a powerful defence of the environment. Before Beattie no Australian artist had ever been overtly political about an environmental issue (Bonyhady 1996). Beattie's concern for the environment was shared by Arthur Streeton, Australia's first environmental painter, who used his 1920s and 1930s landscape paintings as a vehicle to express his fears for the future of Victoria's forests (Bonyhady 1993). Seven decades later contemporary Australian artist Edwina Warrender decorates sixty to eighty year old recycled timber doors with rainforest and other nature scenes to convey her message about environmental damage caused by humans (Habitat Australia 1995:41).

In the United States the 1940 Ansel Adams photograph *The Sierra Nevada and the John Muir Trail* intended as art so impressed President Roosevelt that it led to legislation making Kings Canyon a national park, while photographer Philip Hyde's (1963) publication of *The Place No One Knew: Glen Canyon on the Colorado* is now also considered an early environmental work (Goldberg 1991). By the late 1960s, following a time of social and political

turmoil which resulted in the formation of movements such as the Environmental Defence Fund and Greenpeace (Matilsky 1994), the American environmental art movement emerged in full force.

Hans Haacke was one of the first artists to bring nature indoors by growing grass on a square plexiglas cube at the Howard Wise Gallery in New York in 1966 (Matilsky 1994). In 1969 Mierle Laderman Ukeles issued her *Manifesto! Maintenance Art* in which she proposed to exhibit her daily household cleaning as art (Crabtree 1994). Ukeles went on to confront the public with the problems of waste disposal in such projects as her 1979-80 large-scale piece *Touch Sanitation*, in which she shook the hand of every sanitation worker in New York City and *The Social Mirror*, the display of a mirrored garbage truck in an 1983 New York art parade (Crabtree 1994).

In Newton and Helen Mayer Harrison's 1970 performance piece *Making Earth*, the artists drew attention to the depletion of top soil by actually making "fertile earth from its elemental components" (Matilsky 1994:12). The Harrisons have been investigating aspects of fragile eco-systems worldwide for over thirty years through their *Lagoon Cycle* and other artworks composed of visual and textual narratives. Their 1993 work *Serpentine Lattice* responds to the destruction of America's Pacific Northwest (Matilsky 1994). Many of Christo's artworks, e.g., *Running Fence, Sonoma and Marin Counties* (1972-1976), may

be considered environmental as they delineate the contours of land or nature (Matilsky 1994).

In German-born environmental artist Joseph Beuys' 1974 performance work *Coyote. I like America and America Likes Me* the coyote

> ... symbolised the American West and the extermination of indigenous peoples who viewed the animal as sacred (Matilsky 1994:13).

The performance works of Beuys, Ukeles, Christo and the Harrisons are representative of artists acting as social and political activists. In 1976 Beuys even took the unprecedented step of running for a parliamentary Green Party seat. Although he did not win the seat the attempt was indicative of artists beginning to play a broader political role in society (Cembalest 1991).

By the 1980s the environmental art movement had been established globally with artists internationally cognisant that art has the potential to create practical solutions to environmental problems. As 1980s and 1990s environmental artists are numerous, the trend is perhaps best illustrated by the recent formation of movements such as the International Friends of Transformative Art and the National Movement of Artists for Nature. The latter was formed to protest the killing of whales and the destruction of indigenous

savanas (Calembest 1991). Using slogans like "Art before it's too late" (cited in Calembest 1991:99), today's environmental artists engage in such activities as

> ... gathering garbage from Japan's seashore, planting trees in Germany, creating wildlife habitats in England (Calembest 1991:99).

Ironically, some environmental artists physically disturb nature to create their artwork. e.g., an artist may clear an area in a park to display an environmental work, but the clearance, the materials used in the work, and the placement of the work all have an environmental impact.

A powerful art form which is often omitted by environmental art reviewers is cartoon art. Comic strips became a popular art form when they were introduced into American newspapers on May 5, 1895 (Servtech 1996).

> Over the last one hundred years cartoon humor has evolved from social commentary and observations into biting sarcasm, revealing insight, and clever banter (Servtech 1996:online).

Today's cartoons span the gamut of humour. Although cartoonists are rarely classified as environmental cartoonists as such, there are some examples of environmental cartoon art worth citing. As early as the 1930s and throughout the rest of his life's work, much of the cartoon-illustrated poetry of American artist Kenneth Patchen reflected his sentiment to foster a love for all living

things (Maden, online). Contemporary American cartoonist Gary Larson's Far Side cartoons reflect human's innate relationship with all earth's creatures.

Australia has a number of environmental cartoon artists, the most prominent of whom were brought together in the environmental cartoon exhibit *Black 'n White n Green*, which originated in Townsville in late 1993 (Hirst 1997)[1]. Featuring, amongst others, Australian cartoon artists Patrick Cook, Bruce Petty, Allan Moir, Cathy Wilcox and Judy Horacek (Hirst 1997) the exhibition, which toured a number of Australian galleries, addressed

> ... all aspects of environmental degradation, from deforestation and species extinction to ozone depletion and oil spills (Walker 1996:9).

With the emergence of information technology, environmental art has also made it to the Internet. In *Ozone* French artist Stephan Barron weaves his environmental message into electronic art by establishing an international dialogue link regarding the future of the planet (Brown 1996). The greatest advantage to online environmental art is that it conserves resources and hence has minimal impact upon the earth itself.

---

[1] Hirst, G. (1997) Curator Black 'n White 'n Green, Perc Tucker Gallery, Townsville, personal communication via e-mail, March 18.

Environmental art may have successfully shifted our perception of what constitutes art, but to what extent do environmental artworks in fact manage to revise the relationship between ourselves and nature? Barron (1997) cites American composer John Cage to answer the question:

> The function of art is not to communicate one' own personal ideas or feelings but rather to imitate nature in her manner of operation (cited in Barron 1997:220).

While some projects no doubt galvanise social awareness, Avgikos (1991) argues that the much of the 1990s version of environmental art is

> ... fraught with anxiety and accompanied by a chorus of voices from those environmentally concerned with every pathetic path of earth plopped on a gallery floor and who see salvation in every blade of grass that sprouts under artificial light (Avgikos 1991:106).

4.2.2 Theatre and Film

In her mystical tale *Song of the Seals* (Hewett 1985), set amongst the real world of woodchippers and fishermen in a small Australian coastal village, playwright Dorothy Hewett brings her environmental preservation message by

intertwining nature with humanity through the Celtic myth of the Selchie, a half-seal, half-human creature.

Similarly, in an attempt to raise knowledge and awareness of the delicate complexities and interwoven relations between humans, animals and the earth, the musical theatre parable *The Creature Concert* (Thomas and Braun 1992) gives voice to the endangered animals of the planet. The story revolves around a group of enterprising endangered creatures who decide to organise an international benefit concert to bring their plight to mankind's attention. The conflicts that beset the animals as they attempt to organise and stage the event, reflect issues mankind itself faces, while the viewer is playfully confronted with the better-known endangered species as well as some of the lesser known ones. Thomas and Braun rely on humour, visuals and song to convey their environmental message.

In both musicals the characters have to come to terms with their limitations, whether they are human or animal. The message in *Song of the Seals* (Hewett 1985) is directed at understanding the relationship between humans and nature, while the message in *The Creature Concert* (Thomas and Braun 1992) is aimed at stimulating its audience into taking environmental action. Although the latter

> ... has the potential to give the audience a new perspective on their relationship with endangered

> species, it does not break enough new ground to rouse the audience into action (Beresford-Plummer 1997:personal communication)[1].

In the early 1990s Hollywood jumped on the environmental bandwagon by releasing animated films with overt environmental messages. *FernGully...The Last Rainforest* (1992) pitted evil American exploiters against a pristine rainforest filled with fun-loving fairies. Although environmentally and politically correct, critics called the film a disappointment both in animation and in message delivery (Berardinelli 1993). Sharing the ecological theme, the film *Once Upon a Forest* (1993) was equally ineffective in communicating its message (Berardinelli 1993). In *The Amazing Panda Adventure* (1995), which has many credibility-straining moments in its storyline, the irresistible panda cub and the wilderness location in China's Himalayan mountain highlands nonetheless favourably impact the endangered species message (Thomas 1995).

Although not necessarily intended as environmental message delivery vehicles, a number of Disney's classic and current feature-length animations,

---

[1] Beresford-Plummer, M.H.A. (1997) Playwright, Lecturer at the Theatre Department of the College of Music, Visual Arts and Theatre, James Cook University, personal interview, March 11.

e.g., *Bambi*, *The Jungle Book*, *The Lion King*, embody ecological themes and socio-political concerns (Vujakovic 1996). While Disney's animated features cannot as such be categorised as environmental art, the use of Disney's sophisticated blend of symbolism and narrative do have a powerful impact, especially on young audiences (Vujakovic 1996).

4.2.3 Television

Television covers a variety of environmental issues through news, nature and magazine-style programs (Hiebert 1995; Fortner and Lyon 1985). As outlined in Chapter Three, research in environmental communication supports the theory that the more a person depends on mass media for information, the more instrumental mass media will be in forming that person's image of environmental policy (Pierce et al. 1990).

As discussed in Chapter One, television tends to blur the line between fiction and non-fiction (Hallin 1995), whereby theatricality has replaced reasoned analysis and reporters have turned into hosts presenting compelling footage of dramatic environmental events such as the Exxon Valdez Oil Spill (Delli Carpini and Williams 1994). Generally, environmental disasters are only covered for a brief time and in ways that often simplify the issues (Delli Carpini and Williams 1994). Similarly, an Earth Day special may be full of compelling visuals, but does not necessarily proffer environmental solutions. Nonetheless, the use of powerful story-telling narrative, dramatic graphics and movie clips are likely to influence the

ways in which viewers understand issues (Delli Carpini and Williams 1994). Summarising Delli Carpini and Williams' study on the distinction between fictional and non-fictional television, Berland and Daryl Slack (1994) state that such television coverage, in fact, works

> ... to exclude responses to environmental problems that might also challenge the simultaneous degradation of culture (Berland and Daryl Slack 1994:3).

4.2.4 Interactive Multimedia

It is often argued that because multimedia is interactive it is more empowering than television and cinema, which are passive spectator mediums (e.g.,Wark 1995). Wark (1995) disagrees with this hypothesis and claims that audiences always negotiate meaning no matter what the medium.

> They accept, resist or negotiate what they see and hear depending on how it suits what they know of the world and what they want to imagine in their heads (Wark 1995:80).

Every time a new technology emerges communicators, artists and entrepreneurs alike will look for forms that may suit the new medium (Wark 1995). Hence a wide array of multimedia genres, games and stories have burgeoned, although many of the available multimedia products have been

recycled from other media, e.g., books, films and encyclopedias, and released under the banner of repurposing existing materials (McFadyen 1996).

When we think of the Green movement's mistrust of technology (Street 1992), it is a curious fact that very innovative and technically advanced communication methods are used to foster interest in environmental issues (Wark 1994). *Epsilon*[1] and *SimEarth* are interactive computer games that allow hands-on play with the planet. Both CD-ROM games are visually distinctive in design and present chilling scenarios of the earth's ecological crisis. Their gaming approaches are, however, radically different.

Unlike *Epsilon*, which is based on the film *Epsilon*, *SimEarth* is not much of a game in that the player never wins (Wark 1994). While *Epsilon*'s main objective is to escape Earth, unless each degenerated 'environ' can be regenerated in time before the 'Global Indicator' turns from green to brown, in *SimEarth* the user models one's own biospheric conditions over a number of different time frames (Wark 1994). Although *SimEarth* does provide a feel for the global impact of fundamental energy choices,

> ... what is missing from the sophisticated simulations
> of global climate modelling is an understanding of

---

[1] The Epsilon game (1995) was developed and distributed by Digital Arts. SimEarth (1993) was developed by the Maxis company and distributed by Broderbund.

> the socio-technical processes which create it in any other terms than their physical inputs and outputs. Hence what is lacking is precisely an understanding of interests which might link the global scenario back to the local and the domain of experience (Wark 1994:123).

Local experience was gained by approximately eight thousand Australian students when they took part in *Enviroquest*[1], a game run on interactive computer links across Australia. The idea behind the environmental detective game was to foster increased awareness and interest in environmental issues in primary and secondary schoolchildren (Walls 1995). The schoolchildren were presented with potentially hazardous Australian environmental scenarios and given fourteen multiple choice solutions, thirteen of which were red herrings, one of which held the answer to future prevention of such scenarios. Despite the fact that no post game analysis was performed, according to Walls (1995),

> The interactive nature of the game proved to be a most valuable educational tool and the Department considered the responses of great value (Walls 1995:3).

---

[1] Enviroquest (1994) was a pilot project organised by the Australian Department of the Environment, Sport and Territories in cooperation with the NSW Department of Education, the Murray-Darling Basin Commission and the Great Barrier Reef Marine Park Authority.

Thus the world of today's students and interactive users is fertilised by environmental learning modules wrapped in dynamic electronic imagery and sound effects. Art educator Gregory (1995) believes that non-linear interactive design is

> ... ideally suited to the way the human mind processes information in general (Gregory 1995:13)

and that the medium, provided it is multi-sensory, encourages students to participate actively in the educational process. It is clear that multimedia is changing our understanding of the past and breadth of culture (Wark 1995). It remains unclear, however, the extent to which environmental video and online games are effective educational platforms.

4.2.5 The Internet

As the Internet is a huge collective experiment of thousands of individuals and organisations publishing materials online (Whitelaw 1996), it is host to a myriad of environmental sites. Environmental categories range from national information sites (e.g., ERIN, the Australian Environmental Resource Information Network of The Department of the Environment, Sport and Territories), to global information sharing newsgroups (e.g., *alt.sustainable.agriculture*), international environmental organisation profiles (e.g., *Friends of the Earth*), local green political parties (e.g., *Buendnis 90*, the green party of Tuebingen, Germany), green publications (e.g., *Better World*, a

one-stop source for finding environmentally responsible products, consumer education and activism opportunities), and helpful tips (e.g., *Forty tips to go Green*, a pamphlet distributed by the Jalan Hijau ("Go Green" in Malay) Environmental Action Group in Singapore)[1] .

The above sampling of environmental Internet sites all have the common goal of providing access to and sharing environmental information. Yet, within the limits of an emergent technology, their information delivery method ranges from text-only to a variety of graphical interface designs.

4.3 Interfaces

The personal computer revolution was set in motion by the miniaturisation of computer components and crowned by the development of user-friendly object-oriented and graphical user interfaces (Brown 1995). While glare, flicker and dancing pixels once made the computer a hostile environment, optimal interface design is rapidly making it the preferred interface for the retrieval of information (Souttar 1995). Another dramatic shift occurred when digital technology became the norm, replacing analogue sound and imagery with mathematically precise digital formats (Madeja 1993). The digital

---

[1] All websites and newsgroups listed can be accessed through http://www.webdirectory.com

revolution led to the integration of a variety of media, e.g., text, graphics, animation, still photos, video, music and voice collectively referred to as multimedia or hypermedia (Ekman and Quandt 1995), on platforms such as CD-ROM, laser video disc and the Internet.

Regardless of the interface, multi-sensory and immersion technologies being deployed, Gregory (1995) argues that

> ... the real power of integrated media lies in its non-linear design (Gregory 1995:9),

thus transferring the power of learning into the hands of the user. Even if we are talking about electronic page turning, hypermedia

> ... encourages a different view of knowledge, learning, and teaching. It encourages the constructivist view of learning by providing rich technological resources (Gregory 1995:9).

Rokeby (1995) takes the position that

> ... each participant in an interaction receives the *sensation* of responsibility; each has the *ability to respond.* The simplified relations of interactive media provide us with a space in which we can feel and accept responsibility (Rokeby 1995:155, his italics).

The new digital medium provides a platform for communicators and educators alike to deliver their message. For the medium to be effective, however, new ethical and aesthetic consumption models and interfaces need to be generated (Penny 1995).

Usenet, the domain of Internet newsgroups where a user can browse or post messages, does not yet support multimedia capability, making newsgroups plain text bulletin boards by default. Windows interface software is, however, in place to facilitate access to Usenet texts, but the user still has to scroll through vast amounts of text to find the desired information.

The Internet's World Wide Web, to the contrary, does support multimedia, so website designs range from text only to graphic, animation, audio and video enhanced sites. The choice of media use in a website design tends to depend on the availability of financial and creative resources.

> The Web has its roots in the cultural activity of the communities using it, but is already beginning to support a culture of its own, one beginning to come to terms with the nature of the medium (Whitelaw 1996:29).

All websites invariably contain hypertext links, which allow travel from one document to another,

> ... effectively automating the process of following references in an encyclopedia (Ekman and Quandt 1995:35).

Hypertext teaches us to retrieve information by discerning logical patterns in masses of data, replacing the need to remember vast amounts of information (Floridi 1995). Few studies have been undertaken on the use of hypertext, partially because hypertext programming is still in its infancy and partially, as Ascott (1996) argues, the

> ... scripting, negotiation and critical evaluation of a hypertext present demands for revolutionary pedagogical change (Ascott 1996:54).

Although hypertext resources are not yet part of common interpersonal communication systems, Liestol (1994), in reviewing the emerging qualities of the hypermedia message, argues that

> ... if hypermedia facilities are to have extensive impact on the society of information exchange, they must be implemented and proven useful in communicational relationships...as resource and as environment (Liestol 1994:111).

Hypertext can be programmed in multiple colours. Depending on a user's computer platform and Web browser, a multimedia enabled navigation tool to browse the World Wide Web, a text-only website can hence be visually quite effective. While icons, graphics and animation create an ultra-slick interactive look, they take much longer to download than text. As communicators, writers, publishers and advertisers alike are using these tools to convey their message, hypermedia is, in fact, often misused because

> ... visual thinking is once again considered to be at least as indispensable as symbolic processing (Floridi 1995:265).

Brown (1995) expresses his fear of modern computer graphics imaging being produced by people who have

> ... little appreciation of the history of reproductive graphics or of the evolution of perception (Brown 1995:84)

and hence calls for a taxonomy of computer interface development to improve design parameters. Stressing the importance of visual online information, Souttar (1995) is less concerned with the qualifications of people designing computer interfaces, but argues that

> ... information design is about adding value to data: differentiating messages and giving them a voice so that they are effectively communicated. In the

> context of design for on-screen display, this has two complementary aspects: one scientific, the other aesthetic. The scientific aspect is concerned with determining the criteria for usability and applying them correctly. The aesthetic aspect is concerned with making the arrangement of elements in front of the reader appear inevitable rather than arbitrary (Souttar 1995:23).

From an artistic point of view, having the tools does not necessarily make for an interesting interface or satisfying artistic experience. As McFadyen (1996) argues

> Even a cursory glance over the Net reveals about as many original ideas as a Helen Demidenko novel (McFadyen 1996:83).

Souttar (1995) describes the perfect interface by quoting Chinese philosopher Chuang Tzu's proverb "when the shoe fits, the foot is forgotten" (cited in Souttar 1995:23). Ingram (1995) concurs with Souttar, arguing, in fact, that gratuitous use of 3-D visuals and metaphors only confuses the user and takes away from content. Ingram describes a successful interface as one which is transparent in nature, incorporates visual and behavioural clues, allows the user to rely on real-world knowledge, yet intuitively gives the user control over tasks and goals.

Lupton (1994) focuses on the intimate nature of people's relationship with computer technology.

> The pleasures of cyberspace centre on the loss of the boundaries of the body, of a merging of computer and physicality to the extent that individuality and all the constraints that go with it, are subsumed under interaction with cyberspace (Lupton 1994:562).

Shneiderman (1992) stresses the importance of incorporating human factors, e.g., human diversity and ability, backgrounds, motivations, personalities and workstyles, in designing user-friendly graphical interfaces. Once the user profile is determined, benchmark design tasks can be set (Shneiderman 1992).

> Successful designers go beyond the vague notion of "user friendliness" and probe deeper than simply making a checklist of subjective guidelines. They must have a thorough understanding of the diverse community of users and the tasks that must be accomplished (Shneiderman 1992:8).

As any design is "inherently creative and unpredictable" (Shneiderman 1992:474), Shneiderman further stresses the importance of feedback from the user community throughout the development of the graphical interface.

While a well designed interface is of the utmost importance in the use of computers as a message delivery vehicle, the medium is not the message. Creative message delivery still very much depends on the content of the message itself.

4.4. Technological Convergence

The 1990s have seen a rapid international growth of interest in computer-mediated communication and user-interface design with practitioners and researchers in many fields making vital contributions (Shneiderman 1992). Owing to the technological convergence, which allows the electronic integration of all media and the delivery of multiple digitised media messages through a single technology, novel solutions to environmental information delivery can be offered, making this is an exciting time for all communicators caught in the perpetual quest to find effective new information delivery methods.

Chapter Five
Survey Methodology

5.1 Establishing the Parameters

Research proposals in the exciting new field of information technology (e.g., Morris and Ogan 1996; Newhagen and Rafaeli 1996) tend to focus on establishing or confirming the transition of social realities, e.g., whether the Internet is a functional equivalent of other information media, user addiction to certain types of Internet communications and entertainment, cultural influences in the way messages are produced in the communication age (Morris and Ogan 1996) and identifying the global impact of new mass communication tools such as the Internet (Newhagen and Rafaeli 1996; Grant 1993). Newhagen and Rafaeli (1996) argue that communication researchers should study the Internet because

> ... we need a shorthand map of communication-related phenomena the Net represents (Newhagen and Rafaeli 1996:online)

and hence proposes research focusing on

> ... five defining qualities of communication on the Internet: multimedia, hypertextuality, packet

> switching, synchronicity, and interactivity, as these qualities capture what is, or can be, different about Internet-based communication (Newhagen and Rafaeli 1996:online).

Rice, Grant, and Smitz (1993) suggest that researchers approach new communication technologies through network analysis to better address the issues of social influence and critical mass.

While such issues are of undeniable importance, diagnostic analyses offer one - but not necessarily the most important or pressing - research direction. Despite its phenomenal growth rate, the Internet is still a long way from reaching television's pervasiveness; indeed, not until access to online information is both universally available and affordable, will we be able to study the global impact of the Internet as a mass communication medium.

What has become apparent at this early stage of Internet use, however, is that we are encountering an "infoglut" (Floridi 1995:271), an information overflow through which the public has no alternative but to sort in order to retrieve the information most useful to a particular quest. Floridi (1995) refers to the information overload on the Internet as *"knowledge accessible > knowledge manageable"* (Floridi 1995:271, his italics). It is clear that the infoglut begs for efficient management of online information to help filter and refine topic exploration and to avoid time wasting on the part of the user. While it may be

argued that it is an individual's personal responsibility to browse vast amounts of information to locate the information required to make informed decisions (Tyner 1994), it may also be argued that it is the concomitant task of the content provider to tailor information in niche environments in order to facilitate online information retrieval and supersede conventional information gathering methods. So far, the Internet structure has failed to provide a solution to this complex information delivery issue.

As discussed in the current analysis of mass media and environmental information delivery (Chapter Two), today's environmental educators by and large still employ conventional mass media techniques, e.g., television, radio, films, videos, posters and pamphlets, to disseminate environmental information. As these media are essentially transitory in nature, it follows that such information campaigns need to be repeated on a regular basis to maintain impact and effect enduring behaviour change (De Young 1993). Environmental education researchers (Geller 1995, De Young 1993) concur that community-based intervention is needed to reduce the incidence of environmentally destructive behaviours and argue that there is a compelling need for new techniques with demonstrated durable effects. The role of environmental information is to increase people's understanding of the environment, their concern for it and willingness to act constructively to protect it. While there is undoubtedly an abundance of global environmental resources on the Internet,

the medium has yet to be explored in terms of its potential as an effective channel for the delivery of pedagogic environmental community information.

The exploration of the Internet vis-à-vis the community (Chapter Three) reveals a growing interest in accessing community information via the Internet. Several recent studies (Vandermeulen 1995; Yang et al. 1995; Hecker 1994; Guthrie 1991) have addressed the use of the Internet for public information delivery. These studies suggest unanimously that information networks should be made available to meet the growing demand from citizens for access to information on community matters and to increase communication among citizens about community affairs. The studies further indicate that the emergent information technology can sharply increase the amount and quality of information available to the public and demonstrate that the provision of online access to community-specific information can help residents to participate effectively in local government and community planning processes.

As is evident from the environmental education literature, information campaigns have demonstrated usefulness in building community awareness of environmental issues (Ostman and Parker 1987; Ostman and Parker 1986/87; Ostman and Parker 1985). Hence consistent access to environmental information has the potential to stimulate and empower community members to become involved in creating a sustainable future. The relevant information technology literature suggests that computer-mediated communication has the

ability positively to affect existing social activities and practices on a local level (Vandermeulen 1995; Guthrie 1991). It follows that, by making environmental information available electronically, and therefore reducing the conventional constraints of time and space, the medium has the potential to empower community members to become more involved in creating a sustainable future and thus foster a shift towards socio-environmentally responsible behaviours. In pursuit of the hypothesis that the Internet has the technological ability to provide consistent environmental information as well as the potential to build increased community awareness of environmental issues, a fruitful research direction lies in critically evaluating the Internet as a delivery channel of community-based environmental information.

In order to explore the nexus between information technology and information delivery, the first aim of the study (see 1.3) is to ascertain the potential benefits of an Internet website as a delivery channel for environmental community information. A subsidiary and related aim is to probe the creative and innovative design potential of such a website as a means of enhancing environmental information dissemination.

5.1.1 Identifying the Niche

We live in an era of expressed public concern for the environment. The last two decades have seen a massive growth in green political parties and membership in environmental organisations (Street 1992). The 1992

Conference on the Environment and Development in Rio de Janeiro called for all countries to report on the state of their environments to the United Nations Commission on Sustainable Development (Environmental Resources Information Network 1996).

In Australia, the 1994 National Environment Protection Act is but one of a long list of environmental legislation acts and agreements that have been implemented in the past two decades. With green parties having gained much political clout, industries working hard at creating or maintaining a green profile, and many of today's communities establishing local environmental policies, directives and action groups, it may be argued that global interest in sustainable environmental solutions and local interest in accessing information on regional environmental issues is more likely to increase than subside.

Much emphasis is being placed on the need for environmental information and education to keep communities environmentally intact. Yet recent internal government survey studies and reports have noted the inadequacy of existing local government environmental information resources, identifying localised environmental data as being one of the least available, and subsequently least effective, sources of community information and expressing the need to strengthen community information resources (Environmental Resources Information Network 1996a).

While there is a plethora of environmental information available through mass media, environmental organisations and educational institutions, all of which no doubt contribute to environmental knowledge, political awareness, and environmental education, there is no central environmental information source in place which integrates these sources and provides a conduit for active citizen involvement. Hence environmental lifestyle and consumer information is an appropriate focus through which the study aims to determine the extent to which the Internet facilitates access to local community information, enhances public knowledge, and encourages participation in community planning processes.

5.1.2 Selecting the Community

Potentially, the site for a research project such as this is the global community. However, given the population size and the diverse environmental variables involved, for the purposes of this study it would be impracticable in terms of both time and expenditure to conduct research on a global scale.

Centralising environmental community information requires accessibility to a community's local government, environmental organisations and agencies. Conducting such a study in a distant urban centre or in a smaller yet distant community would be equally impracticable in terms of travel and communication cost. Hence it is necessary to select a community in a geographic location able to furnish cost-effective accessibility to local government, environmental

organisations and agencies, yet also able to provide a broad environmental and demographic spectrum. Adding the latter factors to the above cost constraints, Townsville, where the university through which this study is being conducted is located, offered a viable option in terms of serving as the sample community. There were additional benefits in this location from a number of perspectives.

Located in tropical North Queensland, Townsville offers an environmental spectrum ranging from conservation and wilderness areas to manufacturing and industry. Given its proximity to the The Great Barrier Reef, which enjoys a great deal of environmental attention, it may be assumed that there is heightened environmental interest in the community as a whole, reflected in actions such as Townsville's industry allocating funds towards "greening the capital". Because of its tropical location and relative environmental intactness, there are fewer environmental variables, e.g., numerous competing environmental action groups, than one might expect to find in a larger city. Given the limited environmental and socio-economic variables involved (see below), the Townsville population has an interest in keeping its community environmentally intact and hence provides a suitable location for this study.

A July 1996 State government report on population and housing trends in Queensland currently estimates the combined population of Townsville and the adjacent city of Thuringowa at 134,149, with 89,732 people living in Townsville and 44,417 in Thuringowa (The Townsville Bulletin, July 11, 1996:1).

The Townsville region is considered one of Australia's foremost growth areas, with population increasing by 1.01 per cent a year in Townsville and 4.05 per cent in Thuringowa (The Townsville Bulletin, July 11, 1996:1), as reflected by the 1991 Australian Bureau of Statistics Census figure of a combined Townsville/Thuringowa population of 124,981 (Hornby 1993). Although the 1996 Australian Bureau of Statistics Census has recently taken place, the estimated time for compilation and publication of the population data by the Australian Bureau of Statistics is approximately two years. Hence there will obviously be some additional movement from the time of data collection to publication of the 1996 figures.

In 1991, Aborigines and Torres Strait Islanders made up 4.9 per cent of the population; 67.4 per cent of Townsville's regional population was under 40 years of age; 54 per cent were two-parent families ; 32.2 per cent worked in the Public Sector; 11.7 per cent of the local workforce was unemployed; 7.4 per cent held a Bachelor or higher degree; and 36 per cent had a yearly income between $25.000-$50.000 (Hornby 1993:19,36,41,42, 45, 52). While the above demographics have obviously shifted to some extent since 1991, statistics such as the percentage of people under forty and two-parent families are likely to remain relatively constant, as both the university and the Australian Defence Forces continually replenish the area with students and young families.

5.1.3 Defining a Strategy

Currently a community's access to environmental information is based on the use of conventional media such as television, radio, newspapers, newsletters and pamphlets, with each media channel operating independently in its quest to disseminate environmental information. As no centralised database is in place for the distribution of environmental community information, this form of information dissemination inherently leads to scattered information delivery and possible information duplication.

Potentially, a centralised database in the form of a community website can be an effective channel for environmental community information dissemination if such a website is tailored to the unique needs of a community and information is accessible to all community members. In relation to the latter, to date Internet access remains an élitist proposition, making access to information by all community members possible only if a public access terminal is in place.

Tailoring a website to the unique needs of a community requires content development for such a website based on 1) a community's current knowledge of and attitudes towards environmental issues and computer/online literacy, and 2) ongoing communication with a community's local government, media, environmental organisations and agencies. Thus knowledge of local

environmental issues may be obtained, existing materials may be sourced, links to the various community groups may be established and an open forum may be created to bridge any environmental gaps which may currently exist.

Consequently, the first stage of the study focuses on the collection and analysis of benchmark data to determine a community's current knowledge of and attitudes towards environmental and computer/online issues. Utilising the findings of the first stage in combination with existing environmental community information, in the second stage a framework for the website's content and graphical interface design is formulated. Upon the completion of the website design, it is necessary to evaluate the environmental website. The study was therefore designed in terms of three phases:

Phase One: Environmental Information Phase.

Phase Two: Utilisation of Information in the Website Design: Exploration of Creative Possibilities.

Phase Three : Website Launch and Evaluation.

Phase One :

Environmental Information Phase

5.2 Community Survey

This phase involved the development of a data collection methodology (see 5.2.1) to evaluate a community's perceptions of and attitudes towards environmental and computer/online issues and sample its existing environmental information gathering methods. Following the development of the data collection method a survey sample was defined (see 5.2.2), a questionnaire was designed (see 5.2.3) and subsequently implemented (see 5.2.4). In order to develop a framework for the design of the environmental Internet site in Phase Two of the study, questionnaire returns (see 5.2.5), questionnaire data management (see 5.2.6), a profile of the survey sample (see 5.2.7) and survey analysis issues (see 5.2.8) are also included in this phase.

5.2.1 Determining the Data Collection Strategy

Chapter Two, which analysed environmental knowledge and attitudes, demonstrates that few studies have been undertaken specifically on public environmental knowledge gathering (Arcury 1990), although several earlier studies have correlated education with environmental knowledge and subsequent environmental concern (Weigel and Weigel 1978; Arbuthnot 1977; Ramsey and Rickson 1976; Maloney and Ward 1973).

Extensive research has revealed no recent studies correlating media use with environmental knowledge, nor has prior data collection on the sample community's prevalent environmental attitudes, current environmental information sources, computer literacy level and online experience been undertaken by, or could otherwise be obtained from a regional government institution, green movement or local Internet service provider.

Multiple data collection methods may be applied to sample a community's environmental/online attitudes and explore the interrelationship of its components, e.g., focus group sessions, random telephone interviews, informal interviews in a shopping mall or street environment, mass mailing by postcodes, open-ended and closed-ended questionnaires.

Given the scarcity of funds and interview personnel, focus sessions and personal interviews by telephone proved impracticable, as did informal interviews in a shopping mall or street environment. In the latter case, it is also argued that interviewees are often pressed for time and/or uncomfortable about being singled out in a public environment, which may affect their responses. A blanket community mailing proved both cost prohibitive and managerially too large a task. An open-ended questionnaire was considered a less focused and useful survey method, as open-ended questionnaires tend to produce an wide array of responses, including irrelevant ones, which may not accurately reflect local

environmental and computer/online attitudes and which present difficulties for analysis.

Although survey answers are not necessarily reflective of actual behaviour (Hines et al. 1986/87), it is argued that a closed-ended questionnaire offers the most effective data collection method for the purposes of this study because, when structured with precision and clarity, a closed-ended questionnaire provides a framework for responses and therefore more usefully profiles local environmental and computer/online attitudes. Furthermore, uniformity of responses facilitates the processing of survey data into a computer spreadsheet format and provides access data for Phase Two.

5.2.2 Defining the Survey Sample

Potentially the survey population for a research project such as this is the entire community. However, as a community-wide mailing of a closed-ended questionnaire would clearly be cost prohibitive, a population sample needed to be procured with both environmental and online potential. Considering the fact that these are diverse criteria and taking into account the Green movement's mistrust of technology (Street 1992), it was unlikely that a single survey sample would maximise both environmental and online potential. It was therefore necessary to locate two sample groups, one (Group A) which would maximise environmental potential and a second sample group (Group B) which would maximise online potential.

Hence, for Group A, all the community's environmental organisations and action groups, numbering twenty in total (North Queensland Conservation Council 1996)[1], were examined for their capacity to (1) represent the community's environmental population and (2) maximise environmental potential. Most of the community's environmental organisations, e.g., the Townsville-Thuringowa Landcare Association, the Townsville Chapter of the Wildlife Preservation Society of Queensland, Friends of the Earth and the Townsville Bird Observers Club, claim membership figures of three hundred or fewer with considerable cross-over membership (North Queensland Conservation Council 1996). The latter prevented combining these organisations into one group, while small membership numbers discounted most of these groups as stand alone representation of the community's environmentally oriented population.

It was hence necessary to locate an environmental organisation which could adequately represent the community's environmentally oriented population and also maximise environmental potential. The Great Barrier Reef Aquarium has a membership of eleven hundred individuals and two hundred institutions. Given its membership number and given the fact that the Great

---

[1] North Queensland Conservation Council (1996) List of Townsville Regional Naturalist and Environmental Groups, personal fax September 16..

Barrier Reef Aquarium is a centre for environmental research and education, it is reasonable to assume that the Great Barrier Reef Aquarium membership is likely to be representative of the community's environmentally aware population. Moreover, as the Great Barrier Reef Aquarium already uses information technology in its environmental exhibits and education formats, it is further hypothesised that its members are likely to be familiar with computer-mediated communication and hence are also potential on-line users.

While the potential sample group was 1100 individuals and 200 institutions, institutional membership is often different to that for individuals, e.g., an institution may have a business or green profile interest. It was therefore decided to focus on individuals rather than institutions and exclude the two hundred Aquarium member institutions from the survey. Given the opportunity, it was possible to include a printed questionnaire in an Aquarium membership mailing, which proved to be the most efficient method of reaching the Great Barrier Reef Aquarium membership (see section 5.3.4.1).

For the Group B selection, the community's online population was examined for its (1) representativeness in terms of the community's online population, (2) profile vis-à-vis the Great Barrier Reef Aquarium sampling and (3) maximisation of online potential. In terms of the latter criterion, it is reasonable to assume that all members of the community's online population maximise online potential.

As of July 1996, the community's total online population was estimated at approximately 11800, the majority of which, 10544 (James Cook University Computer Centre 1996)[1], comprised students and staff connected via James Cook University. Two locally based commercial Internet service providers had a combined membership of approximately nine hundred, while several national Internet service providers with local access nodes in the area had a combined membership of about three hundred fifty.

The James Cook University student body is transient and composed of people from all over the world. Although students live in the community over several years and may, as such, be considered representative of the community's online population, it was decided to exclude the university's student base because the total student number by far exceeded the Great Barrier Reef Aquarium sampling and the transient nature of the student base is prejudicial to any project follow-up.

James Cook University staff members, approximately 1900 people (James Cook University Computer Centre 1996), are less transient than

---

[1] James Cook University Computer Centre (1996) JCU Online Staff & Student Usage as of May 1996, personal communication via email, May 12.

students, more likely to establish a family lifestyle in the community and hold membership to such community institutions as The Great Barrier Reef Aquarium. Moreover, since the university encourages the use of external Internet service providers, a number of staff members may also hold commercial Internet accounts for personal or family use. In view of the latter, the university staff could, as such, be considered a group more representative of the community's ongoing online population. It was, however, decided to exclude James Cook University staff from the online survey sampling to avoid possible sample duplication vis-à-vis commercial online survey participants, while the total staff number also exceeded the Great Barrier Reef sampling.

Subsequently, Group B was formed by using the combined membership of the then only two locally-based commercial Internet service providers, Ultranet and InternetNorth and one national service provider, Ozemail, approximately 1050 people in total. This choice inherently built in the potential of fewer online survey returns, since James Cook University provides its staff and students with free online access while commercial service providers charge for online time but had the advantage that, if respondents are willing to pay for online time to complete the survey, the indication is that they are dedicated online users. As no individual customer information could be obtained from the respective commercial Internet service providers, making an electronic version of the questionnaire available online (see section 5.2.4.2) proved to be the most effective method of reaching the online sample group.

5.2.3 Survey Design

Since no prior information on the sample community's prevalent environmental attitudes, current environmental information sources, computer literacy level and online experience could be obtained, a project-specific survey was designed based on cognate research objectives (Schahn and Holzer 1990, Arcury and Johnson 1986, Arcury et al. 1987, Van Liere and Dunlap 1981; Weigel and Weigel 1978) and established survey methods, e.g., the use of closed-ended questions and Likert-type attitudinal measures (King 1996; Babbie 1992; Patton 1982).

As it was the intention of the researcher to assess the community's prevalent environmental attitudes, current environmental information sources, computer literacy level and online experience, the questionnaire required the formulation of relevant quantitative and qualitative questions. Since no demographic information on the sample community was available, the questions had to be accessible to a wide range of educational backgrounds as well as age groups, while associated documentation needed to be formulated to clarify the purposes of the questionnaire.

The questionnaire (see Appendix A) was designed in several stages. Initially categories were devised to cover demographic information, environmental concerns and awareness, environmental and general information gathering, computer/Internet literacy and computer appreciation. Questions

were then formulated for each category followed, e.g., *I am a member of one or more environmental organisations*, *I need more information on environmental issues*, *The Internet overwhelms me*, followed, where applicable, by a multiple-choice Likert-type measurement scale, e.g., *Strongly agree, agree, uncertain, disagree, strongly disagree*. Leading, double-barrelled and negative questions were avoided and care was taken to sequence and structure the questions positively and to be devoid of bias.

In the *personal information* section, reflecting standard demographic queries on gender, age, household size, education level and occupation to help build a social atlas of the community, a project-specific question was added on how long the surveyee had lived in the community. This question was derived from an earlier survey undertaken to gauge the community's attitudes toward the establishment of natural environmental resource (Horeczyi 1979) and added to this section for the purpose of gauging the transience of the population.

For the *environmental concerns* and *environmental awareness* sections, a number of environmental questionnaires (Karp 1996; Pelletier, Legault and Tuson 1996; Krause 1993; Stern, Dietz and Kalof 1993; Hopper and Nielsen 1991; Schahn and Holzer 1990; Vining and Ebreo 1990; Arcury et al. 1987) were examined for relevant questions. Analysis revealed that most such questions were project-specific, e.g., *How much does it bother you to throw*

away glass (Hopper and Nielsen 1991) which was used to elicit personal norms in recycling behaviour, *I turn down heat in* winter (Krause 1993) which was used to assess willingness to accept lifestyle changes, and could hence not be used as they did not directly pertain to the researcher's focus in this study.

These questionnaires did, however, form the basis for the formulation of new questions, e.g., the questions *Contributed money to an environmental group* and *Did volunteer work for an environmental group* (Karp 1996:118) were reformulated into the questions *I contribute money to environmental causes* and *I am a member of one or more environmental organisations* as the words *causes* and *organisations* were deemed more generic than the word *group* and might yield a broader picture of a community's environmental activism. The questions *Neighbors expect recycling* and *Friends expect recycling* (Hopper and Nielsen 1991:205) were too specifically geared towards recycling and were hence combined into *I encourage my family and friends to be environmentally aware.*

To sample the level of environmental activism several original questions were added, e.g., *I run/work for an environmentally friendly business* and *I carpool.* Although 'carpool' is an American term, it was deemed explicit enough to be understood by the Australian sample population. To sample the availability of environmental information in a community a number of questions in the *environmental awareness* section were formulated by the researcher

based on common environmental issues, such as recycling and waste disposal, and specific issues addressed by the community's city council (Townsville City Council 1992) such as land protection and water conservation, e.g.,*There is enough information available in my community on: (a) recycling, (b) energy conservation, (d) land protection, (f) air,water and noise pollution,* etc. These questions were followed by a Likert-type scale ranging from *strongly agree* to *strongly disagree*.

In order to identify any unanticipated difficulties with questions or measurement scales, a pilot study of the above two sections was undertaken with four peer students. The pilot study revealed that the initial layout in the Environmental Concerns section, constructed of a *"yes because"* and *"no because"* scale followed by four multiple choice answers including (a) *it helps sustain our future, (b) my family and friends do/are, (c) it is a good thing to do, (d) other*, proved too complex a formula. To clarify this section, the measurement scale was subsequently revised into a standard Likert-type design. Hence the environmental concern questions were followed by a Likert-type scale ranging from *to a very high* degree to *not at all*, while the environmental awareness questions were rated on a Likert-type scale ranging from *strongly agree* to *strongly disagree*.

Feedback on the survey's category headings identified the problem that the heading *computer access* might be confused with *computer/Internet*

appreciation; hence this category was renamed *computer literacy*. Additional feedback included the suggestion to reverse the *computer/Internet appreciation* and *computer literacy* categories to achieve a smooth sequencing of questions.

In the computer/Internet appreciation section original questions such as *When I see a computer in a public place I am inclined to use it* and *I am interested in obtaining environmental community information via new (electronic) methods* were formulated by the researcher in order to sample respondents' inclination towards computer use for environmental information retrieval. The statement *Computers terrify me* was adapted from a computer opinion survey of undergraduate students in the James Cook University Department of Education (King 1996). King's original question *I sometimes feel intimidated when I have to use a computer* was, however, was judged by the researcher to be too tentative to assess the community's inclination towards computer use for information retrieval. Initially reformulated into *computers scare* me, the question was subsequently reworded into *computers terrify me* to elicit a more definitive response on surveyees' computer fear. A Likert-type scale ranging from *strongly agree* to *strongly disagree* was applied to measure the level of computer fear.

Several Internet-related questions under the computer literacy category were copied from recent online Internet surveys (Cyberatlas 1996; Jupiter Communications 1996; Nielsen Media Research Interactive Services 1996),

since they pertained directly to the researcher's needs, e.g. *I use the Internet at* home, *I use the Internet at work.* Ten questions under the *computer literacy* category which initially would have elicited only a yes/no response were revised to include a frequency scale so that regularity of computer use could be determined, e.g., to the question *I use the Internet at home: no/yes*, the frequency scale *every day, 3+days a week, 1x week, 3x or less a month* was added.

A draft of the completed survey was pilot tested on appearance, clarity and length on the same four peer students. Each student was supplied with a printed copy of the questionnaire, requested to respond to all survey questions and prompted to record the time it took to complete same. All four students finished the survey within fifteen minutes and reported no difficulties understanding any of the questions or measurement scales. Hence this procedure yielded no layout modifications and no question rewording. The final schedule of questions comprised forty nine questions.

Numeric coding was applied to all questions to allow processing of the results into a computer format and facilitate the compilation of survey statistics. A follow-up participation inquiry was added to the end of the questionnaire for future project evaluation purposes. No follow-up participation incentive was offered. To express the researcher's appreciation for the surveyees'

future project evaluation purposes. No follow-up participation incentive was offered. To express the researcher's appreciation for the surveyees' participation, A *thank you for participating in this survey* note was included, while mailing instructions for the printed survey were also added.

5.2.4 Survey Dissemination

First a hardcopy version of the questionnaire was printed for distribution to Group A (see section 5.2.5). While one cannot, as such, speak of distributing an online survey, steps for accessing the online survey had to be taken. Hence the printed survey was duplicated in online format for access by Group B (see section 5.2.4.2).

5.2.4.1 Printed Survey Distribution

Considering the low impact of a stand-alone survey mailing, given the prohibitive cost involved in mailing an eight-page questionnaire, and considering the Great Barrier Reef Aquarium's ability to furnish cost-effective high-impact access to its membership by including the printed questionnaire in a regular membership mailing, the latter proved to be both an efficient manner and timely opportunity to reach the Great Barrier Reef Aquarium membership. Hence, to target the Great Barrier Reef Aquarium membership, a printed survey was included in the Aquarium's June 1996 membership mailing.

In order to make the print survey appear less formidable and decrease mailing costs, the initial eight-page survey was reduced to two double-sided A4 pages with two survey sections per side. To clarify the purpose of the questionnaire a survey cover letter, printed in blue script to simulate a handwritten note, explained that little is known about people's environmental profile in Australia and that the survey is part of a study being conducted through James Cook University to examine people's attitudes toward environmental issues and the ways in which they obtain environmental information. The cover letter further explained that the Great Barrier Reef Aquarium would also benefit from this information in terms of serving its membership more effectively in the long term (see Appendix B).

A reply-paid envelope was included to encourage response and facilitate return of the questionnaire to the researcher. The internal cut-off date for survey returns was set at August 1, 1996, allowing respondents an approximately seven-week return period. Absence, oversight and other circumstances permitting, it is argued that a seven-week period would allow surveyees ample time to respond. Hence any print surveys received after August 1, 1996 would be discounted.

5.2.4.2 Online Survey Distribution

The online survey was programmed by a James Cook University staff member of the computer science department. As funds were not available for

specific design work, the online survey consisted of a list of text questions presented on a green background, subliminally suggestive of an environmental setting. Questions were programmed in cgi-bin, a form-type format, displaying the same categories and Likert-type scale options as the printed survey. Online survey participants could simply point and click on desired answers and, upon completion of the online survey, click on a 'submit survey' button. Once the survey was submitted, a new screen appeared to thank them for participating in the online survey and requesting follow-up interest. If surveyees indicated follow-up interest by supplying personal information such as a name and email address, another screen appeared thanking them by name.

To target the online user group a bulk email was sent to about five hundred members of the local Internet service provider Ultranet. The email message informed potential online surveyees of the online survey location and included a request to complete the online questionnaire. Contrary to the print survey cover letter, upon reaching the researcher's online site surveyees were greeted by a text explaining that a study was being conducted through James Cook University to examine how information about a specific topic can best be placed at the service of individuals and local communities via the Internet. The text further explained that the survey had been designed to find out how, using environmental issues as an example, people currently obtain information and also informed online surveyees that participation would not only contribute to the research but provide them with an opportunity to express how and what

they would like to see happen with Internet information. Email feedback was encouraged for direct mailing to the researcher's email address. This email address was programmed as an active hyptertext button, e.g., the surveyee could click on it, allowing a pre-addressed email window to open in which a message could be composed and sent directly to the researcher (see Appendix C).

In case surveyees happened upon the online survey without prior reading of the above-mentioned text, an abbreviated version of the print survey cover letter was placed at the top of the online survey explaining that little is known about people's environmental profile in Australia and that the survey is part of a study being conducted through James Cook University to examine people's attitudes toward environmental issues and the ways in which they obtain environmental information.

An email message similar to the one received by Ultranet users was sent to the manager of a second local Internet service provider InternetNorth, which at the time had an estimated membership of four hundred, with the appeal to post the survey participation request to its membership. As no direct email access to the InternetNorth membership was granted, the email posting was at the discretion of its management. In addition, an *if you live in Townsville, please participate in this survey* message was posted in an Ozemail newsgroup,

accessible only to members of the national Internet service provider Ozemail. Ozemail membership in Townsville at the time was estimated at 140.

The survey was made available online via a commercial Internet Service Provider as well as via the university's server from June 27th until August 16th 1996, granting online respondents approximately the same seven-week response period as the print survey respondents. During this time period survey accessibility was monitored regularly and a survey data management strategy was determined (see 5.3.6).

5.2.5 Survey Returns

Two hundred and four printed surveys were received by August 1, 1996, which would account for an 18.55 per cent hardcopy return assuming that all members actually received and read their Great Barrier Reef Aquarium mail and survey insert within the prescribed survey period. While it is doubtful that any bulk mailing is successful in reaching its entire intended readership, this return percentage indicates that the enclosure of a reply-paid envelope was indeed effective as the return percentage is notably higher than two previous Great Barrier Reef Aquarium survey membership mailings. Sent without reply-paid envelopes, former survey mailings resulted in returns of less than five per cent each.

Seventy three online surveys were returned, accounting for a 7.01 per cent online return assuming that all targeted online users accessed the online survey. Similar to postal mailings, an online bulk email distribution rarely succeeds in reaching its intended audience entirely. While online users will receive the actual email message in their mailbox, they do not necessarily read or act upon it for reasons such as disinterest in reading unsolicited mail, not being able to access their computer or Internet service provider, and networks being down. In fact, online surveys are known to have return rates as low as one per cent (Jupiter Communications 1996), suggesting that the 7.01 per cent return rate for the current study is well above average. Service providers could only be identified by respondents who provided an email address for follow-up purposes. No survey responses were identified from the InternetNorth membership, although further investigation revealed that the InternetNorth email posting did, in fact, take place.

5.2.6 Survey Data Management

As each printed survey was received, it was opened, perused and assigned an identification number. At the end of the seven-week period a computer spreadsheet was set up in which the survey's coded answers were input and tabulated. A separate computer database was created in which contact details of those respondents interested in participating in follow-up sessions were input.

Online survey submissions were stored in a special computer file and bi-weekly emailed to the researcher. Survey answers were programmed semi-colon delineated to facilitate transfer into a computer spreadsheet program. As above, a separate computer database was created with contact details of those respondents interested in participating in follow-up sessions.

As it was necessary to build a social atlas of the community prior to analysing survey results and determining a community's online needs (see 6.1), the initial data tabulation consisted of the compilation of relevant data and the calculation of survey percentages of same to develop a survey profile of the two sample groups (see 5.2.7). To determine overall survey results, the sample data were subsequently placed in separate spreadsheets for correlation with other survey data.

5.2.7 Profile of the Survey Sample

Tabulating the gender proportions in the printed versus the online survey, 69.6 per cent of the hardcopy sample was identified as female, while 80.8 per cent of the online sample was found to be male. Although no actual membership studies have been undertaken by the Great Barrier Reef Aquarium, staff entrance observation accounts indicate that, particularly during the week, more females accompany their children on Aquarium visits than males. Since only 38.7 per cent of the hardcopy females are employed, the latter may account for females taking a more active part in Aquarium

membership activities, including such tasks as reading the Great Barrier Reef Aquarium's mailings and responding to surveys.

Considering that Internet users are still predominantly male, the survey's online gender findings correspond with current online user trends (Cyberatlas 1996; Spender 1995). The survey also confirms another online user trend that the average computer user is 39 years of age (Cyberatlas 1996), although a somewhat higher percentage of online females surveyed fell within the 21-35 year age group. While a high percentage of online females is employed, they tend to work mainly in the health or education fields and predominantly use the Internet at home. Both print and online survey respondents registered a very high degree of computer literacy, confirming the hypothesis that the Great Barrier Reef Aquarium membership is familiar with computer-mediated communication and may be considered potential on-line users.

The community's dominant household size is 2+ people per household, which is in line with the community's household occupancy trend. Fifty four per cent of the hardcopy surveyees and 72 per cent of the online surveyees have lived in the community for more than five years, indicating a low transience factor in the sample groups and substantiating the choice of the online sample vis-à-vis project follow-up.

Over 35 per cent of all respondents indicated a Bachelor degree or higher level of education, which is much higher than the community's 1991 statistic of 7.4 per cent. It does, however, correspond with findings of other Internet studies that the average Internet user has at least a college degree (Cyberatlas 1996). The education level also corresponds with environmental findings that there is a relationship between environmental concern, gender, residence and education (Schahn and Holzer 1990; Van Liere and Dunlap 1981; Weigel and Weigel 1978). This is likely to account for the fact that all surveyees indicate themselves to be environmentalists to some degree, with the print survey males identifying themselves as environmentalists to a high degree.

5.2.8 Survey analysis issues

Above survey profile data delineate variables such as hardcopy versus online gender, age and education. Considering that online gender and age proportions as well as education level are in line with existing online studies (Cyberatlas 1996, Spender 1995) and that gender and education levels of the hardcopy sample correspond with findings in the environmental literature (Schahn and Holzer 1990; Van Liere and Dunlap 1981; Weigel and Weigel 1978), these patterns are not dramatically different from other studies and hence do not provide any new research parameters for either online or environmental concerns analyses.

While variables such as age, gender and education level are important in building a profile of the sample community, the main purpose of this survey is to determine whether a centralised database in the form of an online environmental Internet site has the potential to be an effective channel for environmental community information dissemination. In view of the latter, it is hypothesised that if community members are potential online users, if they actively seek environmental information and if they are dissatisfied with the current environmental information flow, the more likely they are to be interested in an online environmental database tailored to their information needs.

Having established a high level of computer literacy in both survey groups, which serves to substantiate that all surveyees, regardless of gender, age, education level and employment status, are familiar with computer-mediated communication and may, as such, be considered potential online users, the remaining objectives in the analysis of the survey data vis-a-vis potential online use therefore are (1) the desire to obtain environmental information; (2) the current sources of environmental information gathering; (3) the level of satisfaction with the environmental information currently available; (4) the current use of computers and online services; and (5) the level of interest in accessing environmental information online.

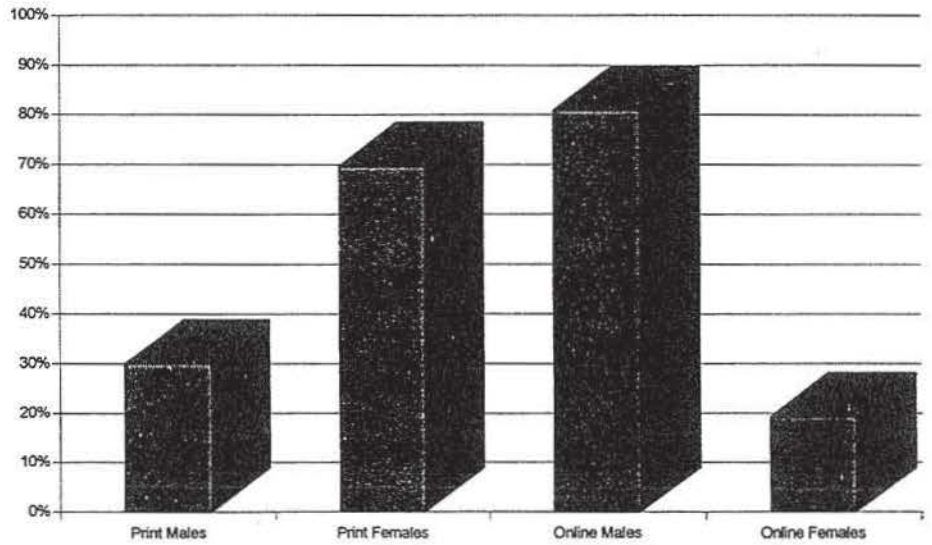
Chapter Six

Community Survey Analysis

6.1 Treatment of Data

For ease of reference, the two sample survey groups were termed the print group and the online group. Since there was a significant gender difference between print and online respondents (see Figure 6.1.1), it was necessary to determine the extent to which results should be analysed in terms of gender. Hence each survey group was subdivided by gender and a preliminary analysis of key questions undertaken. In those instances where gender data differed, they were further compared with variables such as employment status. These data sets were subsequently compared to overall print versus online figures.

Figure 6.1.1
Survey gender percentages



In those cases where a gender difference was found, outcomes are reported as print males and print females versus online males and online females. Where no gender difference was found, results are reported as overall print versus online survey data.

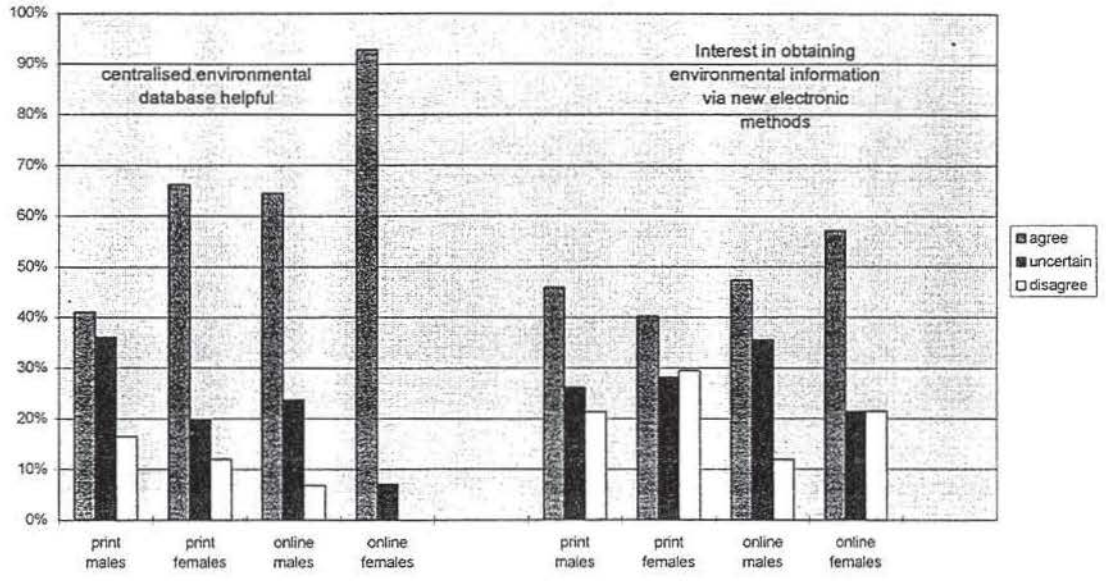
Having completed this process, data were charted and posted on a wall to facilitate a visual perspective on the data, e.g., interest in electronic data access (see Figure 6.2.1) was compared to interest in obtaining environmental information via the Internet (see Figure 6.2.2).

6.2 Interest in Accessing Environmental Information Online

As reflected in Figure 6.2.1, there was a high level of support for a centralised environmental database from online females (92.9 per cent), and substantial support from online males (64.5 per cent) and print females (66.2 per cent). Approximately two-fifth of print males (41 per cent) also indicated that a centralised environmental database would be helpful with a further 36.1 per cent expressing uncertainty or ambivalence about this possibility. Online females espoused a particular interest in obtaining environmental information via electronic methods (57.1 per cent) followed by 47.4 per cent online males, 45.9 per cent print males and 40.2 per cent print females (see Figure 6.2.1). As a whole, the majority of print surveyees (76.5 per cent) and online surveyees (65.3

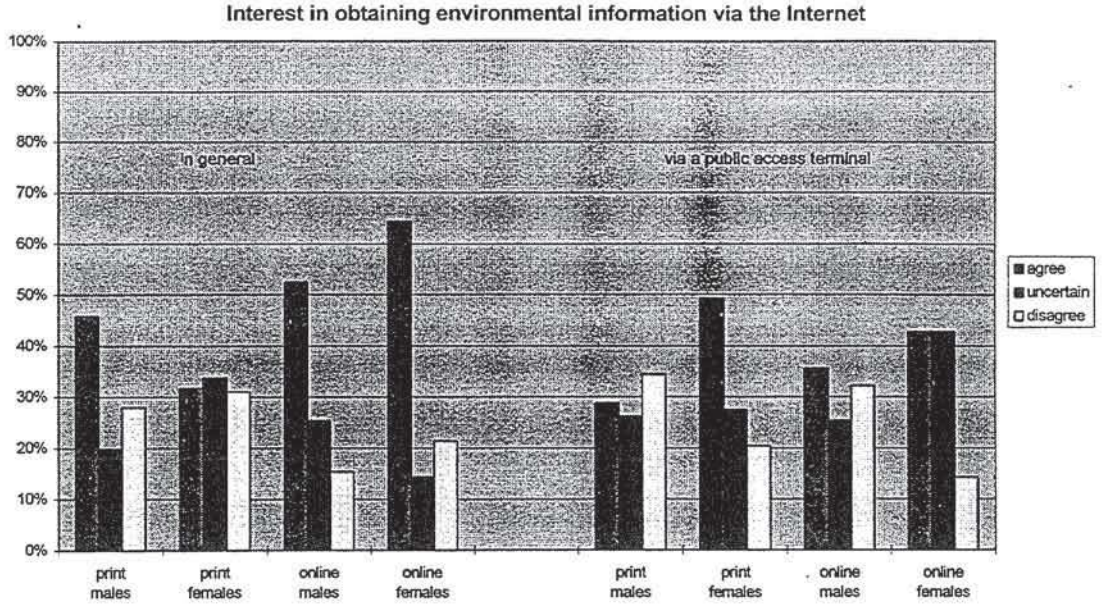
per cent) agreed that, if environmental information is easily accessible they will act on it.

Figure 6.2.1
Interest in electronic data access



Online females also claimed a high level of support for obtaining environmental information via the Internet and more than half of online males (52.5 per cent) indicated that they are interested in obtaining environmental information via the Internet (see Figure 6.2.2). In fact, 40.3 per cent of all online survey respondents already use the Internet to retrieve environmental information. Since the latter group is in a position to use the Internet from work or home, it follows that fewer than half the online surveyees would be interested in obtaining environmental information via a public access terminal (see Figure 6.2.2).

Figure 6.2.2
Interest in obtaining environmental information via the Internet



Print males were consistent in their level of interest in electronic delivery methods and in the Internet for the delivery of environmental information. On the other hand, print females' interest in using the Internet for accessing environmental information was well below the percentage recorded in terms of their interest in new electronic delivery methods. In fact, approximately a third of the print females were uncertain about using the Internet for environmental information, while about another third disagreed (see Figure 6.2.2).

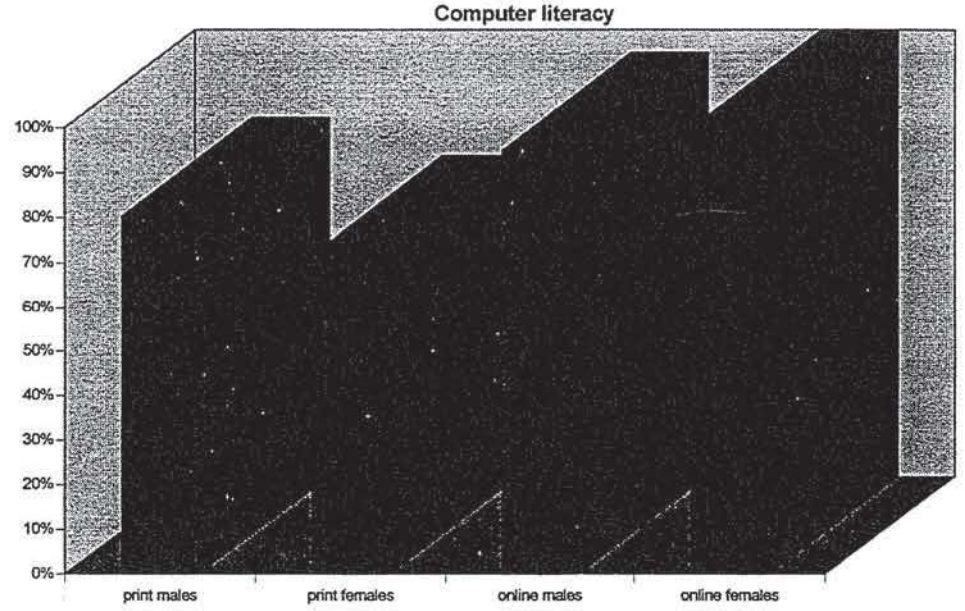
Print females' interest in accessing environmental information via a public access terminal was, however, higher than any other survey subgroup (see Figure 6.2.2). The latter group's interest in a public access terminal could be related to the fact that print females are the least likely to go online within the next twelve months (see 6.3) and also make the most effort to obtain environmental

information (see 6.4). In addition, as print females are the least familiar with the Internet (see 6.3) they may not, as such, equate an electronic environmental database with the Internet.

6.3 Current Use of Computers and Online Services

Computer use and computer literacy is widespread in the community. The majority of respondents (64.2 per cent of print surveyees and 94.4 per cent of online surveyees) indicated that they use a computer at home.

Figure 6.3.1
Computer literacy

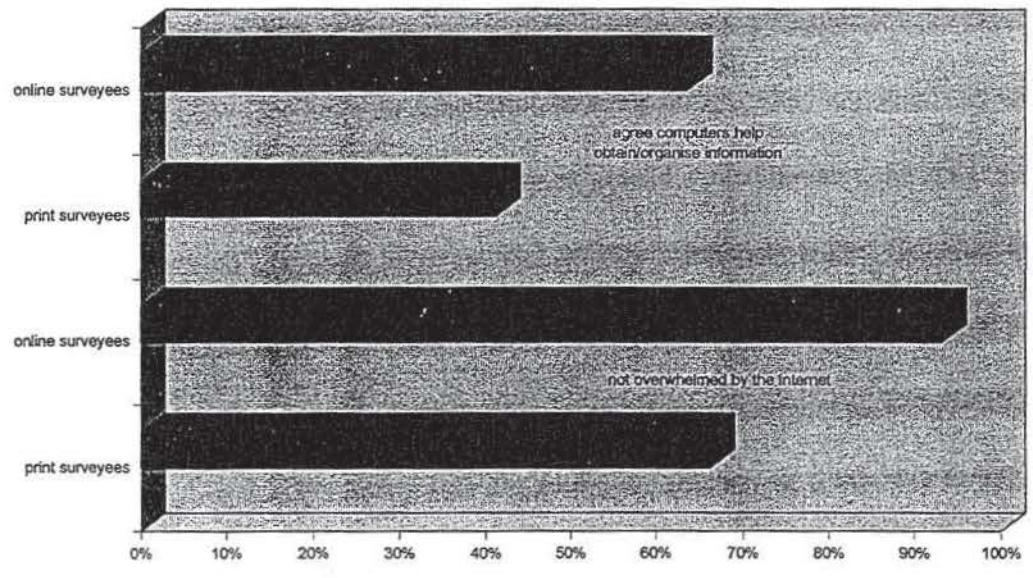


As all surveyees registered a high degree of computer literacy (see Figure 6.3.1), a low level of computer fear and substantial support for computers as information retrieval and organisational tools were recorded (see

Figure 6.3.2). The majority of surveyees also indicate that they are inclined to use publicly accessible computers.

Internet appreciation appears to be growing as reflected by the considerable percentage of print surveyees (41.2 per cent) who claimed that they were not daunted by the Internet. Not surprisingly, the majority of online surveyees (63.6 per cent) are not intimidated by the Internet although the percentage of online respondents (15.3 per cent) who agreed to the question *the Internet overwhelms me*, indicates that it can still be a stumbling block even to those already online.

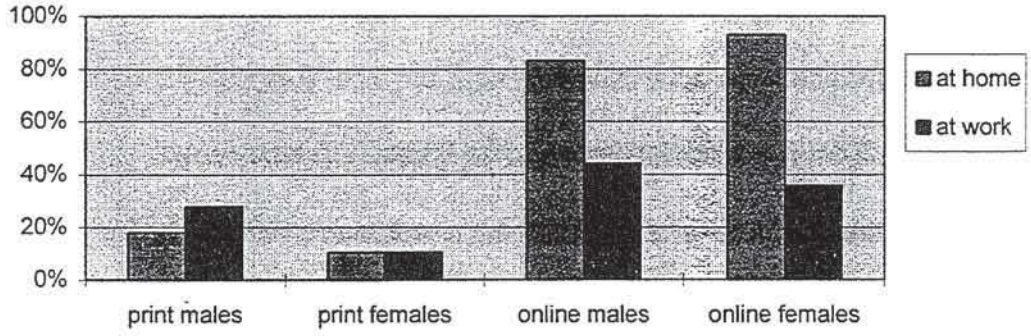
Figure 6.3.2
Computer/Internet appreciation



The vast majority of online users (81.9 per cent) claimed they use the Internet at home, 36.1 per cent doing so every day. Online females use the Internet at home most with 92.9 per cent versus 83.1 per cent of the online

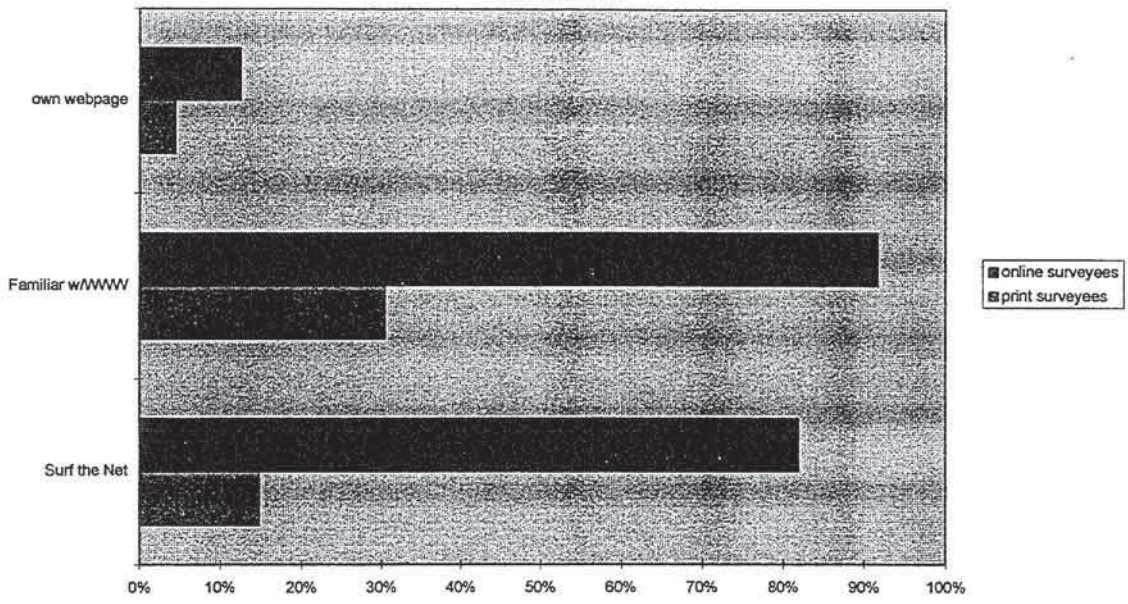
males, although a higher percentage of online males (44.1 per cent) than females (35.7 per cent) use the Internet at work. As reflected in Figure 6.3.3 27.9 per cent of print males also use the Internet at work. Since 28.8 per cent of online males and 26.2 per cent of print males indicate that they work in the service industry, the latter figures are consistent with current online user trends that Internet users are likely to be employed in computer or service related industries and therefore have Internet access at work (Cyberatlas 1996).

Figure 6.3.3
Internet Use - 1



As online users regularly use the Internet at home or work, it follows that most are familiar with the World Wide Web (81.9 per cent), although only 12.5 per cent of online users currently have their own webpage. Of the print surveyees, 14.7 per cent surf the Internet, 30.4 per cent is familiar with the Web and 4.4 per cent have their own webpage (see Figure 6.3.4).

Figure 6.3.4
Internet use - 2



A relatively small percentage of print surveyees seem inclined to go online in the near future. Of the male print surveyees, 29.5 per cent indicated that they intend to go online within the year versus only 19.7 per cent of the female print surveyees. As a relatively small percentage of print females are employed full-time, socio-economic factors may be an inhibitory consideration in the decision to go online. Of the online males 23.7 per cent expect to go online within the next 12 months. The large percentage of blank answers received (62.7 per cent) from online males would indicate that many are already online. Of the online females 64.3 per cent intend to go online within the year, while 28.6 per cent blank answers were received.

Analysis of the *I intend to go online* question was clearly impeded by the many blank responses received. Hence, in retrospect, the question *I intend to*

go online within the next 12 months should have been worded *I intend to go online at home within the next 12 months* and should have been preceded by the question *I am currently online at home yes/no*, since it proved confusing to respondents already online either at work or at home and made prediction of future online use both arduous and imprecise.

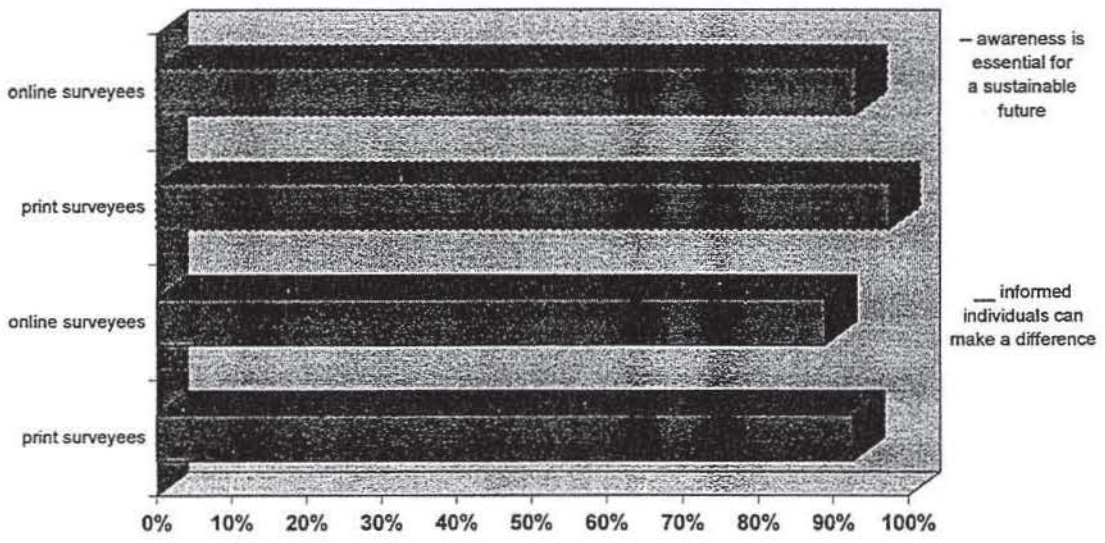
In terms of accessing general information via electronic means, responses are in line with interest in accessing environmental information online (see 6.1), e.g., surveyees unanimously agree that the Internet is useful for retrieving information. There was once again a high level of support for a public access terminal from print females (52.8 per cent), although currently only 11.8 per cent of print surveyees and 16.7 per cent of online surveyees access the Internet in a public place. As seen above, the latter group is the least likely to go online within the next year, which may explain why they are more interested in a public terminal than print males. As both online males and females are already in a position to obtain online information via either home or work, it follows that less than 45 per cent would be interested in a public access terminal.

6.4 Desire to Obtain Environmental Information

All surveyees have a reasonably strong desire to obtain environmental information, substantiated by 64.2 per cent of print surveyees and 61.1 per cent of online surveyees indicating awareness of environmental issues. Further

establishing the community's interest in environmental information are both survey sample groups' strong agreement that awareness is essential for a sustainable future and that informed individuals can make a difference (see Figure 6.4.1). Moreover, both print surveyees (92.7 per cent) and online surveyees (81.9 per cent) make at least some effort to encourage family and friends to be environmentally aware; the majority of surveyees recycle; and 56.9 per cent of online surveyees indicated that they work for an environmentally-friendly business, although only one-fifth of all surveyees carpool. However, the community's suburbs cover an extensive geographical area, which may make carpooling difficult and hence may play an inhibitory role in the latter figure.

Figure 6.4.1
Importance of being environmentally informed

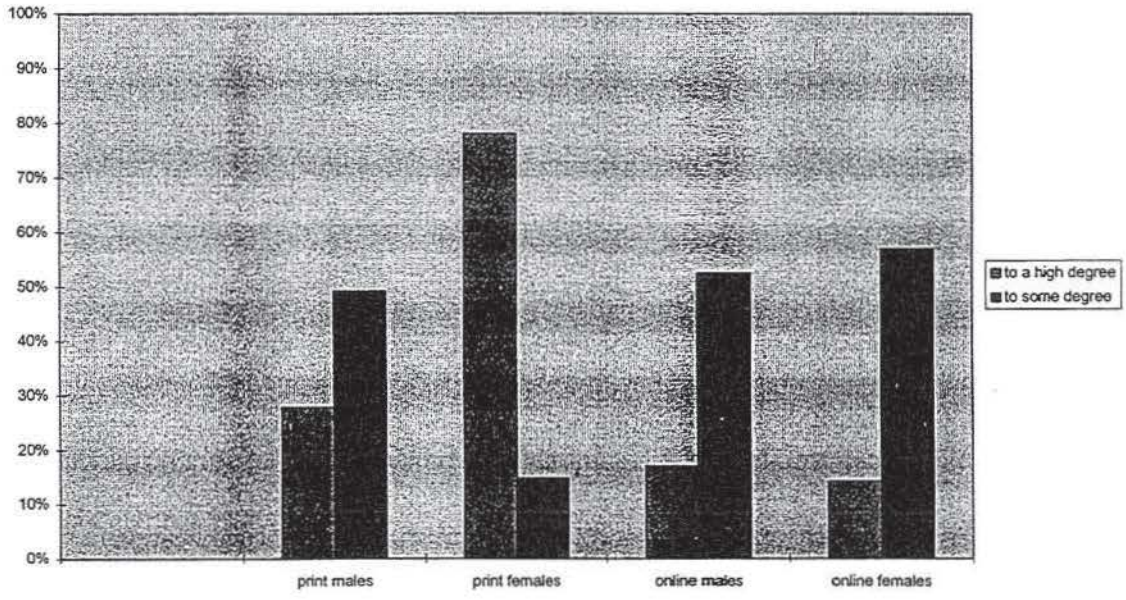


As became evident in the sample profile (see section 5.2.7) all surveyees indicated themselves to be environmentalists to some degree, with the print survey males identifying themselves as environmentalists to a high degree.

However, when comparing the degree of effort undertaken to obtain environmental information (see Figure 6.4.2) the latter group's reported level of effort is surpassed by all other surveyees. As most online survey respondents are employed full-time, lack of time could be a contributing factor, especially when compared to the high degree of effort (78.1 per cent) undertaken by print survey females, 38.7 per cent of whom are employed full-time.

Over 70 per cent of all surveyees do make at least some degree of effort to obtain information, although only a small percentage of print respondents (27.9 per cent) and online respondents (16.7 per cent) actually are members of one or more environmental organisations; less than 16 per cent attend environmental community meetings; and 44.6 per cent of print respondents and 58.3 per cent of online respondents rarely or never contribute to environmental causes.

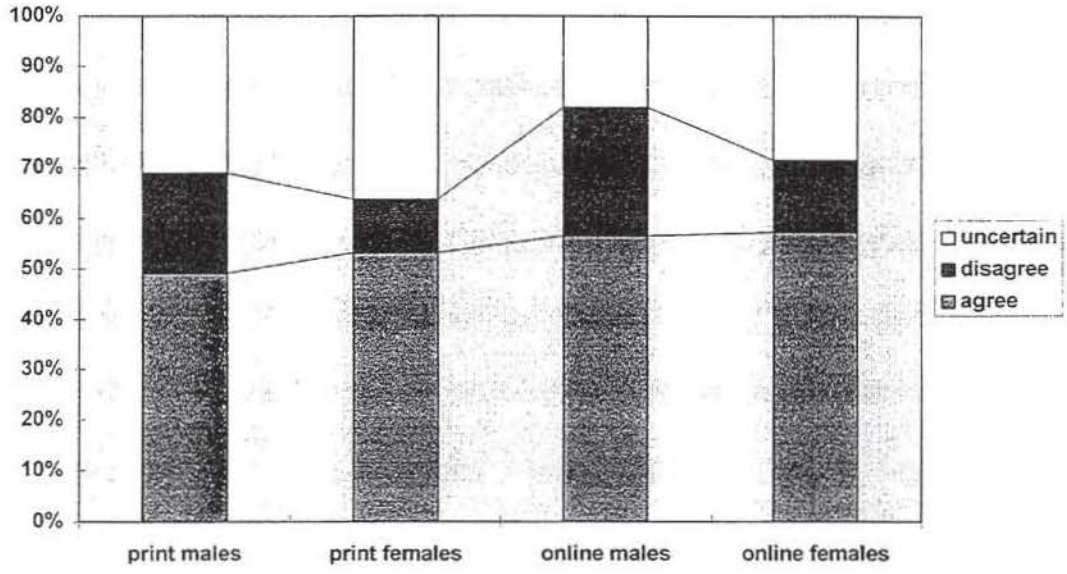
Figure 6.4.2
Effort to Obtain Environmental Information



6.5 Satisfaction Level with Available Environmental Information

Since all respondents in essence agree that more environmental information is needed (see Figure 6.5.1), the current level of environmental information available in the community is not satisfactory.

Figure 6.5.1
Need more environmental information



However, the majority of surveyees considered themselves adequately informed on only two issues: recycling and the marine environment. Of all environmental items listed to gauge a community's satisfaction level with environmental information currently available, 61.3 per cent of print survey respondents versus 54.2 per cent of online survey respondents agreed that there was sufficient information available on recycling and 51.4 per cent of online surveyees indicated that there was enough information available on the marine

environment versus 44.1 per cent of print surveyees, 21.6 per cent of whom where actually uncertain about the availability of marine information.

Recycling is one of the dominant environmental topics in any community and, given the community's environmental profile, recycling is a topic likely to be covered by local government and environmental agencies. Similarly, given the sample community's proximity to The Great Barrier Reef and its various reef management agencies and institutions, increased awareness about the region's marine environment and subsequent information availability on the latter topic may also be expected.

While by no means exhaustive, in reviewing the other environmental items on the list, it became apparent that both survey groups agreed that there was insufficient information available, or they were unsure about information availability, on all other items listed; these included energy conservation, alternative energy sources; land protection; water conservation; air, water and noise pollution; solid waste disposal; hazardous waste disposal; cultural heritage and conservation; environmental building and construction; environmental packaging and products; city council initiatives; environmental institutions and organisations; environmental events, shows and exhibits and environmental involvement opportunities.

As demonstrated in Figure 6.5.1, more than half of online males (52.8 per cent), online females (57.2 per cent) and print females (52.8 per cent), as well as approximately half of print males (49.2 per cent) agreed that more environmental information is needed, while one-third of print males sample was uncertain about this need.

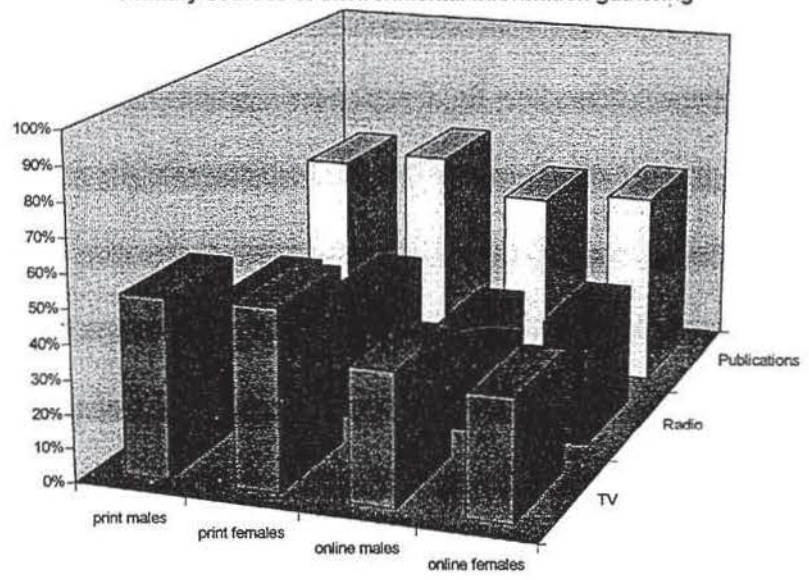
6.6 Current Sources of Environmental Information Gathering

Publications were most popular for environmental information gathering, followed by television and radio (see Figure 6.6.1). Libraries, museums, schools, poster, flyers and public environmental events were least popular.

In both survey groups, publications were more often utilised than television with 63.8 per cent of print respondents often using publications for environmental information versus 54.2 per cent of online respondents, although only 23 per cent of the print respondents and 12.5 per cent of the online respondents regularly access their information from ecological publications. For print surveyees television proved to be a more popular medium to obtain environmental information (52.8 per cent) compared to only 39.0 per cent of online surveyees, who regularly use television to obtain environmental information (see Figure 6.6.1). Comparing these results to general information gathering data, 72.3 per cent of print surveyees and 59.7 per cent of online surveyees frequently use television to obtain general information.

Given that environmentally-themed radio shows are sparse, radio is used notably less than either television or publications for environmental information gathering with less than 37 per cent of all surveyees using radio regularly for this purpose (see Figure 6.6.1). Again a higher percentage of surveyees (63.1 per cent of print surveyees and 54.1 per cent of online surveyees) indicate that they do use radio as a general information source.

Figure 6.6.1
Primary sources of environmental information gathering



Ecological posters and flyers are rarely or never read according to 39.3 per cent of the print respondents and 52.7 per cent of the online respondents, while more than 40 per cent of all surveyees say they rarely or never watch ecological films and videos. Libraries, museums, schools and public environmental events are attended regularly by less than 18 per cent of all surveyees. Over 40 per cent of print surveyees indicate that they sometimes visit

museums and public environmental events, while they also at times obtain environmental information via family and friends. Similarly, 41.7 per cent of online respondents indicate that they sometimes obtain environmental information via family and friends, but overall community group, museum, library and public event attendance by online respondents tends to be low.

It is of interest to note that the online survey respondents were less inclined towards the use of conventional media, museums, public events, etc. to obtain environmental information than the print survey respondents. In fact, 93.2 per cent of online males and 78.6 per cent of online females use the Internet to obtain general information. This would indicate a significant shift in media use from print media to electronic and online media, especially if one considers that the environmental communicators Ostman and Parker's (1985) study concluded that amongst those surveyed at the time in the United States neither television nor newspapers were actually considered reliable sources for scientific information on the environment and that books and pamphlets rated highest as believable sources for scientific environmental information.

In terms of reliable media sources, one quarter of hardcopy surveyees (25.5 per cent) and approximately one-sixth of the online surveyees (16.7 per cent) indicated that they trust the environmental information they obtain to a high degree. More than half of the hardcopy surveyees (61.3 per cent) and over half of

the online surveyees (59.7 per cent) were more sceptical, however, indicating that they trust the environmental information only to some degree.

6.7 Survey Conclusions

The high levels of computer literacy and computer use in both survey groups combined with the low levels of fear associated with computers and the Internet indicate a general interest in the use of information technology for information dissemination. In terms of accessing environmental information, community members have expressed a reasonably strong desire to obtain environmental information while respondents' low levels of satisfaction with the availability of environmental information echoes the need for dissemination of additional environmental information.

Considering the need for more environmental information; given the level of computer and online interest; and considering that online users are already using the Internet to obtain environmental information, it follows that a centralised database in the form of an online environmental Internet site can potentially be an effective channel for environmental community information dissemination. As online surveyees have verified, if environmental information is available online, they are highly likely to access it.

In sum, these results are consistent with the hypothesis that if community members are potential online users, if they actively seek environmental information, and if they are dissatisfied with the current environmental information flow, the more likely they are to be interested in an online environmental database tailored to their information needs.

Although there is a high level of interest in accessing information at community members' point of need, e.g., at the workplace or at home, the evidence is not conclusive that providing environmental community information via a public access terminal, e.g., a touch-screen kiosk, has a high level of valence for community members. It follows that a community Internet site and a touch-screen kiosk attract different publics. Hence, if both an environmental community Internet site and an environmental touch-screen kiosk were to be constructed, they should be designed accordingly.

While the two information systems can operate in tandem with information being shared where applicable, the community Internet site should primarily be designed for community and remote Internet users, which may be accessed either via home and work or via public access terminals already in place at such locations as a local library, bookshop or cyber cafe; and an environmental touch-screen kiosk should predominantly be geared towards on-the-spot information delivery for the computer fearful, out of town visitors and tourists. Once the two

systems are in place and a touch-screen kiosk user profile has been determined, information content may be adapted accordingly.

Phase Two:

Utilisation of Information in the Website Design: Exploration of Creative Possibilities

Chapter Seven
Website Development

7.1. Establishing the Niche

As profiled in the analysis of creative message delivery in the digital age (Chapter Four), the Internet might be thought of as a huge collective experiment of thousands of individuals and organisations publishing materials online (Whitelaw 1996) and hence is host to a myriad of environmental sites. To illustrate how extensively environmental issues are covered online, searching the Internet on the broad keyword "environment" via a so-called search engine, a program that examines documents for specific keywords on the World Wide Web and returns a list of documents in which specified keywords were found, produced 1,150,261 matches. Specific topic searches are discussed later in this Chapter (see section 7.2).

While the Internet offers a plethora of online resources dedicated to environmental issues, each site is subject specific with topics ranging from chemical catalogues to pollution information exchange and federal sources to citizen action groups, to name but a few (Alston 1996). Within the limits of the emergent technology, which currently allows for information viewing,

information retrieval, information contribution and information exchange, each site also has a specific delivery format.

At this time, there are various online information delivery formats in use, e.g., an online database, a news service, an electronic journal, a bulletin board, etc. (Alston 1996). A site's information delivery choice is generally contingent on the subject matter and niche purpose of the site and may contain more than one information delivery format, e.g., an electronic journal is likely to offer its readers access to a database of back issues. Hence the design of delivery formats inherently call for consideration and integration of content, technical and aesthetic design elements.

One form of delivery is the so-called community network. As described in the analysis of the Internet and the community (Chapter Three) these networks originated in text-based electronic bulletin boards. Community networks tie together people within a geographical area who have common interests or professions. Hence each group tends to operate within a niche environment (Cisler 1993). Some community networks are bulletin boards, others are based on large commercial services and some are Unix-based systems with connections to the Internet (Cisler 1993). The latter systems provide their users with an electronic on-ramp to a myriad of global resources, while bulletin boards generally have no connectivity outside of the town or area they serve (Cisler 1993).

Today a convergence of many of these services and systems has been set in motion through the explosive growth of the Internet (Hecker 1994). The growth of the Internet has led to increased interest in access to local information and increased expectations of better services and connectivity (Hecker 1994). It follows that an important phase of development is the delivery of niche community information via the Internet.

Having established a community's desire to obtain environmental community information; having determined a community's interest in a centralised environmental database; and considering a community's potential willingness to access environmental information via computer-mediated communication, a niche community Internet site can be created for the delivery of environmental community information. Its design needs in terms of an information delivery vehicle may hence be placed within the framework of a community network.

7.2 Eliminating the Competition

To ascertain that no other local community website of this nature is currently in existence, a review of existing environmental Internet sites with similar content delivery objectives was undertaken.

As the Internet contains tens of thousands of environmental sites, an exhaustive review was neither necessary nor practical in terms of time and help available to review sites. Hence, with the assistance of search engines such as Infoseek, Lycos, Yahoo, Alta Vista and Excite, a series of searches was undertaken based on a single keyword, e.g., *the community's name*, followed by a series of Boolean searches, whereby relevant keywords were combined, e.g., *the community's name* plus *environment*; *community* plus *environment*; *environmental information* plus *community*; etc. These searches were undertaken during the month of May 1997 and all sites listed were accessed during that time. Multiple new sites are added to the World Wide Web on a daily basis, while present sites and even search engines may cease to exist. Given the nature of the medium, there will hence be some changes from the time of this data collection.

7.2.1 Single Keyword Search

As search engines examine documents for specific keywords on the World Wide Web via their own database system, search results can vary greatly, e.g., the single keyword search using *the community's name* resulted in 2929 matches from Excite, 4774 matches from Infoseek, 1817 matches from Lycos, yet a mere ten matches from Yahoo.

Given that viewing each match would be prohibitively time consuming, and given that search engines generally list sites in the highest matching order,

the first one thousand matches provided by above-mentioned search engines were reviewed to yield an overview of site purpose, community-based content, technical and aesthetic information delivery mode.

Although search engines returned numerous single keyword matches, there was extensive repetition in the listing of sites, while a number of sites listed were either no longer in existence or displayed information, e.g., specific sports results, which is long outdated but has neither been updated nor removed.

Having discounted duplications, futile links and outdated sites and having reviewed the remaining results of the single keyword search using the community's name, it became apparent that there is no local site in existence which functions as a centralised environmental database specifically dedicated to the delivery of environmental information to the community, nor does any local site provide a conduit for active environmental community involvement.

Internet sites which do contain the community's name range from environmental institution sites, e.g., *The Great Barrier Reef Marine Park Authority (GBRMPA), Australian Institute of Marine Science (AIMS)*; to general and tourist information sites, e.g., *Townsville's Window to the World, City of Townsville, Sunzine: Welcome to the North, City.Net -Townsville, Australian City in Tropical Queensland*, etc.; announcement sites for forthcoming events,

e.g., *VIth International Rangelands Congress - Townsville 1999*; sports sites, e.g., *Townsville Sun Player Current Statistics, Townsville -104 def. Brisbane-89*; a myriad of the community-based university sites, e.g., *Tropical Environment Studies and Geography Department*, *Department of Computer Science*; to community-based business sites, e.g., *Townsville & District Planning Strategy Group*, *Mid Ocean Marine Sciences*; and community-based organisation and club sites, e.g., *Townsville Art Dealers* and *The Townsville Canoe Club*.

In reviewing the sites' information delivery strategies, no so-called multi-purpose community sites were found. Each of the above-mentioned sites may be considered subject-specific single purpose sites, e.g., the focus is on delivery of tourist information, sports results, etc. Although a tourist information site such as *Sunzine* includes area attractions and maps or links to other tourist attractions in the region, it should be considered as a single-purpose site as it does not contain more than one information delivery system, e.g., an online database as well as a forum facility.

City.Net -Townsville may be a considered a multi-purpose site in that it offers tourist information on the community and simultaneously facilitates transactions, e.g., travel reservations. However, this site is not a specialised local endeavour but is part of an international database offering worldwide travel reservations. Apparently most of the above-mentioned sites aimed at

attracting tourists to the region either omitted to investigate what local tourist information was already available online prior to designing a new site or obtained their information from a single source, as content was frequently duplicated.

In terms of aesthetic delivery, many of the above-mentioned information sites were single hypertext listings with minimal or no graphic displays, e.g., *VIth International Rangelands Congress - Townsville 1999*. Most tourist sites included area pictures, some of which did not necessarily pertain to the hypertext, e.g., the *Sunzine* site talks about beautiful Magnetic Island and the rugged outback, which was illustrated by a picture of a couple dressed in tropical attire.

7.2.2 Multiple Keyword Search

The Boolean keyword search using *the community's name* plus *environmental information* resulted in 16,550 matches from the Alta Vista search engine, 41,466 matches from the Lycos search engine and 3,908,276 matches from the Excite search engine. The keywords *community* plus *environment* resulted in 22,939,714 Infoseek matches and 40,349 Lycos matches. Given the potential time invested in viewing each site would be prohibitively time consuming, where possible search items were subjected to advanced searches matching all words within the search criteria, e.g., an advanced Lycos search on *community* plus *environment* narrowed matches

down to 63 relevant sites. Taking into consideration that search engines generally list sites in the highest matching order, where the pairing down option was not available, the first five hundred matches from each search engine were reviewed on site purpose and site content.

Several sites contained environmental information specific to the area, e.g., the local *Townsville-Thuringowa Water Board* site displays the total yearly rainfall recorded in the area as well as the region's annual water consumption statistics, but its so-called press page was devoid of information, indicating a relatively static site. The university's *School of Biological Sciences* has local area flora and fauna sites e.g., a regional frogs species lists and a rainforest slide show, maintained by the *Department of Zoology and Tropical Ecology*, while the School's *Department of Marine Biology* offers a slide show about the wonders of the coral reef. The *GBRMPA* site contains a sea temperature monitoring database and online copies of its reef research journals with information such as Crown-of-Thorns starfish research and the Great Barrier Reef world heritage area report.

Each of the above-mentioned sites is a single purpose subject-specific site, where the interactivity is confined to following hypertext links. In terms of aesthetic appeal, webpages like the university's *Department of Zoology and Tropical Ecology* species listings, which are devoid of graphics, cannot initially be considered aesthetically pleasing until one follows the listings' hyperlinks

and is rewarded with species pictures and a slide show. Nonetheless, these sites offer useful community information with which the researcher had hitherto been unfamiliar and only discovered by entering key search criteria into a search engine. Given the fragmentation of environmental community information, these sites are hence potentially excellent information links to a centralised environmental community database.

The predominant *community* plus *environment* returns from Infoseek and Lycos were overseas cities, databases or organisations, e.g., *Sustainable Seattle, Sustainable Minneapolis*, which list information on or links to environmental action groups like *The Center for Sustainable Development, Living Lightly on The Earth, American Forests* and *Zero Population Growth*, but do not have general environmental community information. The *Sustainable Seattle* site is a multi-purpose site in that it does have a discussion forum in the form of a newsgroup called *scn.sustainable.general*, although no discussion items were posted when the site was accessed. An American site called *Best Practices Database* contains environmental information submitted by communities from around the world, but does not focus on any particular community. From an aesthetic interface point of view, these sites were predominantly hypertext-based sites without elaborate interface designs. Hence, while they might, as such, be considered useful as an information database, little or no effort was made to please the user aesthetically.

No specific Australian cities or websites were detected among the first five hundred matches as part of the *community* plus *environment* search. Given the tentacular nature of the World Wide Web, and considering the fact that search engines will omit a site if exact keywords are not contained within a site, a relevant site may be found virtually by accident in an unexpected category. A search using the keywords *Australian communities* resulted in locating the *Waterwatch Australia* site with the subheading communities caring for catchment, which subsequently led to the related *Waterwatch Victoria* site. The latter site encourages community involvement in water monitoring and uses the Internet to communicate. Although the *Waterwatch Victoria* site operates on a state-wide rather than a single community basis, it offers an example of a successful multi-purpose site in that it provides directives on how to monitor water, has a dynamic news and events section, as well as a forum to discuss waterwatch issues with scientists. Aesthetically, the site's graphics are pertinent to the subject matter at hand and the site layout satisfies quick perusal needs.

Another search result in the *Australian communities* category, e.g., the Queensland city of *Ipswich*, merits a mention in that it was among the first Australian cities to put a community website on the World Wide Web. It is, however, a single purpose site, does not contain any environmental community information or links and, offering merely some stills of the town on display, is not particularly innovative in its design. The recently developed *Brisbane City*

Council site is amongst the most comprehensive city council information sites currently available in Australia and includes some environmental information.

Having been unsuccessful in locating a local or a remote multi-purpose environmental community website and, in pursuit of the hypothesis that the Internet has the technological ability to provide consistent environmental community information as well as the potential to build increased community awareness of environmental issues, this study's aim is to design and evaluate a prototype environmental community Internet site which integrates content and design elements tailored to a community's needs. Since the website is developed as a prototype, no actual information delivery software product will be placed on the Internet for download purposes.

The findings of the study's community survey indicated that an Internet website would be used predominantly by community members while the primary function of a public access terminal, e.g., a touch-screen kiosk, would be to cater for out of town visitors and tourists (see section 6.7). Since the focus of the study is community access to information, it follows that the design and evaluation of a kiosk or equivalent lie are outside the scope of the study at present.

7.3 Website Issues

As discussed in the analysis of creative message delivery in the digital age (Chapter Four), every time a new technology emerges, communicators, artists and entrepreneurs alike will look for forms to suit the new medium. To illustrate that website design is still in its formative stages, an Internet search on the keywords *website design* via the search engine Excite resulted in 1,861,207 returns. As Penny (1995) argues, for the medium to be effective, new ethical, aesthetic and consumption models and interfaces need to be generated (Penny 1995).

Being an interactive tool, the Internet puts the power in the hands of the user. Hence captivating one's targeted website audience is not an easy task. A user is neither likely to remain at a website nor return to it in future browsing sessions unless the site caters to the user's needs in terms of information access, dynamic content, technical quality and aesthetics. Hence, to make the environmental community website a potentially exciting and effective information channel, its target audience, platform use, content and design requirements must be determined.

7.3.1 Target Audience

To meet the target audience's needs, it is imperative to establish early in the design process the nature and extent of the potential website users. The amount of prior knowledge about one's target audience dictates the extent to which website information and terminology need to be explained (Levine 1996). While target users may already be familiar with the subject matter, information providers should take into account the fact that the user base may change or expand and that not all prospective users are familiar with the subject matter.

Although a high level of computer literacy was recorded in the community and computer use is widespread, registered Internet use is relatively low (see section 6.3). Since the majority of the target user base was not familiar with the Internet and since no community profile of the future user base has been determined, it follows that the website should be optimised for a broad range of new users. Hence the need for a user-friendly site in terms of platform access, content and graphical interface, which incorporates a range of human factors, e.g., human diversity and ability, backgrounds, motivations, personalities and workstyles.

7.3.2 Platform Access

The survey did not yield a pattern of common platform use by the online community. Hence it must be assumed that users are likely to access the website from a variety of platforms. As the environmental community site's objective is to cater to the broadest possible number of users, a wide range of platforms would need to be accommodated. This may be accomplished by facilitating site viewing from either a text-only platform, e.g., a Unix system, or from a browser enhanced viewing platform, e.g., through Netscape or Microsoft Explorer.

7.3.3 Content

One measure of successful content delivery is when users find the information contained in the website valuable enough to add the site to their "hotlist" or list of bookmarks (Levine 1996). Website content is programmed in clickable Hypertext Mark Up Language (HTML) which lends itself to a hierarchical structure. If content is provided in a value-free set of intermediate pages instead of in a so-called flattened hierarchy, whereby as much content as possible is provided at the top of the hierarchy, one is likely to lose one's user (Levine 1996). Hence, to satisfy a range of audience needs, paring down of text, pointed prose, pertinent graphics (see section 7.3.4) and context links should be provided. Furthermore, since users tend to avoid static websites (Levine 1996), content needs to be updated regularly by adding dynamic data

to static data and providing users with clues to the dynamic nature of the content (Levine 1996).

To formulate main hierarchical headings on the website, surveyees' environmental information needs (see section 6.5) were reviewed; information was collected from local resources, e.g., Townsville City Council, North Queensland Conservation Council; materials were collected at environmental events, e.g., 1996 and 1997 Eco Fiestas, and content discussions were held with local environmental experts, e.g., Great Barrier Reef Aquarium staff, JCU Tropical Environment Studies and Geography staff.

Having assembled a broad range of potential environmental information to be included in the community website, the materials were sorted into batches upon which category headings were defined reflecting the general content field of each batch, e.g., government, home, industry. The site name *Eco-Mate* was chosen, as it was deemed to reflect both a helpful nature and an Australian flavour. Having established a draft list was created in which main category headings were classified and a series of subheadings was developed based on the actual content materials in each batch, e.g., listing of environmental community organisations, recycling information. The draft list categories included *Eco-Action, Eco-Education, Eco-Forum, Eco-Government, Eco-Home, Eco-Industry, Eco-Links, Eco-Living, Eco-News,* and *Eco-Tourism.* In order to identify any unanticipated difficulties in the content presentation and structure,

the draft website contents list was subsequently printed and submitted for review by an instructional designer of the university's Flexible Learning Unit (FLU). This procedure yielded several content modifications.

Although the Internet is based on non-linear interactivity and information is accessed accordingly, the suggestion was made to arrange text-based category headings alphabetically to give new users the choice of either accessing information via a potentially unfamiliar graphical non-linear interface or via a more familiar linear text order. In order to retain the user at a site as long as possible, websites tend to display their *links* which provide connections to other websites at the end of category listings. Listing headings alphabetically inherently builds in the danger that the user might leave the website earlier than desired. However, since the environmental community site functions as a database, information will be provided predominantly by linking category subheadings to existing sites, e.g., in the eco-government category subheading links are created to local government departments, potentially resulting in the user leaving the website well before the alphabetical *links* listing is reached. Subsequently, it was decided to favour the more familiar linear text order and hence the main categories, appearing as text within the interface design (see section 7.3.4), were rearranged in alphabetical order.

The *Eco-Home* and *Eco-Living* category headings were deemed too similar, as subcategories such as *Energy, Pollution, Recycling* and *Water* might

be classified under either category and were therefore considered interchangeable. Moreover, *Eco-Home* would exclude any work or business related environmental references. As a result, the *Eco-Living* and *Eco-Home* categories were combined into one *Eco-Living* heading and all the *Eco-Home* subheadings were moved to the *Eco-Living* category. The subheading *Motoring* which was initially placed under the *Eco-Community* heading was moved to the *Eco-Living* category as well, as it was considered a personal or family issue rather than a community issue.

To maintain the consistent familiarity of a linear order it was decided to alphabetise all subcategories as well. To further aid the new user in locating available categories, the additional suggestion was made to include a site map, providing a graphical overview of the site's menu choices, as well as a site search engine facility for the purpose of locating a particular topic of interest. Both were subsequently incorporated in the contents structure.

In reviewing the draft list with the revised contents layout, it became apparent that, in a number of instances, cross-referencing would occur, e.g., in the *Eco-Community* category under the *Landcare* subheading, it was likely that there would be a reference to the local landcare organisation, which would also be listed in the subheading *Environmental Interest Groups* under the *Eco-Action* category heading. Further feedback from the FLU instructional designer revealed that cross-referencing is likely to increase rather than decrease

usefulness of the site. Hence no subheadings subject to cross-referencing were eliminated and the revised contents review resulted in no further content modifications. Having included all revisions in the draft contents list, a final contents list was created (see Appendix D).

Ultimately any website should be fully developed and contain detailed information in all categories and subcategories included in the aforementioned contents list. However, considering the prohibitive amount of time required to assemble a complete environmental database, full development of the website is neither practicable or desirable as a first step. It is essential that a prototype be developed and evaluated before further development is contemplated.

Prototype options included omitting a broad website structure and developing one or two detailed strands instead, or partially developing the website by including the broad range of main categories and subsections but omitting in-depth strand information. If strands were to be developed, any two strands would have the potential of further development. Although full development of one or two strands, e.g., *Eco-Action* and *Eco-Community*, would give evaluation participants (see section 7.4) a sampling of the in-depth information the website can potentially deliver in the future, it would fall short in delivering the overall design and scope of the website. Hence it was decided that all main and secondary categories represented in the contents list would be included in the prototype but categories would be displayed as inactive links.

However, to be able to evaluate the subcategory structure and the depth of environmental information desired, it was necessary to include topical database information in at least one main and one sublevel category.

Any subcategory containing environmental community information could potentially have been developed to include specific database information. However, prior familiarity with a topic was deemed helpful to determine the depth of information desired on any given topic. Since community members were already familiar with recycling issues (see section 6.5), and hence would be in a position to judge the adequacy of the recycling information offered online, the *Recycling* subcategory under the *Eco-Living* strand was further developed for evaluation purposes (see section 7.4).

To ensure continued user interest in an environmental community website, its content would need to be updated regularly. Therefore, where applicable, subheadings would need to be earmarked for regular content updates, e.g., seasonal habitat changes under habitat in the *Eco-Living* category, new municipal initiatives in the *Eco-Government* category, forthcoming environmental events in the *Eco-News* category. Other potential options to keep a website dynamic are 1) securing regular user feedback, 2) posting user contributions, and 3) creating an open forum in which users would have the opportunity to exchange ideas.

Potentially, user feedback may be accomplished via methods such as conducting periodic surveys or focus sessions; establishing a telephone feedback line for community members; and providing email access to the webmaster. Given the prohibitive time and funding required to administer periodic surveys or focus sessions; given the level of funding and personnel needed to establish and staff a telephone line; and considering that technology currently allows for direct user email access via the website, the latter would clearly be the most efficient method to elicit regular user feedback.

Potential options to facilitate user contributions include establishing a local mailbox; establishing a local fax line; holding a periodic public forum; and creating a newsgroup facility online where contributions and opinions can be posted. Considering that *xyz* dollars would be required to establish a local mailbox; given that the establishment of a local faxline would require *y* dollars; and considering that focus sessions would entail the periodic hiring of both a locale and personnel at *z* dollars, it became apparent that cost factors would preclude any of these options.

Given, however, that there is no additional charge to online users to post messages online; and considering that technology allows for the posting of an online message directly to a newsgroup, the latter would be the most efficient method of securing regular user contributions. In addition, since a periodic public forum would not only entail the hiring of a space and personnel but also

require the physical presence of community members, an online chat (IRC) facility where users can meet, communicate and exchange ideas in real time from the convenience of their home or office, would clearly be a more time and cost-effective meeting solution. Hence to contribute to the dynamic profile of the community website it was decided to create a forum, comprising an email, a newsgroup and an IRC chat facility, to accommodate user feedback, user contributions and the exchange of ideas.

Monitoring the use of a website also helps determine its level of dynamism. Currently there are a number of different tabulation methods in use which may or may not be visible to the user. One obvious way is to display a visitors' counter on the website itself. However, should the website not be a popular one, as reflected by the low number displayed on the counter, such a monitoring device could potentially be detrimental to the website's image. Another method is to include a so-called cookie program, which is sent to the user upon visiting the site and, if accepted by the user, allows certain user information to be released to the website sending the cookie. Cookie programs give users the option to refuse the release of personal information and preferences (Horey 1997). However, other tabulation programs are being developed whereby user information is extracted for user database building without the prior knowledge of the user. The latter has given rise to debates on privacy rights and the ethics of website monitoring (Horey 1997).

Since this study aimed to build a prototype rather than a fully developed website and, given that a prototype website would have limited use and would hence not yield an definitive website user profile at this time, it was decided unnecessary to include a site monitoring program. However, since so-called meta tags were included as part of the site index hypertext programming, search engines could potentially locate the site based on the keywords *environment* and *community*. As a result a number of website hits might be received and hence it was decided to include a simple page log program to measure the effectiveness of meta-tags, to tabulate hits and gauge the general type of user interested in accessing the environmental community site, e.g., someone from an educational (.edu), governmental (.gov), military (.mil) or commercial (.com) institution.

7.3.4 Interface Design

Although not every user is likely to have a browser with graphical interface facility, using graphics is a crucial part of information delivery for any website. Graphics and image maps are important navigational aids and an effective way of organising page layout (Levine 1996). The predominant argument against using graphics is the time involved in downloading them.

As discussed in the analysis of creative message delivery in the digital age (Chapter Four), information design is about adding value to data whereby visuals communicate messages effectively (Souttar 1995). In this context, a

web designer's initial concern is that the aesthetic aspects of the interface design draws the user into 'entering' the site. To keep the user immersed in the site an interface design is required, which Ingram (1995) describes as one which is transparent in nature, incorporates visual and behavioural clues, allows the user to rely on real-world knowledge, yet intuitively gives the user control over tasks and goals (Ingram 1995).

Having examined the need to enmesh the user in the site, reviewed a number of websites for graphical interface design, considered the necessity to provide multiple platform access, determined the number of category headings involved in the environmental community site, and discussed the interface design with a FLU instructional design expert and two graphical designers involved in the website creation, it became apparent that an interface needed to be designed which offered (1) the option of hypertext text-only access, and (2) clickable graphic access.

Although it is currently popular to separate hypertext and graphics by using multiple frames within a single webpage whereby each frame or window has its own arrow access bar and frames load individually, frame designs cannot be accessed from all platforms. Hence, considering the necessity to provide multiple platform access, a frame design had to be excluded as a viable option and an alternative interface design needed to be created. Apart from the fact that all platform users could thus be accommodated, choosing a no-frame

design had the further advantage that the main graphic would not need to be condensed into a smaller size window and that the design would not portray unsightly frame lines. As all information is reloaded each time a webpage is accessed, using a no-frame design did, however, build in the inherent danger that the graphics might be slow in loading and deter people from returning to the site. To avoid the latter, the size of the graphics files needed to be kept to a minimum without compromising the design.

To facilitate the creation process of the website's main graphical interface design and secondary page design, categories were grouped in a hierarchal flow chart (see figure 7.3.4.1) and submitted to the two graphic designers for design and technical suggestions. Since the design was to include a relatively large number of categories, the suggestion was made initially to curtail the design by grouping a number of categories into broad clusters, representing general community, business, and communication strands. However, the flow chart inspired the idea of designing an online flow chart in the shape of a mobile with dangling categories. As a result, all main categories could be accommodated and displayed clearly in the design and hence the cluster idea was abandoned in favour of category clarity. To augment category clarity, each category was also identified by name. To avoid text crowding of the interface, it was decided to eliminate the word from the category names on the main interface design, e.g., *Eco-Living* was reduced to *Living.* Having thus linked all main categories to a central graphic, a selection

could be made from the main graphic into any strand of choice without the involvement of any hierarchal steps.

To avoid crowding the main graphical design further and to maintain a prestine and memorable interface, the suggestion was subsequently made to move the alphabetical index down one level. However, to ensure that text-only browser access would still be available from the homepage, it was necessary to add a text-based site access facility. Hence a space was allocated below the homepage graphic to incorporate a main category text listing.

Website backgrounds are an integral part of the interface design. As a dense background has the tendency to conflict with webpage content, a background needed to be created for the main and strand topic pages which would not distract from the site's content. Given that the colour graphics created for the mobile would be detailed depictions of objects found on a beach and, considering that various background options, e.g., a tropical setting or a gradation of tropical colours, would distract the user from the graphic details and the text displayed under each of these objects, creating a background suggestive of an environmental setting had to be abandoned in favour of clarity and legibility. Hence it was decided to leave the graphics backgrounds on the main and sublevel pages white.

However, to accommodate the above-mentioned access needs in an alphabetically ordered and aesthetically pleasing fashion, it was decided for the design of the sublevel pages that the semblance of frames should be created through the use of different background colours, e.g., the left side of the screen would show the consistent alphabetical hypertext listing of the categories set in one background colour, while the right side of the screen would display pertinent information using a combination of graphics and hypertext set in a different background colour. Adopting the frame semblance strategy, a green background setting reminiscent of an environmental setting could, as such, be re-introduced for the alphabetical listing on the sublevel pages, while the background on the graphics side of the page could remain white consistent with the prior decision to leave graphics backgrounds on the main and sublevel pages white.

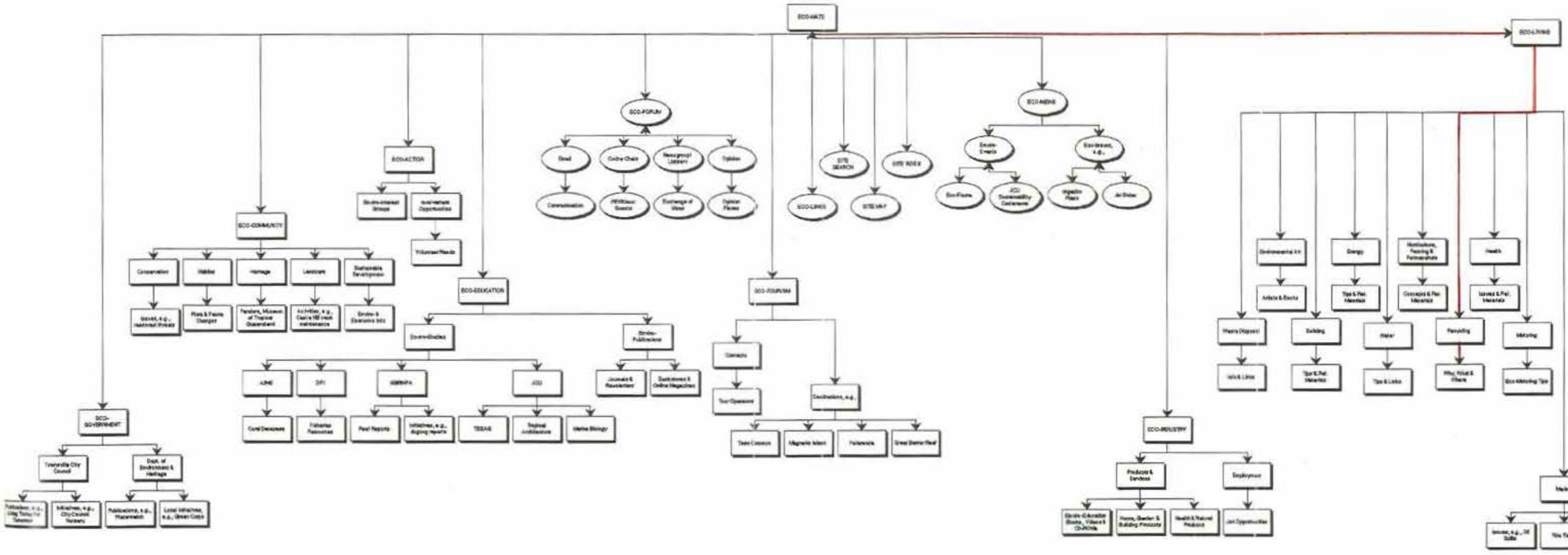
Since the website content contains an array of environmentally-themed categories and subcategory topics, many of which are not necessarily associated with standard visuals, icons in combination with textual navigation hints needed to be designed in order to identify strand subject matters graphically. Having thus designed category icons for the main mobile interface, for consistency purposes it was decided that a larger version of these category icons should be used to introduce each main category. Main category icons accessed on the site's sublevel pages would hence closely resemble the main

interface icons, although it was decided to add an illustrative border and reintroduce the word *Eco* as part of the sublevel category text.

Where applicable navigational buttons similar to those used in daily life, e.g., the circle of arrows which is widely recognised as the recycle symbol, could be used. Should the prototype be developed into a full-fledged website, all icon palettes would be used consistently in any related pages.

Upon the completion of the prototype design, the website could be uploaded onto the World Wide Web for evaluation purposes. By placing the site online, it could be viewed by a variety of users and hence be evaluated on issues such as platform access, loading speed and effectiveness of design.

Figure 7.3.4.1

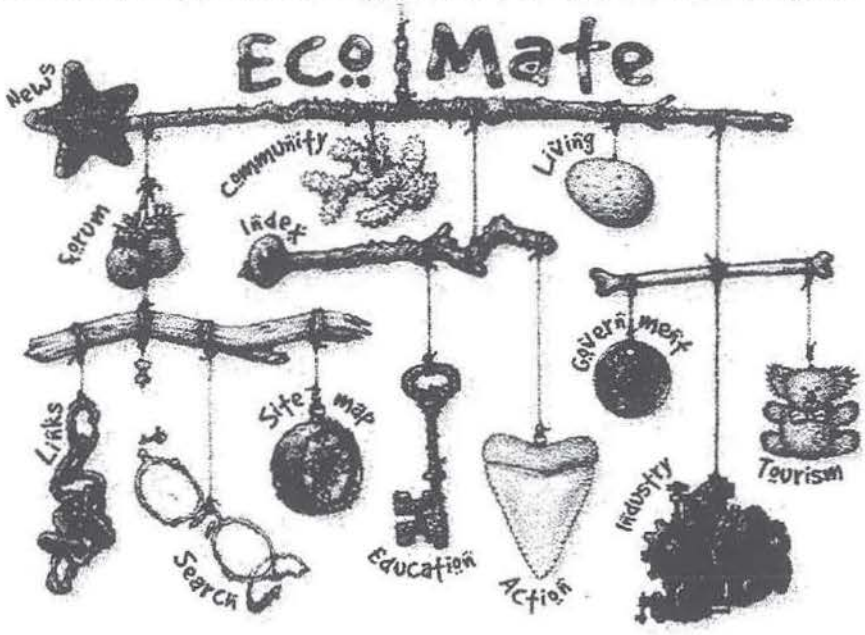


The flow chart (Figure 7.3.4.1) guides the user through the Eco-Mate entry square at the top of the chart to all main categories: *Eco-Living, Eco-Community, Eco-Action,* etc. Upon entering a category, e.g, *Eco-Living,* the user is greeted by general category information. All category sublevels, e.g., *Recycling*, are accessed via the main category page. Actual database information, e.g., community recycling details, is accessible by clicking on the *Recycling* hypertext link, which takes the user to the *Why, What & Where* sublevel. Clickable cross-reference links (not reflected in Figure 7.3.4.1) are also provided at the database information level, e.g., a link to the local *City Council*, which provides recycling information and services, takes the user directly to the *City Council* page located under the main category heading *Eco-Government.* Similarly, a cross-reference link to *Recycling* is established on the *City Council* sublevel. Another link on the *Recycling* page might lead to the *Yellow Pages* (see Figure 7.3.4.2) and a listing of industrial rubbish removal companies, e.g., club, business and shopping centre rubbish, not covered by the *City Council.*

The red coloured section of the flow chart represents the *Eco-Living* strand selected for development in the prototype (see section 7.3.3). Since it was not possible to reproduce the entire prototype, Figure 7.3.4.2 reflects samples of the site, e.g., the *Eco-Mate* interface, the *Eco-Living* category and the *Recycling* subcategory, published online via http://www.ultra.net.au/~patrice/eco-mate.

Figure 7.3.4.2

Pages 167 - 170



[eco-action] [eco-community] [eco-education] [eco-forum] [eco-government]
[eco-industry] [eco-links] [eco-living] [eco-news] [eco-tourism]
[site index]
[search] [site map]

Building
Energy
Environmental Arts
Health
Horticulture, Farming, Permaculture
Marine
Motoring
Recycling
Waste Disposal
Water

Eco-Living is, simply put, a way of life which helps meet our community's current needs without compromising the needs of future generations. As members of this community, we hold the greatest power to help create a sustainable future for our children. Succesful eco-living requires community awareness, responsibility, and involvement.

This means we should all know about reducing, reusing and recycling our daily living products and be aware of waste disposal options. But there's more to eco-living than recycling and waste disposal. For example, there's pollution, clean air and water to think about. These aren't the responsibility of government and industry alone. Individuals can help to reduce and reverse harmful economic and environmental effects.

This means we need to be aware of how we can conserve energy, for example by building environmentally sound homes and furnishing them with recycled furniture and environmental arts. Carpooling and other sensible motoring options can help reduce pollution and dumping of hazardous materials into the Great Barrier Reef and its precious marine environment. Organic horticulture, farming, permaculture methods can help reduce ozone depleting chemicals and increase our health, etc. etc.

If we all become active participants, these eco-living options will become the norm and we'll all enjoy a healthy planet.

Building
Energy
Environmental Arts
Health
Horticulture, Farming, Permaculture
Marine
Motoring
Recycling
Waste Disposal
Water

Recycling

Recycling is a community effort
reduce reuse recycle

· What is recycling?

Recycling is the process of recovering materials used in our industry and homes for further uses.

· Why do I need to recycle ?

We recycle to decrease the demand for raw materials and to minimise waste output and pollution. When we recycle, we reduce, reuse, recycle and buy products from recycled materials. By consuming less, we can cutback on activities such as logging and mining, which helps to preserve our natural resources and reduces the demand on our fragile environment

· How does it work ?

Before the end of the year Townsville and Magnetic Island households will have a free fortnightly collection service of recyclable items in 240 litre yellow-topped wheelie bins. Until then, use recycling bags.

Recycling bags are available from the Health Services Department on the 1st floor of the Townsville City Council Administration Building on Walker Street and from the City Council shop at Stockland Shopping Plaza

· What can I put in my recycling bag ?

Recyclables should be put all together in large recycling bags:

- Glass (jars and bottles, not flat or plate glass)

- Steel cans (e.g. supermarket tins and pet food cans)
- Paper (newspapers, magazines and phonebooks, clean waste paper)
- Cardboard (clean and no larger than a storage box. Large boxes should be cut or folded)
- Aluminium cans
- Plastics (plastic containers, softdrink and milk bottles with R petbottle 1 or 2 on the bottom)

· When is my recycling collected ?

The Townsville City Council provides a fortnightly domestic kerbside recycling service for Townsville residents on the same day as your garbage pick-up. You can put as many recycling bags as you can fill near (but not against or on top of) your wheelie bin

August 1997						
S	M	T	W	T	F	S
31					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30

If you're unsure what day your street is serviced, call the City Council Health Services Department on 220222

· Remember to compost food & garden scraps

Call the Council to find out more about compost bins and grass recycling

· Additional recycling information

Bulk glass and business paper recycling, event recycling, motor oil disposal, etc. all help to conserve energy and natural resources. Consult the local
Yellow Pages
to find the additional waste reduction and recycling services you need.

· Reduce and Reuse BEFORE you Recycle

Take a look at the items you purchase and use in your daily life and the impact they have on the environment. Is the product made from recycled content ? Is the item meant to last or be discarded after use ? Can the container be reused or recycled ? Can the product be bought in bulk or large sizes ? Consider not only the product, but also the packaging, which accounts for almost one-third of our rubbish.

Back to top

Phase Three:

Website Launch & Evaluation

Chapter Eight

Website Appraisal

8.1 Establishing an Evaluation Method

To ascertain the benefits of the website as a means of disseminating community environmental information and to explore the interface design of the website as a means of enhancing dissemination of environmental knowledge, it was necessary to develop an evaluation method.

8.1.1 Defining the Evaluation Strategy

To evaluate a website's validity in terms of content and interface design multiple data methods may be applied, e.g., random telephone interviews, informal interviews in a cyber cafe or street environment where a public access terminal is present, mass mailing by postcodes, bulk email feedback request, online questionnaire, and/or group focus sessions.

To be able to participate in a website evaluation via a mass mailing, via telephone interviews or via informal interviews in a cyber cafe or street environment, access to and familiarity with the website is essential. Given that only a small portion of the community was online at the scheduled evaluation time, and considering that there were but few public access terminals in place

within the community, a mass mailing, telephone interviews and informal interviews in a cyber cafe or street environment proved impracticable in terms of access to and familiarity with the website.

It may be argued that a bulk email feedback request would be an effective method in that email recipients are already online and have access to the website, but the latter would only reach the community's online population and was hence deemed too narrow an evaluation method. In addition, an email feedback request would not guarantee that email respondents actually visited the website before responding. Similarly, lack of Internet access by the majority of the population also prevented website evaluation via an online survey.

As any design is "inherently creative and unpredictable" (Shneiderman 1992:474), it is important to receive constructive feedback throughout the development of the interface design. It is not uncommon, therefore, for software developers to test their product first in focus groups during the so-called alpha testing phase and subsequently place a beta version of their product on the Internet for free download by potential users. Typically, focus group participants are briefed by a session leader and their responses, insights and ideas are audio or video recorded during the focus session (Krueger 1988). Thus valuable feedback is received on the general valence of the product. Krueger (1988) argues that the advantages of a focus session also include flexibility, high face validity, speedy results and low costs (Krueger 1988).

Given that this study aims to evaluate user-friendliness of the interface design as well as general benefits of the project and considering the scarcity of funds available for evaluation purposes, it follows that alpha testing through focus groups would be an appropriate website evaluation method. Moreover, given that anyone could be a focus group participant as long as access to the website was provided during the focus session, conducting alpha testing would also be an efficient website evaluation method in terms of the community population. However, given that this evaluation concerned a prototype; considering that no beta software product would be placed on the Internet for download purposes and, given that funds were unavailable to alter the website design after initial alpha testing, beta testing, as such, was not practicable and was hence excluded from the evaluation process.

8.1.2 Defining the Evaluation Sample

Potentially the target population for a website evaluation such as this is the entire community. Given the available funds and the need to access a computer lab for each focus group session, it was necessary to limit the size of groups while still ensuring representativeness within the parameters of both environmental and online potential. Having conducted a survey with two sample groups which represented both environmental and online potential in Phase One (see section 5.1.3) of the study and, having created a separate computer database with contact details of print and online survey respondents interested

in participating in follow-up sessions, the computer database was subsequently analysed for potential focus group participants of both survey groups. Given that the survey identified professions, and considering that the community workforce ranges from blue collar and service industry workers to government and university employees, this provided potential for focus group sessions to be representative of the community workforce.

Of the print surveyees, 62 of the 204 respondents indicated an interest in participating in follow-up sessions. Seventy two online submissions were received, 29 of which indicated an interest in follow-up participation. However, since the survey took place as part of Phase One of the study over a year ago, it seemed likely that a percentage of the print and online surveyees might no longer either be available or be interested in participating in a focus session. Furthermore, since it was not possible to offer an incentive to participate in a focus session, it was recognised that this might also reduce the pool of potential focus group participants. In view of the latter and, given that focus sessions had to be kept small for financial reasons, it was decided to conduct one focus session comprising both online and print surveyees. Since local computer labs generally accommodate approximately 20 hands-on participants at a time, 10 print and 10 online focus group participants were sought.

Upon securing a computer lab, print and online surveyees who indicated an interest in follow-up participation by supplying the researcher with a phone

number and/or an email address needed to be approached. To procure 10 print surveyees who would be representative of the community's workforce, a cross sectional sample was identified from the potential 62 candidates based on their identified professions. It was decided that these potential print group surveyees should be approached by telephone and/or via email until the designated number of participants was secured.

All online candidates who indicated an interest in follow-up participation supplied the researcher with an email address. Since the computer file received for online surveyees did not match survey returns with professions, it was not possible to identify a cross sectional sample from the potential 29 online candidates based on their identified professions. Hence, in order to procure 10 online surveyees representative of the community's workforce, it was decided that all potential participants should be approached via email, that they should be asked to indicate their willingness to participate in the focus session and confirm their profession.

At the time of the alpha testing, the 1997 Students and Sustainability Conference, the peak environmental forum for the Australian student movement since 1991, was to be hosted at the researcher's university. The Student and Sustainability Conference, which has a strong emphasis on information sharing, education, activism, and a coordinated approach to environmental campaigns, attracts community representatives and student

delegates from universities all over Australia and the Pacific. As this conference draws together high profile environmental and political activists and a broad cross-section of the Australian university community, its audience has both environmental and online potential and was hence uniquely qualified to evaluate the website on content and design.

Given that a single focus group builds in the inherent danger of delivering insufficient evaluation insights; and given the opportunity to conduct a workshop at the Student and Sustainability Conference on the use of electronic media to convey environmental messages, it was decided to include the workshop participants as an independent group with environmental interest in the website analysis process.

Unlike focus sessions, workshops are typically not held to evaluate potential customer response to a new strategy or product, but rather to host a topical discussion forum of personal interest to all workshop participants. Since the conference workshop session was to be held in a lecture room with overhead capability, the setting did not allow for hands-on website testing by workshop participants.

8.1.3 Designing the Evaluation Method

As it was the intention of the researcher to assess the website's content and design by conducting one hands-on computer session and one conference workshop session, a method had to be formulated which would facilitate the analysis of data generated from these two diverse session formats.

It may be argued that because the sessions were conducted in different environments, website evaluation results might be influenced by the session settings. However, given that the evaluation concerned a prototype which does not allow for much user manipulation and, given that hands-on lab participants would be guided through the website in the exact same way workshop participants would be guided through the overhead presentation, it follows that evaluation results should not differ substantially. To ensure the latter would indeed be the case and to be able to gauge the potential difference of a workshop setting versus a hands-on lab session settings, it was decided that lab participants should evaluate the website twice, once after being guided through the site by the researcher and a second time after browsing the site on their own.

Since two separate evaluation sessions were being conducted and given that the researcher was seeking to tabulate individual user responses to the content and design of the website rather than group feedback, conventional

focus group protocol, e.g., posing primary questions followed by a set of secondary questions designed to get others in the group to either confirm or disagree (Krueger 1988), could not be applied. As group dynamics could potentially influence the individual opinion, audio and/or videotaping the sessions, another conventional focus group practice (Krueger 1988), would not be conducive to eliciting idiosyncratic individual responses. Conducting individual interviews was inappropriate for time and financial reasons. Hence, to maximise the individual response potential, it was decided to construct an evaluation questionnaire which could be used in both evaluation sessions and would provide the researcher with individual evaluation opinions.

Potentially, such an evaluation questionnaire might be constructed in online and/or in hardcopy format. However, given that the conference workshop would not provide hands-on Internet access to participants, the latter group would not be in a position to complete an online questionnaire. Moreover, considering that a relatively small group of people would be involved in the computer lab session, creating an online questionnaire for the hands-on Internet session alone would be time and cost prohibitive in terms of programming. Hence it was decided to construct a hardcopy questionnaire for handout at each session.

In determining the questionnaire format, several options are available to the survey researcher, which include an open-ended questionnaire, a close-

ended questionnaire or a combination of both. It is argued that an open-ended questionnaire is a less focused and useful evaluation method, as open-ended questionnaires tend to produce an wide array of responses, a number of which may be irrelevant to the researcher's intent (Babbie 1992). It is further argued that a closed-ended questionnaire offers a more effective data collection method for the purposes of this study because, when structured with precision and clarity, a closed-ended questionnaire provides a greater uniformity of responses and hence would more accurately reflect participants' opinions on the website. Furthermore, uniformity of responses would facilitate the processing of evaluation data into a computer spreadsheet format and streamline access to the benchmarking data required for evaluation analysis. However, since this research pertains to the new field of online communication and evaluation parameters are barely in place (see section 8.1.5), a framework should also be available to accommodate idiosyncratic responses. Hence it was decided to construct a questionnaire containing a combination of closed-ended and open-ended questions.

Given the evaluation session settings and given that the majority of session time would likely be spent either online or on discussion, it was deemed essential that the questionnaire was kept short and could be completed in a timely manner. Hence a one-page questionnaire was designed. To further expedite selections, three-tiered multiple-choice Likert-type measurement scales were constructed.

8.1.4 Designing the Evaluation Questionnaire

Work on scholarly and/or commercial World Wide Web evaluation approaches has barely commenced. Hence selection criteria used in website reviewing remain rather broad at this time (Ciolek 1996). Not only are reviewing methods still quite general, they are also numerous, as reflected by an Internet search conducted on the key words *website evaluation* via the search engine Alta Vista, which returned 1,632,920 matches to the search. However, the steadily growing interest in website reviewing techniques suitable for assessing and comparing Web resources had led to the creation of specialised sites (Auer 1996, Smith 1996) to monitor practical and methodological developments in this area (Ciolek 1996).

Scholarly works by researchers (e.g., Ciolek 1996; Auer 1996; Smith 1996; Tillman 1996) specify a number of essential features of so-called good or high quality websites. These features generally reflect the overall stability of information presented online and include 1) ease of access to the website, 2) graphic and multimedia design of the site, and 3) scope, structure and purpose of the site's content. Each of aforementioned criteria is in turn based on a series of more detailed variables, e.g., a specific question in the access area might be *Is the site still useful with a text-based browser* or *Do parts of the site take too long to load* (Ciolek 1996).

In view of the above, a website evaluation questionnaire (see Appendix E) would need to include questions covering current website criteria, e.g., ease of access; graphic and multimedia design; and scope, structure and usefulness of the website's content. Hence questions were formulated based on the aforementioned website evaluation criteria. Given that the sessions comprised a variety of participants, it was necessary to first establish how participants rated themselves as Internet users, e.g., *How would you rate yourself as a World Wide Web and Website user?*, which was followed by a Likert-type measuring scale rated *Beginner, Intermediate* and *Advanced.*

As it was deemed of vital importance to substantiate initial survey interest in, and gauge potential use of, online environmental community information (see 6.5), several questions were composed to elicit answers on the site's appeal, e.g., *What is your first impression of this website?*, *How would you rate the overall information contained in this site?*, *How would you rate the overall design of this site?* All questions were followed by Likert-type scales, e.g., *Exciting, Functional, Disappointing* and *Likely, Possibly, Doubtful.*

As it was imperative to keep the questionnaire brief, in-depth content questions on matters such as the site's name, choice of the main menu headings and sublevel categories, alphabetical index, and links could be shortened by clustering under one general content rating question, e.g., *How would you rate the information structure of this site?* followed by Likert-type coded sublevel

questions delineating *site name, main menu, sub menus, text listing* and *links*. In-depth design questions could similarly be clustered under one general design rating question, e.g., *How would you rate the design elements in this site?* followed by Likert-type coded sublevel questions delineating *main graphic, colour* and *navigation*.

As a participant's initial reaction to the site would likely be design and/or content driven, all design and content questions needed to be placed before such open-ended questions as *What is missing on this site?* Considering that responses to content and design questions would be likely to impact on the decision to return to the site in the future, the question *Would you be tempted to return to this site in the future?* needed to be placed at the end of the questionnaire to allow the results to be interpreted in an ordered fashion.

In order to identify any unanticipated difficulties with questions and/or measurement scales, the draft questionnaire was printed for review by two university-based interactive designers. This review did not generate any layout changes but did result in the suggestions to add one new question, *How long did you have to wait for this site to appear?* as it was deemed important to gauge download time regardless of setting, and expand another question, *How would you rate the following design elements*, whereby the general criterion *colour* was further delineated to include *background colour*, *text colour* and *links colour* and the word *navigation* was replaced by *moving around* (with *navigation* printed in

a smaller font underneath) for the benefit of new Internet users unfamiliar with the word navigation. A final review of the questionnaire by the project supervisor resulted in the suggestion to add the open-ended question *What could be improved on this site?*

A final draft of the completed survey was pilot tested on appearance, clarity and length by two peer students with Internet access. Each student was provided with the prototype website location, supplied with a printed copy of the questionnaire, requested to access and navigate through the website first and respond to all survey questions after viewing the site. They were also prompted to record the time it took to complete the survey. Both students took no more than fifteen minutes to complete the evaluation survey and reported no difficulties understanding any of the questions or measurement scales. Hence this procedure yielded no layout modifications and no question rewording. The final schedule of questions comprised ten questions.

Numeric coding was applied to all nine questions to allow processing of the results into a computer spreadsheet format and facilitate the compilation of evaluation statistics. Although participants are to be guided through the website during the evaluation sessions, a short introduction explaining the purpose of the questionnaire was added. To show the researcher's appreciation for the surveyees' participation, a *thank you for you participation* note was also included.

8.1.5 Website Analysis Issues

Since the questionnaire was composed to ascertain the potential benefits of the website as a means of disseminating community environmental information and to explore the interface design of the website as a means of enhancing dissemination of environmental knowledge, the main objectives in the analysis of the evaluation questionnaire would hence be (1) the functionality of the website's interface; (2) the level of satisfaction with the environmental information displayed; and (3) the level of interest in continued online environmental community information.

Chapter Nine
Website Evaluation Results

9.1 Evaluation Profile

The two evaluation groups were termed the student group and the community group. Both the workshop session and the hands-on lab session were held within three weeks of completing the website prototype and uploading it online.

The 1997 Student & Sustainability Conference was attended by approximately 500 students from universities around Australia, the average age of conference attendees being between 19 and 22. The researcher's two-hour workshop entitled *Environmental Information Delivery via the Internet* was one of ten workshops scheduled for the first day of the Conference. Twenty two students attended the workshop, during which time attendees were guided through the website via an overhead projector and supplied with a questionnaire which they were requested to complete.

As this was a conference workshop rather than a scheduled evaluation session, completing the questionnaire was optional. Since Internet access was available for the duration of the workshop, participants opted to view and

discuss a variety of online environmental sites, which resulted in some students allowing insufficient time to complete the questionnaire. Approximately one-third of the students were not able to complete the questionnaire in the time available. The result was 14 workshop questionnaire returns.

The lab group session was attended by a total of 20 community members, eleven of which were identified from the hardcopy survey group and nine from the online survey group. The mean age of attendees was 31, with the eldest participant being 54 and the youngest being 14 years of age. Reflecting a cross-section of the community workforce, participants' occupations were broadly based and included pre-school teacher, public servant, naturopath, secretary, civil engineer, electrical draftsman, librarian, field interviewer, scientist, student and home duties.

Upon arrival at the computer lab, each community group member was seated at a computer and supplied with an evaluation form. Participants were subsequently guided as a group to the website location and the various website strands. Upon finishing the guidance session, participants were requested to complete the evaluation form. Upon completion of the evaluation form, participants were handed a second, identical, evaluation form; instructed to leave the site; return to it; browse the site individually; and complete the same form again after solo browsing of the site.

As the community group completed the questionnaire twice, once after being guided through the site by the researcher and a second time after browsing the site on their own, two sets of 20 questionnaires were generated. Data collected from the evaluation sessions were labelled student data, community group one data and community group two data.

9.2 Treatment of Data

Upon the completion of the evaluation sessions, a computer spreadsheet was created in which the numerically coded answers from the three sets of questionnaires were input and tabulated. Percentages based on tabulated answers were subsequently calculated on a separate computer spreadsheet.

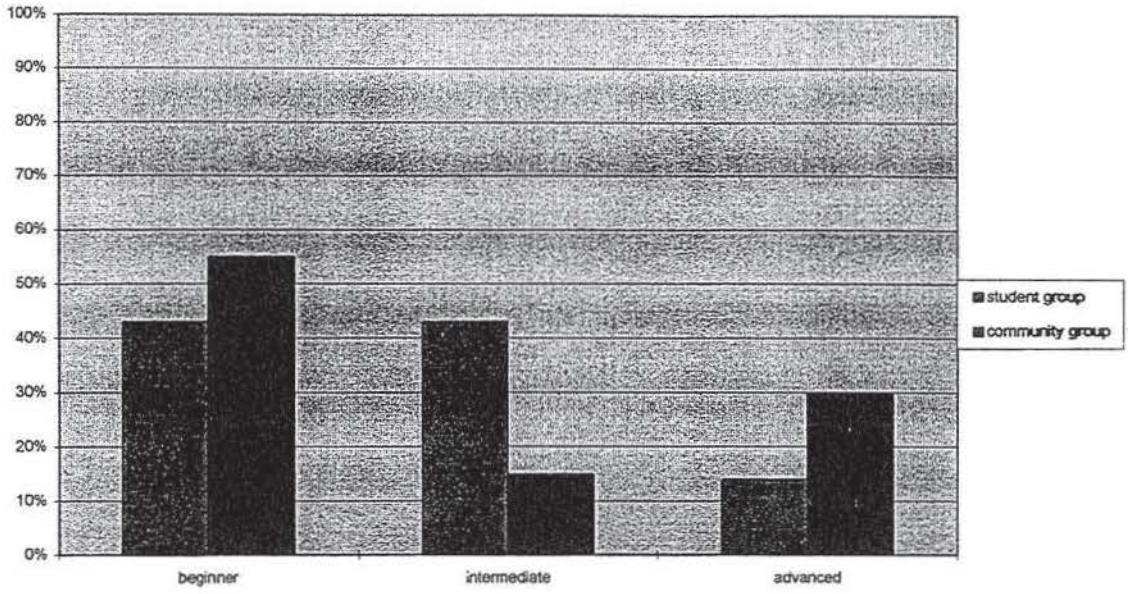
Given that the first set of community group data was generated via a website guidance process similar to the one to which the student group was exposed, it follows that only the first set of community data could validly be compared to the student data. In those instances where the second set of community data differed notably from the first set of community data, e.g., increased likelihood of return to the site (see section 9.7), indicating evaluation results can vary when participants browse a website solo, secondary community results are also included in the website analysis.

To obtain a visual perspective on the data, a series of diagrams was charted reflecting the percentage results of the student session versus the guided community session. Unless indicated otherwise, e.g., in Figure 9.7.1, individual browsing results generated from the community session are not included in these diagrams. Given the small number of evaluation participants involved in both the student and the community sessions, it should be noted that percentages reflected in these diagrams are descriptive rather than inferential in nature.

9.3 Level of Internet Expertise

The majority of community members indicated that they were new to the Internet and the World Wide Web. As reflected in Figure 9.3.1, over 50 per cent of the community group described themselves as beginning Internet users versus 43 per cent of students. A similar percentage of students (43 per cent) considered themselves intermediate Internet users versus only 15 percent of the community group. Approximately one-third of both groups described themselves as advanced Internet users. The latter may be attributed to the fact that most tertiary students have Internet access via their universities, while almost half of the lab group are self identified online users.

Figure 9.3.1
Level of Internet Expertise



While the terms beginner, intermediate and advanced were not, as such, expressly defined in the questionnaire, for the purposes of this study anyone who has never or only sporadically browsed the Internet is considered a beginner; anyone with prior browsing experience is considered an intermediate Internet user; and anyone who browses the Web on a regular basis is considered an advanced Internet user.

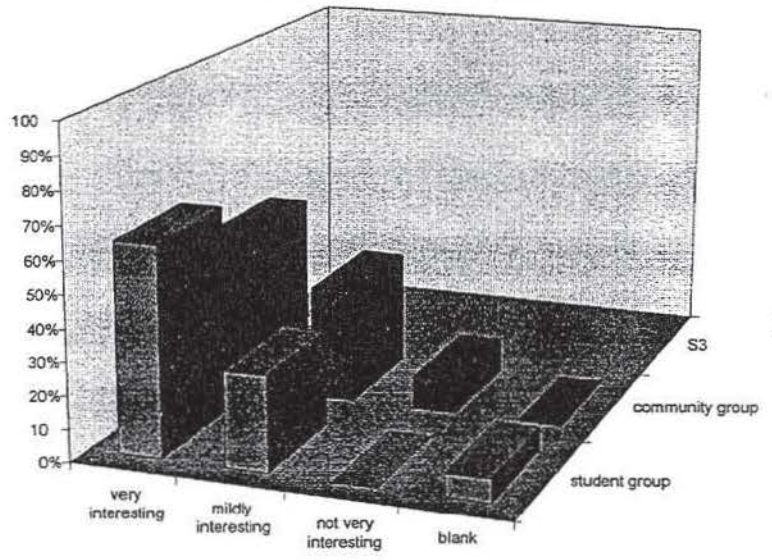
9.4 First Impression of the Website

Upon first exposure to the website, more than half of the students (64 per cent) and half of the community members (50 per cent) indicated that they found it very interesting (see Figure 9.4.1). It should be noted that the

community group's interest in the site increased by a further 10 per cent to 60 per cent upon browsing the site solo.

Approximately one-third of participants found the website mildly interesting at first exposure, an opinion which was not altered by individual browsing. One community member considered the site confusing.

Figure 9.4.1
First Impression of the Website



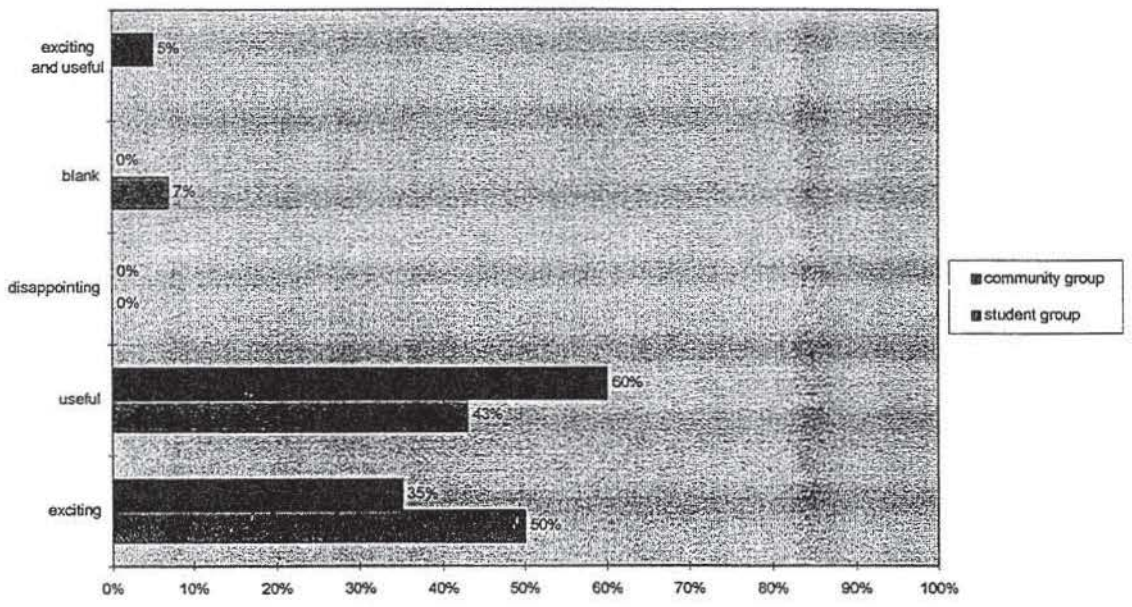
Website access time was considered excellent by the community group (95 per cent) and worth waiting for by the student group (50 per cent). Both groups were linked to the university network when they accessed the site. It should be taken into consideration that the community session was conducted at night versus a student session in the daytime. Network congestion is considerably less at night. No one considered the waiting time too long, although approximately one-fifth (21 per cent) of the students did not complete the question.

9.5 Interface Design

9.5.1 Overall Design

Most members of the student group agreed that the website's overall design was exciting, while most members of the community group agreed it was useful. As depicted in Figure 9.5.1.1, a larger percentage of the student group (50 per cent) than the community group (35 per cent) considered the design exciting, although the reverse was true for usefulness. One community member described the site as both exciting and useful, while one of the older community participants considered the design inappropriate. Given the playful design of the website and given the median age of the student group, the design is more likely to appeal to a younger age bracket.

Figure 9.5.1.1
Overall Design



Upon browsing the site solo, the number of community participants who considered the site exciting increased by five per cent, while usefulness dropped by 10 per cent and five per cent indicated they were disappointed in the site.

9.5.2 Design Element - Main Graphic

There was a high level of support for the main graphic (93 per cent of students and 80 per cent of the community group ticked the effective box), although a small percentage (five per cent) of lab participants did consider it inappropriate (see 9.8). It should be noted that in the second set of community group figures a lower percentage (70 per cent) found the site effective.

9.5.3 Design Element - Icons

Icons were considered effective by approximately two-thirds of the participants or 71 per cent of the student group and 70 per cent of the community group). Secondary lab figures for icon effectiveness further increased by five per cent to 75 per cent and the initial 10 per cent of lab participants who labelled the icons inappropriate dropped by five per cent.

9.5.4 Design Element - Background Colour

Approximately half of all participants indicated that the site's background colour was adequate (57 per cent of the student group and 55 per cent of the

community group). While only 30 per cent of the community group versus 43 per cent of the student group initially considered the background colour effective, that figure increased to 50 per cent after individual browsing. The number of lab participants (10 per cent) who stated that the background colour was inappropriate did not change.

9.5.5 Design Element - Text Colour

The colour used for the site's hypertext was rated as adequate by 64 per cent of the student group and 50 per cent of the community group, although a small percentage (five per cent) of lab participants apparently would have preferred another text colour (see 9.8). Initially, 45 per cent of the community group (versus 36 per cent of the student group) considered the background colour effective, a figure which increased to 50 per cent after community group members browsed the site solo. The number of community participants (10 per cent) who stated that the background colour was inappropriate did not change.

9.5.6 Design Element - Links Colour

Approximately half of all participants indicated that the links colour was adequate (50 per cent of the student group and 45 per cent of the community group), However, the colour of the site's links, which changed from a darker green to a lighter green once a link was clicked on, proved less effective than some of the other design elements, as 20 per cent of the community group

indicated that they found it difficult to distinguish the lighter green colour against the green background (see section 9.8).

9.5.7 Design Element – Navigation

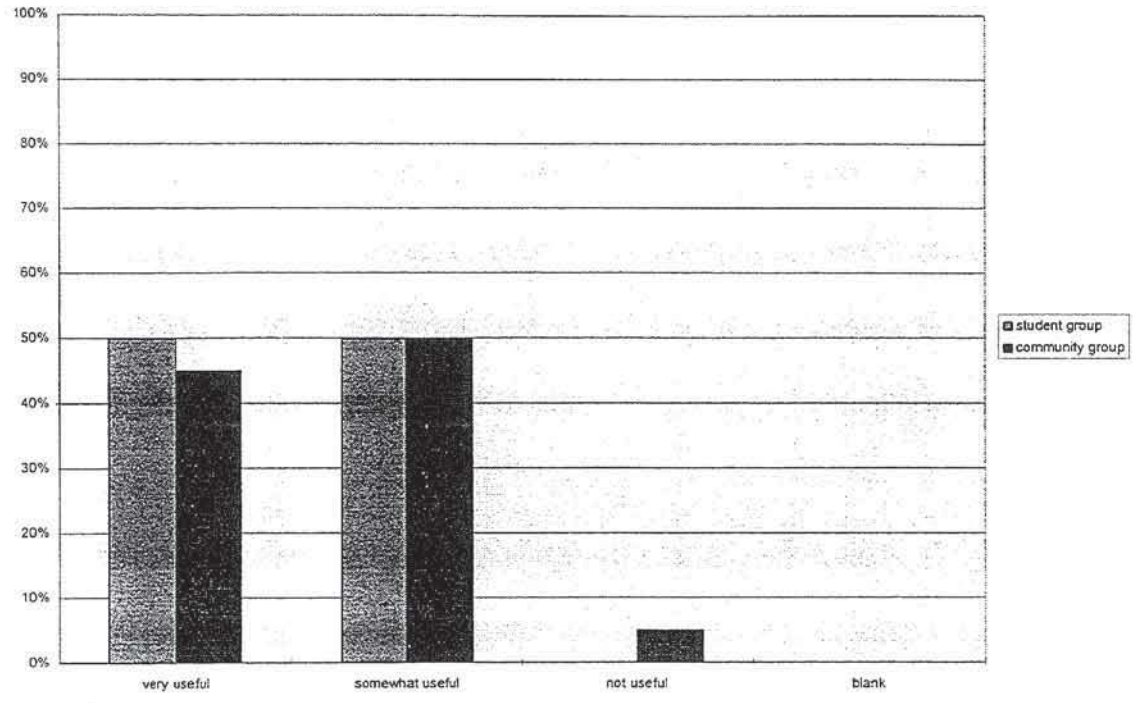
The majority of participants (64 per cent of the student group and 60 per cent of the community group) approved of the navigation design. Upon browsing the site independently, community group members' approval rate increased by 5 per cent to 65 per cent. No one considered the navigation design inappropriate.

9.6 Website Content

9.6.1 Overall Content

Participants generally expressed appreciation of the site's content. As shown in Figure 9.6.1.1, 50 per cent of the student group versus 45 per cent of the community group indicated that the site's content was very useful, while 50 per cent of both groups rated the content somewhat useful. The latter figures may be due in part to the fact the evaluation concerned a prototype with relatively little content development and hence evaluation pertained predominantly to the content concept rather than actual content. Only 5 per cent of community participants described the content as not useful.

Figure 9.6.1.1
Content Appreciation



9.6.2 Website Content - Site Name

The majority of participants indicated approval of the site name Eco-Mate with 64 per cent of the student group and 75 per cent of the community group marking it as effective. Thirty-six per cent of the student group and 15 per cent of the community group decided the name was adequate. Only five per cent of the community group deemed the name inappropriate.

9.6.3 Website Content - Main Menu and Submenus

Most participants considered the main menu well ordered (79 per cent of the student group versus 65 per cent of the community group). The percentage

of community members (20 per cent) who considered the main menu initially confusing was reduced to 10 per cent upon browsing the menu solo.

Submenus were equally well received with 71 per cent of the student group versus 60 per cent of the community group indicating they considered the submenus well ordered. The latter figure increased by five per cent to 65 per cent after community group participants browsed the site a second time.

9.6.4 Website Content - Alphabetical text listing

Half of all participants (50 per cent of each group) agreed that the alphabetical text listing was well ordered. The other 50 per cent of the student group, versus 20 per cent of community participants, considered the text listing adequate, while a relatively high percentage (30 per cent) of community members did not answer the question. Upon browsing the site on their own, the community participants' approval rate increased to 55 per cent, while 30 per cent considered it adequate, five per cent labelled it confusing, and 10 per cent left the question blank.

9.6.5 Website Content - Links

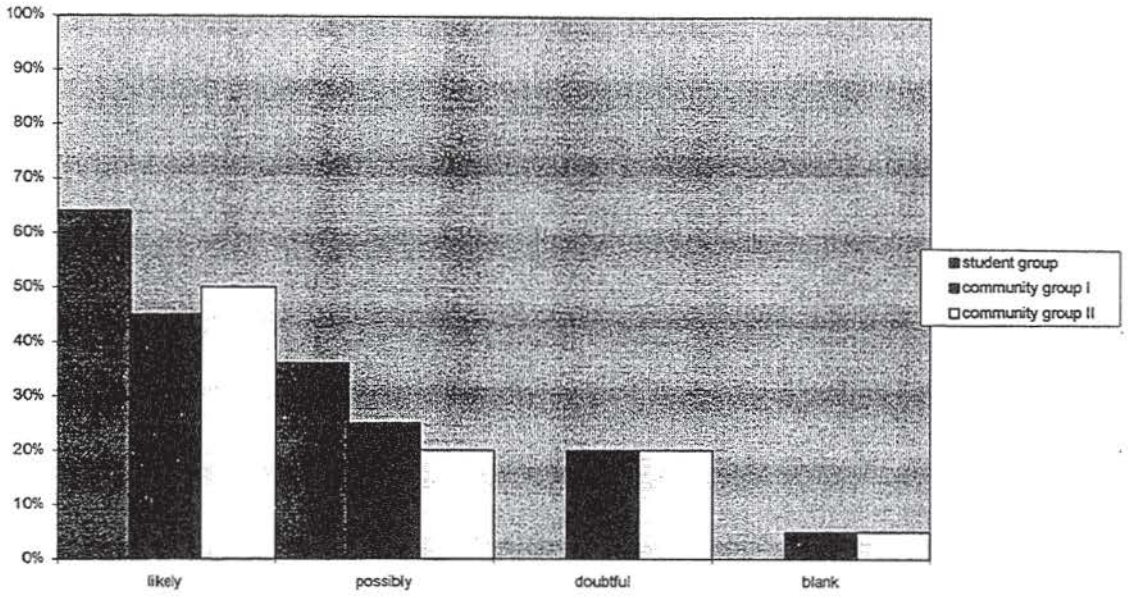
Links were effective according to 50 per cent of both groups. About one-third of participants (36 per cent of the student group and 30 per cent of the community group) considered them adequate and only five per cent deemed them inappropriate. Fifteen per cent of community participants did not answer

the question. As the question concerned a prototype, it has to be taken into consideration that few links to other sites were established and participants were not judging established links but potential links from various site points. Although not reflected in the above results, several community participants indicated that they were not familiar with the term "links". The latter may be attributed to the fact that 55 per cent of the community group are beginning Internet users.

9.7 Temptation to Return

The overwhelming majority of participants indicated that they would be likely tempted to return to the website. As reflected in Figure 9.7.1, some 64 per cent of the student group and 45 per cent of the community group claimed they are likely to return to the site, while 36 per cent of the workshop group and 25 per cent of the lab group indicated that they would possibly return to the site. Twenty per cent of the lab group was doubtful that they would return and one lab participant indicated that a return to the website was very doubtful. Also shown in Figure 9.7.1 (see community group II) is the shift of five per cent of lab participants from a possible return to a likely return to the site after browsing it solo.

Figure 9.7.1
Likelihood of Return to the Website



Given that two-thirds of the student group perceive themselves to be at least "intermediate" online users, it may be assumed that they are familiar with webpages. Since experienced web browsers tend to return to a website only if it holds their interest (see section 7.3.4), it follows that students' potential willingness to return to the site indicates approval of the site. Since more than half of the community group members are currently non-Internet users, many of whom had never even seen a website prior to attending the community session, it follows that a lower number of community participants would be inclined to return to the website. The fact that 45 per cent has a potential interest in returning to the site may hence be considered a positive result.

9.8 Personal Responses

The question *What is missing from this site?* generated personal responses from the student group ranging from "looks pretty good and informative to me!" and "I think it's loaded with potentiality and anything missing will soon appear by demand" to the obvious need to "set up more links". One student suggested the inclusion of a "Design and The Environment" category outlining environmental courseware on vocational and tertiary levels. In fact, *Eco-education,* one of the website's designated categories, is designed to include environmental courseware (see Appendix B). Content for this category was, however, not developed for the prototype and was subsequently not shown to students in the guided overhead session. Nonetheless, the latter suggestion could be considered an endorsement of desired and/or useful content.

The question *What could be improved on this site?* generated student answers such as "finish the construction" and add "links to organisations". A suggestion to include a "holistic index/page" is another example of information already earmarked for content inclusion (see section 7.3.3). One student suggested that the website facilitate "for others to be able to put info onto your site". As the design presented a prototype rather than a working website, accommodating external uploading of community information onto the site and

outsourcing content delivery and/or maintenance was beyond normal programming scope.

Comments from community participants on *What is missing from this site?* ranged from "apart from necessary information for each link, site appears clearly presented and easy to use" to "sound, animation" and "almost everything it seems". Several participants commented on the need for better visibility of links against the background colour, suggesting that "greater contrast in line colours would be helpful". More than one participant commented on the need for environmental information "...that isn't readily available or known" on topics such as where to "recycle oils, etc.", "organic gardening in the tropics" and "preferential materials/packaging". While the prototype only displayed readily available recycling information to gauge community members' interest in accessing it online, a fully developed environmental community website should clearly be a source for both readily and not so readily available environmental community information.

Community group comments on the question *What could be improved on this site?* included "looks fine right now" and "remove the word *eco* from the submenus". Although the frequent use of the word "eco" might by some be considered superfluous, the suggestion that an "explanation of what it's all about" is needed indicates that the subject matter was not clear to all participants and that a more descriptive terminology may hence be preferable.

One participant in an older age bracket labelled the design "feral" yet "good if you know what you're looking for" and suggested "colour and more appropriate icons for type of topic" to make more impact and target "the pitfalls of not being interested in ecology". Another participant preferred "text information unless graphics show information". One community group member commented on the danger of "mixing environmental issues incorrectly, e.g., mining non-renewable, logging renewable but other processes may be harmful and impacts unacceptable". Considering the latter, it follows that an open forum, in which users would be able to post and exchange information, would be an essential part of an environmental community website in order to accommodate the full spectrum of environmental topics and views.

9.9 Evaluation Conclusions

Having tested the interface design on a broad age group and having analysed the results of the website evaluation, it became apparent that the website design was targeting the average computer age (currently at 39) successfully as well as younger age groups. Given the reaction to the interface design by a small percentage of older evaluation participants, the design apparently had a lower appeal level for the older age group. Given that the community survey's online gender findings correspond with current online user trends (see section 5.2.7), it is argued that unless the average online user age

rises and more senior community members take to using the Internet, the current interface design targets the community online population successfully.

Although the evaluation concerned a prototype and hence only a small amount of information was available for comment by participants, considering the high level of satisfaction with the site's content and content structure, it may be assumed that the level of satisfaction is likely to increase rather than decrease once additional environmental community information is added to the website.

In addition, given the percentage of participants interested in returning to the site, it is likely that there is a high level of interest in continued online environmental community information. Moreover, the increased approval rating of overall design and content (see sections 9.5.1 and 9.6.2) after community participants browsed the site individually, further suggests that community members' interest in the site is likely to increase with greater familiarity with the site.

In sum, these results indicate that, when an online environmental database is tailored to a community's environmental information needs, it is potentially an efficient means of disseminating environmental community information. Furthermore, if the environmental site's interface targets a

community's online population successfully, the design is likely to enhance the dissemination of environmental information.

Chapter Ten
Reflections and Directions

10.1 Advancing the Study Aims

This study was undertaken to explore the potential of IT for community access to information in an ecologically and communally sensitive area. Contrary to established academic disciplines, the new field of IT has little research available in terms of methodologies for online information delivery and retrieval. Hence this study necessarily embarked on charting new territory, in which process it was not always possible to predict which direction the study would take or where that direction might lead. Provocative and timely in nature, this exploratory study yields some predictable and some less predictable results, all of which make a valuable contribution in setting the pace and parameters for future research in online content delivery.

The main focus of this study has been to establish the scope and nature of a community's environmental information needs, environmental information gathering methods and computer/online interest; to utilise those findings in the prototype design of an environmental community website; and to evaluate the prototype as a means of enabling community access to environmental community information. A related aim of the study was to explore innovative

designs for an Internet site as a means of enhancing dissemination of community environmental information.

Having confirmed a community's desire to be environmentally informed, having determined the prevailing level of dissatisfaction with the current environmental information flow, having established a community's high level of computer literacy and growing IT awareness, and having ascertained a community's general interest in accessing and disseminating environmental information via new electronic means such as the Internet, it is the contention of this study that an online environmental community site is potentially an effective channel for environmental community information dissemination.

Having established a high level of satisfaction with the site's interface design, a subsidiary conclusion of this study is that a creatively innovative graphical user interface (GUI) has the potential to enhance a community's interest in accessing an online environmental community site, provided that the GUI design targets a community's online user profile and related technological expectations.

We live in an era of rapid technological change. When this study commenced in mid 1996, the sample community had two commercial Internet Service Providers (ISP). At the time of the completion of this study, some fifteen months later, a dozen ISPs are vying for the community's online clientele and

WebPoint, a network of public Internet terminals throughout Australia, has established three coin-operated public Internet terminals within the community.

Although there is still a vast disparity in online familiarity and GUI exposure, the evaluation process revealed community members' desire for technological accoutrements such as sound and animation, indicating that community members are currently more sophisticated in their knowledge of technology than the researcher had anticipated. It follows that the more technologically aware community members become, the more they will expect the latest technology, e.g., streaming audio/video, Java and Shockwave. Hence, in order to keep users engaged in the community site and cater to the rapidly increasing level of computer and online sophistication, community website design must address market expectations, while retaining the capacity to provide access to a broad range of computer platforms.

Public habits recently recorded from users of Webcast terminals indicate that 42 per cent of Australians are already online at home; 30 per cent claim they will go online within a month, while a further eight per cent expect to go online within three months, and the remainder indicate they expect to go online at home within the year (The Weekend Australian, Syte, October 11-12,1997:8). In addition, 60 per cent of Webcast users expect the Internet will replace television, 55 per cent think it will replace radio, 74 per cent believe it will replace newspapers and 78 per cent think the Internet will replace

magazines (The Weekend Australian, October 18-19,1997a:8). While males still dominate the Internet, the gender gap is narrowing slowly but steadily (Graphics, Visualization & Usability Center 1997:online).

Aligning burgeoning online user trends with the findings of this study, which indicate a high level of support from both genders for an online environmental database and an already significant change in media use by online community members, a shift in environmental information gathering from conventional media to online media seems a likely outcome.

10.2 Study Applications and Implications

10.2.1 Niche-Tailoring Information

Although computers are sometimes blamed for generating social isolation, it cannot be ignored that the Internet links global users with common interests, whether it be a virtual community of stamp collectors, historians or ecologists. Virtual community members tend to be physically separated and local community network members are generally within the same geographical region, yet both groups are united by shared interests and both are dependent on the exchange of niche information.

Considering the community's increasing online ratio and given the participatory nature of both the Internet and community networks, the Internet

platform should be uniquely suited for local community information exchange. Yet the niche knowledge accessible on the Internet has remained fragmented, e.g., an Internet user conducting a multiple keyword search on a *community's name* plus *environmental information* is obliged to sort through thousands of search engine returns, thus failing to facilitate efficient individual information gathering and the needs of community networks which require a niche location to exchange community information.

It is the belief of this researcher that online technology can and should be utilised to synthesize a fragmented information base. There are a number of potential benefits in creating centralised niche information environments tailored to local community needs. Firstly, it can enable the Internet platform to function as a genuine community network, effectively upgrading online community networks from a text-only BBS status to a more user-friendly interface level. Secondly, such an online location is ideally suited to contain and link to regional environmental information, which can help to eliminate information fragmentation and lead to more efficient information gathering. Thirdly, and perhaps most importantly, such an online centre has the potential to foster involvement in environmental community life, create awareness of environmental issues and programs, and ultimately stimulate responsible environmental lifestyles on a municipal level.

A centralised environmental online database can potentially encompass a broad range of environmental community information, e.g., a user might browse for regional environmental legislation and initiatives, scientific research, environmental syllabi, eco-events, local environmental organisations, environmental opinion pieces or involvement opportunities, to name but a few examples. Since access to online technology has the potential sharply to increase the amount and quality of information available to a community, the latter can best be achieved through the establishment of a collaborative process between government, industry and the public.

Linking together a community's government and city agencies, educational institutions, non-governmental organisations and other environmental information resources in a centralised database has a number of potential advantages. Firstly, information can be utilised by a much wider and more diverse audience. Secondly, duplication of information can be eliminated. Thirdly, the cost of information generation and dissemination, e.g., campaigns and brochures, can be reduced. Fourthly, by establishing a regional consortium, IT skills and resources can be shared, effectively maintaining the online centre at technological market standards while empowering the entire community to participate in a sustainable future. Finally, by synergizing regional efforts, whether it be on an information, communication or transaction level, a significant regional online presence can be secured.

The website prototype has provided valuable community feedback on, and has laid the content and design groundwork for, future community website development. As the focus of this study was on identifying some of the issues involved in using online information technology for community use, the scope of the study did not encompass extensive examination of the pedagogic impact of centralised niche information delivery at this time. Inevitably related research topics, e.g., the correlation of online media use with environmental knowledge; the exploration of whether tailoring information in a niche environment has the potential to refine topic exploration and enhance knowledge; and whether niche tailoring information is applicable to a range of (community) information, also had to be omitted.

10.2.2 Information Diversity

The sample community, like many communities, encompasses a broad range of environmental consumers ranging from 'deep green' to 'environmentally aware' to 'environmentally inactive'. The evaluation process foregrounded such issues as the depth of environmental content sought by community members. The nature of the medium is compatible with access to readily available environmental community information, e.g., recycling, as well as less readily available yet desirable environmental information, e.g., preferential materials and packaging. An environmental community site thus has the potential to become a database where community members search for

specialised environmental topics beyond general environmental community information.

In the past, given that conventional media are non-interactive, environmental communicators and consumers have been obliged to seek out niche publications and programs to disseminate or obtain environmental information. Today both the environmental communicator and the environmental consumer can access and/or contribute desired environmental information through interactive means. As such, outsourcing of content delivery, facilitating online feedback and external uploading of community information are potentially effective methods of disseminating, upkeeping and exchanging a diverse range of environmental information. Thus information supply and demand will dictate the range, update frequency and in-depth level of information required.

At this time the majority remain inexperienced Internet users and even more inexperienced Internet content providers. Users and providers are, therefore, faced with a steep learning curve. While introductory Internet courses are available and website design is becoming a lucrative business, educational methodologies to assist community network content users and providers in such tasks as the creation of new online content, retrieval and uploading of content, and/or the repurposing of existing content for the new medium still need to be formulated. Methodologies for these tasks have the potential to

facilitate access to information, improve information dissemination and encourage wider participation in the medium.

10.2.3 Hybridity

While the community survey did determine that a website and a kiosk would cater to different publics, this study's scope did not encompass potentially vital research in the direction of public Internet access through hybrid community information presentation, e.g., through a combination of private and public access points. Many communities are still a long way from universal online access, preventing any Internet-based community information centre from becoming a genuine community network until such time as it is freely accessible for all members of a community. A hybrid delivery platform is therefore essential and communities should be assisted in making the Internet accessible and affordable.

Free public access points can help fill the gap between the information-rich and the information-poor by functioning as an interim public delivery platform until a more complete infrastructure is in place. Webcast terminals are commercial in nature and do not necessarily provide affordable access for all community members. Hence they do not address the online needs of community groups such as the financially and educationally disadvantaged, the aged or the disabled, an area which presents a further array of qualitative and attitudinal research opportunities.

10.3 Website Principles

Issues such as audience sophistication, diversity of information, tentacularity (to coin an appropriate term) and hybridity emerge from this tudy as important considerations in community website design. It is clear that the market expectations of sophisticated website users will need regular evaluation against the comparative lack of online sophistication of other community members; more effective search methods are essential in order to alleviate laborious online surfing; depth of information will need to be offset against breadth vis-à-vis the need to make a community website a database par excellence; in addition website users will need to be provided with the online access, knowledge and tools to act locally which in turn will enable them to think and act globally.

This study offers an initial contribution to knowledge in the area of pedagogic community information delivery. Additional research is critical in order to establish the processes involved in the reciprocal nature of community website design, e.g., conducting cross-generational studies on online access skills and needs, determining strategies to achieve technological competence, exploring and implementing appropriate interfaces between users and community systems.

IT is a community issue. Thus the development, implementation and analysis of online community information exchange systems offer an important outcome potential for further research on the cusp of a new millenium in which information technology will play an increasingly integral role.

Appendix A

Environmental/Computer Opinion Survey

Section 1 - Personal Information
(Please tick (√) one box per line only)

1. My gender is: ☐ Male [1] ☐Female [2]

2 . My age is: ☐10-20 [1] ☐ 21-35 [2] ☐ 36-50 [3] ☐ 50 + [4]

3. My household size is: ☐1 [1] ☐ 2 + [2] ☐ 5 + [3]

4. My highest level of education is:
   ☐ Primary school [1]
   ☐ Junior Certificate (year 10) [2]
   ☐ Senior Certificate (year 12) [3]
   ☐ Certificate [4]
   ☐ Associate Diploma [5]
   ☐ Diploma [6]
   ☐ Bachelor degree [7]
   ☐ Postgraduate degree [8]

5. I have lived in Townsville:
   ☐ Less than 6 months [1]
   ☐ 6 months to 2 years [2]
   ☐ 2+ years [3]
   ☐ 5+ years [4]

6. I am currently
   ☐ In full-time paid employment [1]
   ☐ In part-time paid employment [2]
   ☐ Not in paid employment [3]

7. My current occupation is: _____

Environmental/Computer Opinion Survey - Cont'd

Section 2 - Environmental Concerns

(Please circle (○) one number per line only)

	to a very high degree	to a high degree	to some degree	hardly at all	not at all
8. I consider myself an environmentalist	1	2	3	4	5
9. I am aware of environmental issues	1	2	3	4	5
10. I make efforts to obtain local environmental information	1	2	3	4	5
11. I trust the environmental information I obtain	1	2	3	4	5
12. I encourage my family/friends to be environmentally aware	1	2	3	4	5
13. I recycle	1	2	3	4	5

	very often	often	from time to time	seldom	not at all
14. I contribute money to environmental causes	1	2	3	4	5
15. I attend community meetings on local environmental issues	1	2	3	4	5
16. I carpool	1	2	3	4	5

17. I am a member of one or more environmental organizations	☐ yes [1]	☐ no [2]
18. I run/work for an environmentally friendly business	☐ yes [1]	☐ no [2]

Environmental/Computer Opinion Survey - Cont'd

Section 3a - Environmental Awareness
(Please circle (O) one number per line only)

	strongly agree	agree	uncertain	disagree	strongly disagree
19. Environmental awareness is essential for a sustainable future	1	2	3	4	5
20. Informed individuals can make a substantial environmental difference	1	2	3	4	5
21. I need more information on environmental issues	1	2	3	4	5
22. There is enough information available in my community on:					
(a) recycling	1	2	3	4	5
(b) energy conservation	1	2	3	4	5
(c) alternative energy sources	1	2	3	4	5
(d) land protection	1	2	3	4	5
(e) water conservation	1	2	3	4	5
(f) air, water and noise pollution	1	2	3	4	5
(g) solid waste disposal	1	2	3	4	5
(h) hazardous waste disposal	1	2	3	4	5
(i) the marine environment	1	2	3	4	5
(j) cultural heritage/conservation	1	2	3	4	5
(k) environmentally preferred building/construction methods	1	2	3	4	5
(l) environmentally friendly products/ packaging	1	2	3	4	5
(m) City Council environmental initiatives	1	2	3	4	5
(n) environmental institutions and organizations	1	2	3	4	5
(o) environmental events, exhibits, performances, art shows	1	2	3	4	5
(p) environmental involvement opportunities	1	2	3	4	5

Environmental/Computer Opinion Survey - Cont'd

Section 3b - Environmental Information Gathering
(Please circle (O) one number per line only)

23. In order to obtain **environmental** information I use:

	very often	often	sometimes	rarely	never
(a) television	1	2	3	4	5
(b) radio	1	2	3	4	5
(c) newspapers/publications	1	2	3	4	5
(d) ecological publications	1	2	3	4	5
(e) posters	1	2	3	4	5
(f) flyers	1	2	3	4	5
(g) films/videos	1	2	3	4	5
(h) the Internet	1	2	3	4	5
(i) school	1	2	3	4	5
(j) library	1	2	3	4	5
(k) museums	1	2	3	4	5
(l) government or City Council	1	2	3	4	5
(m) public environmental events	1	2	3	4	5
(n) environmental interest groups	1	2	3	4	5
(o) professional/community groups	1	2	3	4	5
(p) family and friends	1	2	3	4	5

(q) other (please specify) _____

(r) none (please specify why) _____

Environmental/Computer Opinion Survey - Cont'd

Section 3c - General Information Gathering
(Please circle (O) one number per line only)

24. In order to obtain **general** information I use:

	very often	often	sometimes	rarely	never
(a) television	1	2	3	4	5
(b) radio	1	2	3	4	5
(c) newspapers/publications	1	2	3	4	5
(d) posters	1	2	3	4	5
(e) flyers	1	2	3	4	5
(f) films/videos	1	2	3	4	5
(g) the Internet	1	2	3	4	5
(h) school	1	2	3	4	5
(i) library	1	2	3	4	5
(j) museums	1	2	3	4	5
(k) government or City Council	1	2	3	4	5
(l) special interest groups	1	2	3	4	5
(m)professional/community groups	1	2	3	4	5
(n) public meetings/events	1	2	3	4	5
(o) family and friends	1	2	3	4	5

(p) other (please specify) _____

(q) none (please specify why) _____

Environmental/Computer Opinion Survey - Cont'd

Section 4a - Computer/Internet_Appreciation
(Please circle (O) one number per line only)

	strongly agree	agree	uncertain	disagree	strongly disagree
25. Computers terrify me	1	2	3	4	5
26. Computers help me obtain and organize information	1	2	3	4	5
27. When I see a computer in a public place, I am inclined to use it	1	2	3	4	5
28. The Internet overwhelms me	1	2	3	4	5
29. The Internet can be a useful place to obtain information	1	2	3	4	5
30. It would be helpful if environmental community information were to be centralized in one place	1	2	3	4	5
31. I am interested in obtaining environmental community information via new (electronic) methods	1	2	3	4	5
32. I am interested in obtaining environmental community information via a public access computer terminal	1	2	3	4	5
33. I am interested in obtaining environmental community information via the Internet	1	2	3	4	5
34. If environmental information is easy to obtain, I am more likely to act on it	1	2	3	4	5

Environmental/Computer Opinion Survey - Cont'd

Section 4b - Computer Literacy

(Please tick (√) one box per line and, if your answer is yes, also circle (O) one number)

			every day	3+ days a week	1x week	3x or less a month
35. I am computer literate	☐ no [1]	☐ yes [2]				
36. I use a computer at home	☐ no	☐ yes	1	2	3	4
37. I use a modem at home	☐ no	☐ yes	1	2	3	4
38. I use the Internet at home	☐ no	☐ yes	1	2	3	4
39. I intend to go on-line within the next 12 months	☐ no [1]	☐ yes [2]				
40. I use a computer at work	☐ no	☐ yes	1	2	3	4
41. I use a modem at work	☐ no	☐ yes	1	2	3	4
42. I use the Internet at work	☐ no	☐ yes	1	2	3	4
43. I access the Internet at a public place (i.e. school, library, restaurant)	☐ no	☐ yes	1	2	3	4
44. I would like to access the Internet at a public place	☐ no [1]	☐ yes [2]				
45. I surf the Internet	☐ no	☐ yes	1	2	3	4
46. I am familiar with the World Wide Web (WWW) and Webpages	☐ no [1]	☐ yes [2]				
47. I have my own Webpage	☐ no [1]	☐ yes [2]				
48. I retrieve general information via the Internet/WWW	☐ no	☐ yes	1	2	3	4
49. I retrieve environmental information via the Internet/ WWW	☐ no	☐ yes	1	2	3	4

Environmental/Computer Opinion Survey - Cont'd

THANK YOU FOR PARTICIPATING IN THIS SURVEY !

Please return your completed questionnaire to James Cook University in the reply paid envelope enclosed herewith.

Follow-up interview sessions will be conducted at a later date. If you are interested in participating in the next phase of this research project, please tick (√) the **Yes** box below and kindly provide us with a phone number or e-mail address so we may contact you then.

☐ **Yes**, I am interested [1] ☐ **No**, I am not interested [2]

☐ Name _____

☐ Phone number _____

☐ E-mail address _____

Appendix B

Printed Survey Cover Letter

Dear Aquarium Member,

This survey is part of a study being conducted through JCU to examine people's attitudes toward environmental issues and the ways in which they obtain environmental information.

The Great Barrier Reef Aquarium has given permission for the inclusion of this survey in Coralines as the Aquarium will also benefit from this information in terms of serving you better in the /long run.

Little is known about people's environmental profile in Australia, hence your time and help in completing and returning the questionnaire will be greatly appreciated. A reply paid envelope is attached for your convenience and I thank you for your assistance.

Patrice Braun

JCU postgraduate student

Appendix C

Online Survey Cover Text

Welcome to Patrice's Home Page

Each of you who has logged onto the Internet is aware of the vast amount of unorganised information that is available online. Although the various search engines (Yahoo, Excite, Infoseek, etc.) assist people in finding the information they require, search results are often restricted to general categories and subject headings.

This site is part of a study being conducted through James Cook University of North Queensland, Australia, to examine how information about a specific topic, e.g., environmental issues, can best be placed at the service of individuals and local communities via the Internet.

Your time and assistance in completing this survey will not only contribute to this research project but also provide you, the Internet user, with an opportunity to express how and what you would like to see happen with Internet information.

All comments and suggestions are welcome and may be mailed to [redacted]

GO TO SURVEY

Appendix D

Eco- Mate Contents List

ECO-MATE ↓

- ECO-ACTION
  - Enviro-Interest Groups
    - Involvement Opportunities
    - Volunteer Needs

- ECO-COMMUNITY
  - Conservation
    - Issues, e.g., Rainforest Threats
  - Habitat
    - Flora & Fauna Changes
  - Heritage
    - Pandora, Museum of Tropical Queensland
  - Landcare
    - Activities, e.g., Castle Hill track maintenance
  - Sustainable Development
    - Enviro- and Economic Info

- ECO-EDUCATION
  - Enviro-Studies
    - AIMS
      - Coral Database
    - DPI
      - Fisheries Resources
    - GBRMPA
      - Reef Reports
      - Initiatives, e.g., Dugong reports
    - JCU
      - Marine Biology
      - TESAG
      - Tropical Architecture
  - Enviro-Publications
    - Journals, Newsletters
    - Bookstores & Online Magazines

- ECO-FORUM
  - Email
    - Communication
  - Online Chats

W/Without Guests
Newsgroup/Listserv
Exchange of Ideas
Opinion
Opinion Pieces

ECO-GOVERNMENT
Townsville City Council
Publications, e.g., Living Today for Tomorrow
Initiatives, e.g., City Council Nursery
Dept. of Environment & Heritage
Publications, e.g., Waterwatch
Local Initiatives, e.g., Green Corps

ECO-INDUSTRY
Products & Services
Enviro-Education Books, Videos & CD-ROMs
Home, Garden & Building Products
Health & Natural Products
Employment
Job Opportunities

ECO-LINKS

ECO-LIVING
Environmental Art
Artists & Books.
Building
Tips & Ref. Materials
Energy
Tips & Ref. Materials
Horticulture, Farming & Permaculture
Concepts & Ref. Materials
Health
Issues & Ref. Materials
Marine
Issues, e.g., Oil Spills
Tide Times
Rescue Groups
Motoring
Eco-Motoring Tips
Recycling
Why, What & Where
Water
Tips & Links
Waste Disposal
Info & Links

ECO-NEWS

- Enviro-Events
  - Eco-Fiesta
  - JCU Sustainability Conference
- Eco-Issues, e.g.,
  - Irrigation Plans
  - Jet Skies

ECO-TOURISM
- Destinations, e.g.,
  - Town Common
  - Magnetic Island
  - Pallarenda
  - Great Barrier Reef
  - Contacts
  - Tour Operators

SITE SEARCH

SITE MAP

SITE INDEX

Appendix E

Evaluation Questionnaire

This is a prototype website, in which most links are inactive. Your feedback is instrumental in developing this prototype into a user-friendly and informative environmental community site, so please assist us by ticking (√) one answer per question.

1. How would you rate yourself as a World Wide Web and Website user ?

□ Beginner (1) □ Intermediate (2) □ Advanced (3)

2. What is your first impression of this website ?

□ Very interesting (1) □ Mildly interesting (2) □ Not very interesting (3)

3. How long did you have to wait for this site to appear ?

□ Not very long (1) □ Worth waiting for (2) □ Too long (3)

4. How would you describe the overall design of this site ?

□ Exciting (1) □ Useful (2) □ Disappointing (3)

5. How would you rate the following design elements in this site ?

main graphic	□ Effective (1)	□ Adequate (2)	□ Inappropriate (3)
icons	□ Effective (1)	□ Adequate (2)	□ Inappropriate (3)
background colour	□ Effective (1)	□ Adequate (2)	□ Inappropriate (3)
text colour	□ Effective (1)	□ Adequate (2)	□ Inappropriate (3)
links colour	□ Effective (1)	□ Adequate (2)	□ Inappropriate (3)
moving around (navigation)	□ Effective (1)	□ Adequate (2)	□ Inappropriate (3)

6. How would you rate the overall information contained in this site ?

□ Very useful (1) □ Somewhat useful (2) □ Not useful (3)

7. How would you rate the information structure of this site ?

site name	□ Effective (1))	□ Adequate (2)	□ Inappropriate (3)
main menu	□ Well ordered (1)	□ Adequate (2)	□ Confusing (3)
sub menus	□ Well ordered (1)	□ Adequate (2)	□ Confusing (3)
text listing	□ Well ordered (1)	□ Adequate (2)	□ Confusing (3)
links	□ Effective (1)	□ Adequate (2)	□ Inappropriate (3)

8. What is missing from this site ?

_____

9. What could be improved on this site ?

_____

10. Would you be tempted to return to this site in the future ?

□ Likely (1) □ Possibly (2) □ Doubtful (3)

Thank you for your participation

BIBLIOGRAPHY

Alston, P.G. (1996) Environment Online - Update '95, Database,19, 1, 32-38.

Arbuthnot, J. (1977) The Roles of Attitudinal and Personality Variables in the Prediction of Environmental Behavior, Environment and Behavior, 9, 217-232.

Arcury, T.J. (1990) Environmental Attitude and Environmental Knowledge, Human Organization, 49, 4, 300-304.

Arcury, T.J., Johnson, T.P. (1987) Public Environmental Knowledge: A Statewide Survey, The Journal of Environmental Education, 17, 31-37.

Arcury, T.J., Johnson, T.P., Scollay, S.J. (1986) Ecological Worldview and Environmental Knowledge: An Examination of the "New Environmental Paradigm, The Journal of Environmental Education, 17, 35-40.

Ascott, R. (1996) The Planetary Collegium, Art and Education in the post-biological era, Artlink, 16, 2&3, 51-54.

Atwater, T., Salwen, M.B., Anderson, R.B. (1985) Media agenda-setting with environmental issues, Journalism Quarterly, 62, 2, 393-397.

Auer, N. (1996) Bibliography on Evaluation Internet Resources, online: http://refserver.lib.vt.edua/libinst/critTHINK.HTM (accessed 1997, June 25).

Australian Bureau of Statistics (1992) Environmental Issues: People's Views and Practices, ABS Catalogue No. 4602.

Avgikos, J. (1991) Green Piece, Artforum, 29, 4, 104-110.

Babbie, E.R. (1992) The Practice of Social Research, Sixth Ed., Belmont, CA.: Wadsworth.

Barlouw, E. (1990) Tube of Plenty. The Evolution of American Television, New York: Oxford University Press.

Barron, S. (1997) Art Planetaire et Romantisme Techno-ecologique, Chapter 12, Universite de Paris, 220.

Berardinelli, J. (1973) Survey Research Methods, Belmont, CA.: Wadsworth.

_____ (1993) Once Upon a Forest, a film review, online http://www.cybernex.net/~berardin/movies/o/once_upon.html

(accessed 1997, March 20).

Berland, J., Daryl Slack, J. (1994) On Environmental Matters, Cultural Studies, 8, 1, 1-4.

Bonyhady, T. (1996) The Artist As Activist, Periphery, 26, 7-9.

_____ (1993) A Different Streeton, Art Monthly Australia, 61, 8-12.

Bowman, J.S. (1978) American daily newspapers and the environment, The Journal of Environmental Education, 10, 1, 2-11.

Bowman, J.S., Hanaford K. (1977) Mass media and the environment since Earth Day,Journalism Quarterly, 55, 1, 160-165.

Brickman, L. (1972) Environmental Attitudes and Actions, The Journal of Social Psychology, 87, 2, 323-324.

Brown, D. (1997) IT Revolution is a Community Issue, The Australian, Computers News Features, October 7, 59.

Brown, P. (1995) The Ethics and Aesthetics of the Image Interface, Metro, 103, 81-85.

Brown, P. (1996) Stephan Barron, Ozone/Night and Day, Visual Arts Program, Adelaide Festival, March 1-17, 8.

Calembest, R. (Ed.) (1991) The Ecological Art Explosion, ARTnews, Summer, 96-108.

Carli D. (1994) A Designer's Guide to the Internet, *Step-by-Step Graphics*, Peoira, ILL: November-December.

Carpenter, E. (1960) The new languages. In (Explorations in Communications, Carpenter,E. and McLuhan, M. (eds.) 1960), 162-179.

Carpenter, E. and McLuhan, M. (eds.)(1960) Explorations in Communications, Boston: Beacon Press.

Cisler, S. (1993) Community Computer Networks: Building Electronic Greenbelts, online: gopher://gopher.cic.net...communet/ComNet6.93.txt (accessed 1996, June 12).

Ciolek, T.M. (1996) The Six Quests for the Electronic Grail: Current Approaches to Information Quality in WWW Resources, Online: http://coombs.anu.edu.au/SpecialProf/QLTY/TMC/QuestMain.htm (accessed 1997, June 25).

Cohen, B. (1986) in (Educating for the Environment. Proceedings of a Seminar and Workshops, Thompson, C.J. (ed.) 1986), Department of Arts, Heritage and Environment, Canberra: Commonwealth Government Printer.

Council on Environmental Quality (1980) Public Opinion on Environmental Issues: Results of a National Public Opinion Survey, Washington D.C.: Government Printing Office.

Corbett, J. (1992) Rural and urban newspaper coverage of wildlife: Conflict, community and bureaucracy, Journalism Quarterly, 69, 921-928.

Crabtree, A. (1994) Re-Spect, Art & Design, 9, 5/6, 17-21.

Cyberatlas (1996) Demographics, San Francisco: I/Pro, online: http://cyberatlas.com/ demographics.html (accessed 1996, October 26).

Daley, P., O'Neill, D. (1991) "Sad is too mild a word": Press coverage of the Exxon Valdez oil spill, Journal of Communication, 41, 42-57.

DeFleur, M., Ball-Rokeach, S. (1989) Theories of mass communication, 5th Ed., New York: Longman.

Delli Carpini, M.X., Williams, B.A. (1994) 'Fictional' And 'Non-Fictional' Television Celebrates Earth Day: Or, Politics Is Comedy Plus Pretense, Cultural Studies, 8, 1, 74-98.

Deutscher, L. (1973) What we say/what we do: Sentiments and Acts, Glenview, ILL: Scott, Foresman, and Co.

De Young, R. (1993) Changing Behavior and Making It Stick. The Conceptualization and Management of Conservation Behavior, Environment and Behavior, 26, 4, 485-505.

Diffey, T.J. (1995) What Can We Learn From Art? Australasian Journal of Philosophy, 73, 2, 204-211.

Downes, D. (1993) Manifesting Destiny: The Colonization of Cyberspace, MA thesis, MAI, Vol. 32-03, 755-910, Canada: Carleton University.

Durnell, A., Thomson, K. (1997) Gender and Computing: A Decade of Change? Computers & Education, 28, 1, 1.

Ekman R., Quandt R. (1995) Scholarly Communication, Academic Libraries and Technology, Change, 27, 1, 34-44.

Environmental Resources Information Network (1996) The Quarterly newsletter of National State of the Environment Reporting, Federal Department of the Environment, Sport and Territories, online: http:// www.erin.gov.au/soe/ soenews1.html (accessed 1996, October 21).

_____ (1996a) n.a., Meeting the Environmental Information Needs of Local Government. Chapter 4: Availability of Environmental Information Resources, Federal Department of the Environment, Sport and Territories, online: http://www.erin.gov.au/ portfolio/esd/pubs/local/loc _ch4.html (accessed 1996, October 21)

Everson, W.K. (1978) American Silent Film, New York: Oxford University Press.

Falk J., Steinfeld C. (Eds.)(1990) Organizations and Communication Technology, London: Sage Publications.

Fien, J. (1993) Education for the Environment: Critical Curriculum Theorising and Environmental Education, Geelong: Deakin University.

Floridi, L. (1995) Internet: which future for organized knowledge, Frankstein or Pygmalion? International Journal Human-Computer Studies, 43, 261-274.

Fortner, R.E., Lyon, A.E. (1985) Effects of a Cousteau television special on viewer knowledge and attitudes, The Journal of Environmental Education, 16, 3, 12-20.

Gebhart, A.M., Lindsey, G. (1995) Differences in Environmental Orientation Among Homeowners, The Journal of Environmental Education, 27, 1, 4-43.

Geller, E.S. (1995) Actively Caring for the Environment. An Integration of Behaviorism and Humanism, Environment and Behavior, 27, 2, 184-185.

Geller, J.M. and Lasley, P. (1985) The New Environmental Paradigm Scale: A Reexamination, Journal of Environmental Information, 17, 9-12.

Gerbner, G. (1977) Trends in Network Drama and Viewer Conceptions of Social Reality, 1967-76, Annenberg School of Communications, Philadelphia: University of Pennsylvania.

Giddens, A. (1990) The Consequences of Modernity, Cambridge:Polity Press.

Goldberg, V. (1991) A Terrible Beauty, ARTnews, summer, 106-113.

Graphics, Visualization & Usability Center (1997) GVU's WWW User Surveys, College of Computing, Georgia Institute of Technology, Atlanta, GA,

online: http://www.gvu.gatech.edu/usersurvey (accessed 1997, October 12).

Gray, D.B., Borden, R.J., Weigel, R.H. (1985) Ecological beliefs and behaviors: Assessment and Change, Westport, CN: Greenwood Press.

Greenfield, P.M. (1984) Mind and Media: The Effects of Television, Video Games and Computers, Cambridge: Harvard University Press.

Gregory D.C. (1995) Art Education Reform and Interactive Integrated Media, Art Education, 48, 3, 7-15.

Guthrie, K.K. (1991) The Politics of citizen Access Technology: The Development of Community Communication and Information Utilities in Four Cities, Ph.D. thesis, DAI, Vol. 52-06A, 1932-3001, University of Southern California.

Habitat Australia (1995), n.a. Opening Doors for the Environment, February, 41.

Halberstam, D. (1995) TV that Changed our Lives, in (Impact of Mass Media, Hierbert, R.E. (ed.), 1995), 39-46.

Hall, J. (1995) Data Communications History, Tampa: Tampabay Interactive, online: http://www.tbi.net/~jhall (accessed 1996 March 2).

Hallin, D. (1995) Whatever Happened to the News?, in (Impact of Mass Media, Hierbert, R.E. (ed.), 1995), 159-162.

Harden, B (1995) TV and Ankara's War for Central Asia, in (Impact of Mass Media, Hierbert, R.E. (ed.), 1995), 335-338.

Hearn, G., Anthony D., Holman, L., Dunleavy, J., Mandeville, T. (1994) The Information Superhighway and Consumers, The Communication Centre Research Report Series, Research Report No.1, Queensland University of Technology.

Hecker, F. (1994) Community Network Services, online: http://www.access.digex.net/~hecker/papers.html (accessed 1996 April 4).

Henrichs, R.B. (1995) Factors That Impact Consumer Adoption of Innovative Technological Services over Time: The Case of the Internet, D.B.A. thesis, DAI, Vol. 56-07A, 2773-2920, U.S.: Golden Gate University.

Hewett, D. (1985) Song of the Seals, Sydney: Currency Press.

Hiebert, R.E. (ed.) (1995) Impact of Mass Media, White Plains: Longman.

Hines, J., Hungerford, H., Tomera, A. (1986/1987) Analysis and Synthesis of Research on Responsible Environmental Behavior: A Meta-Analysis, The Journal of Environmental Education, 18, 2, 1-8.

Horeczyi, P.P. (1979) On finding a meaning to the Townsville Town Common: an investigation of attitudes toward a natural environmental resource, B-Ed thesis, James Cook University.

Horey, J. (1997) Cookie concerns half-baked, Computers Opinion, The Australian, June 10, 45.

Hornby, F. (1993) The Townsville Region. A Social Atlas, 3rd ed. Community & Cultural Services, Townsville City Council.

Hoyt, M.(1995) When the Walls Come Tumbling Down, in (Impact of Mass Media, Hierbert, R.E. (ed.), 1995), 199-207.

Ingram F. (1995) Eloquent Interfaces, Metro, 103, 86-91.

Johnson, W. R.(1991) Anything, Anytime, Anywhere: The Future of Networking, in (Technology 2001: The Future of Computing and Communications, Leebaert, D.(ed.) 1991), 150-175.

Jones, S.G. (ed.), (1995) Cybersociety: Computer-Mediated Communication and Community, Newbury Park, CA: Sage.

Jupiter Communications (1996) Internet survey, online: http://www.jup.com/survey.html (accessed 1996, May 27).

Kaplan, R. (1986) Culture and the Written Language, Culture Bound: Bridging the culture gap in language teaching, Cambridge: Cambridge University Press.

Karp, D.G. (1996)Values and Their Effect on Pro-Environmental Behavior, Environment and Behavior, 28, 111-133.

Katz, J. (1995) Beyond Broadcast Journalism, in (Impact of Mass Media, Hiebert, R.E. (ed.), 1995), 23-30.

Kean, J. (1992) Education for Action: A Practical Demonstration of Reflected Action on the Urban Environment, Australian Journal of Environmental Education, 8, 17-25.

King, J.A. (1996) Computer Opinion Survey, developed for education course #1441, Townsville: James Cook University, School of Education.

Krause, D. (1993) Environmental Consciousness, An Empirical Study, Environment and Behavior, 25, 1, 126-142.

Kress, G. (ed.) (1988) Communication and Culture: An Introduction, Kensington NSW: New South Wales University Press.

Kruger, R.A. (1988) Focus Groups, Newbury Park, CA: Sage Publications.

Leebaert, D. (ed.), (1991) Technology 2001: The Future of Computing and Communications, Cambridge: MIT press.

Leeming F.C., Dwyer W.O., Bracken, B.A. (1995) Children's Environmental Attitude and Knowledge Scale: Construction and Validation, The Journal of Environmental Education, 26, 3, 22-34.

Levy M., Fink E. (1984) Home Video Recorders and the Transcience of Television Broadcasts, Journal of Communications, Spring, 56-68.

Liestol, G. (1994) Wittgenstein, Genette, and the Reader's Narrative in Hypertext, in (Hyper/Text/Theory, Landow, G.P. (ed.) 1994), Baltimore: John Hopkins University Press.

Lorimer, R. (1994) Mass Communications, a comparative introduction, Manchester: Manchester University Press.

Luke, C. (1995) Multimedia Multiliteracies, Education Australia, 30, 14-17.

Lupton, D. (1994) Panic Computing: The Viral Metaphor and Computer Technology, Cultural Studies, 8, 3, 556-568.

Madeja, S. (1993) The Age of the Electronic Image: The Effect on Art Education, Art Education, 46, 6, 9-12.

Maden, G.S. (nd) Kenneth Patchen, excerpt from thesis on Kenneth Patchen, online:http://ourworld.compuserve.com:80/homepages/Patchen/thesis1.htm, accessed 1997, March 18).

Maloney, M. P.,Ward, M.P. (1973) Ecology: Let's Hear From The People: An Objective Scale for the Measurement of Ecological Attitudes and Knowledge, American Psychologist, 28, 583-586.

Maloney, M.P., Ward, M.P.,Braucht, G.N. (1975) Psychology in Action. A Revised Scale for the Measurement of Ecological Attitudes and Knowledge, American Psychologist, July, 787-791.

Matilsky, B.C. (1994) The Survival of Culture and Nature. Perspectives on the History of Environmental Art, Art and Design, 9, 5/6, 9-15.

McFadyen I. (1996) Waiting for the CyberMuse, Artlink, 16, 2&3, 83-84.

McLuhan, M. (1962) The Gutenberg Galaxy: the Making of Typographic Man, London: Routledge and Kegan Paul.

_____(1964) Understanding Media: The Extensions of Man, London: Routledge and Kegan Paul.

_____(1967) The Medium is the Massage, Harmondsworth: Random House.

_____(1968) War and Peace in the Global Village, New York: Bantam Books.

Meyrowitz, J. (1985) No Sense of Place, New York: Oxford University Press.

Morris, M., Ogen, C. (1996) The Internet as Mass Medium, Journal of Computer-Mediated Communication, 1, 4, online: http://www.usc.edu /dept/ annenberg/vol1/issue4/vol1no4.html (accessed 1996, June 12).

Newhagen, J., Rafaeli, S. (1996) Why Communication Researchers Should Study the Internet: A Dialogue, Journal of Computer-Mediated Communication, 1, 4,online: http://www.usc.edu/dept/annenberg/vol1/ issue4/vol1no4.html (accessed 1997, April 15).

Nielsen Media Research Interactive Services (1996) Internet use survey, online: http://www.nielsenmedia.com/survey (accessed 1996, May 24).

Negroponte, N. (1996) Being Digital, Australia: Hodder & Stoughton.

Ogan, C. (1993) Listserver Communication During the Gulf War: What Kind of Medium is the Electronic Bulletin Board? Journal of Broadcasting and Electronic Media, 37, 2, Spring, 177-196.

Ostman, R.E., Parker, J.L. (1985) Awareness of, concern for, and perceived lifestyle effects of environmental messages in television and other mass media. Paper presented to The Popular Culture Association, April 3-7, Louisville, KY.

_____(1986/1987) A Public's Environmental Informatio Sources and Evaluations of Mass Media, The Journal of Environmental Education, 18, Winter, 9-17.

_____(1987) Impact of Education, Age, Newspapers, and Television on Environmental Knowledge, Concerns, and Behaviors, The Journal of Environmental Education, 19, 1, 3-9.

Patton, M.Q. (1982) Practical Evaluation, Beverly Hills, Sage Publications.

Pelletier, L.G., Legault, L.R, Tuson K.M. (1996) The Environmental Satisfaction Scale. A Measure of Satisfaction With Local Environmental Conditions and Government Environmental Policies, Environment and Behavior, 28, 1, 5-26.

Penny, S. (ed.) (1995) Critical Issues in Electronic Media, Albany: State University of New York Press.

Pierce, J.C., Lee-Salmos, L., Steger, M.A., Lovrich, N.P. (1990) Media reliance and public images of environmental politics in Ontario and Michigan, Journalism Quarterly, 67, 838-842.

Pollay, R.W. (1995) Cigarettes under Fire, in (Impact of Mass Media, Hierbert R.E. (ed.), 193-198.

Provenzo, E. Jr. (1986) Beyond the Gutenberg Galaxy. Microcomputers and the Emergence of Post-Typographic Culture, New York: Columbia University, Teachers College.

Ratner, N.C. (1990) Environmental Education & The Visual Message. A Cross Cultural Perspective, School of Natural Resources, Columbus: Ohio State University.

Ramsey, C.E., Rickson, R.E. (1976) Environmental Knowledge and Attitudes, Journal of Environmental Education, 8, 10-18.

Rice, R.E., Grant, A., Smitz, J. (1990) Individual and network influences in the adoption and perceived outcomes of electronic messaging. Social Networks, 12, 1, 27.

Reardon, K.K., Rogers, E. (1988) Interpersonal Versus Mass Media Communication. A False Dichotomy, Human Communication Research, 15, 2, 282-303.

Rokeby, D. (1995) Transforming Mirrors: Subjectivity and Control in Interactive Media, in (Critical Issues in Electronic Media, Penny S. (ed.) 1995), 133-158.

Rosengren, K.E. (ed.) (1994) Media Effects and Beyond. Culture, Socialization and Lifestyles, London: Routledge.

Rossow, M.D., Dunwoody, S. (1991) Inclusion of "useful" details in newspaper coverage of a high-level nuclear waste siting controversy, Journalism Quarterly, 68, 87-100.

Rubin, D.M., Harris, T.H, Jones, D.W. Jr., Sachs, D.P., Schoenfeld, C. (1977) The changing role of mass communication in environmental education, The Journal of Environmental Education, 8, 3, 60-64.

Schoenfeld, C. (1974) Environmental Mass Communications: Problems and Promises, The Journal of Environmental Education, 6, 2, 20-26.

Schahn, J. and Holzer, E. (1990) Studies of Individual Environmental Concern. The Role of Knowledge, Gender and Background Variables, Environment and Behavior, 22, 6, 767-786.

Schuler, D. (1994) Community Networks: Building a New Participatory Medium, online:http://www.cpn.org/sections/topics/networking/index.html (accessed 1997, May 3).

_____ (1995) Creating Public Space in Cyberspace: The Rise of the New Community Networks, online: http://www.cpn.org/sections/topics/networking/index.html (accessed 1997, May 3).

Servtech (1996) The Far Side by Gary Larson, online: (http://www.servtech.com/public/robertk/FarSide.html (accessed 1997, March 20).

Sharlin, H. I. (1985) A case study in the communication of health risks. Report submitted to the Office of Policy Analysis, Washington D.C.: U.S. Environmental Protection Agency.

Shneiderman, B. (ed.) (1992) Designing the User Interface, Strategies for Effective Human-Computer Interaction, Second Edition, Reading, Mass: Addison-Wesley.

Smith, A.G. (1996) Criteria for evaluation of Internet Information Resources, online: http://www.vuw.ac.nz/~agsmith/evaln/index.htm (accessed 1997, June 25).

Smith, C. (1993) New sources and power elites in news coverage of the Exxon Valdez oil spill. Journalism Quarterly, 70, 393-403.

Souttar, J. (1995) Designing Information For On-Screen Display, Imaging Information, 2, 3, 23-24.

Spender, D. (1995) Nattering on the Net. Women, Power and Cyberspace, Australia: Spinifex.

Spicer, B.J. (1983) The Individual In His Environment: Language, Personality, and Sex factors in Perceptual Style, Ph.D. thesis, Monash University.

Stern, P.C., Dietz, T., Kalof, L. (1993) Value Orientations, Gender, and Environmental Concern, Environment and Behavior, 25, 3, 322-348.

Stevenson, N. (1995) Understanding Media Cultures, Social Theory and Mass Communications, London: Sage.

Stoll, C. (1996) Silicon Snake Oil. Seconds Thoughts on the Information Highway, London: Pan Books.

Street, J. (1992) Politics and Technology, New York: The Guilford Press.

Tennant, H., Heilmeier, G.H.(1991) Knowledge and Equality: Harnessing the Tides of Information Abundance, in (Technology 2001: The Future of Computing and Communications, Leebaert, D. (ed.) 1991), 117-149.

Thomas, F., Braun, P. (1992) The Creature Concert, Los Angeles (unpublished).

Thomas, K. (1995) Stars, Setting Sustain 'Panda Adventure', Los Angeles Times, August 28, online: http://www.hollywood.com/movies/panda/review/index.html (accessed March 20).

Thompson, C.J. (1986) (ed) Educating for the Environment. Proceedings of a Seminar and Workshops, Department of Arts, Heritage and Environment, Canberra: Commonwealth Government Printer.

Thompson, J.B.(1995) The Media and Modernity, Cambridge: Polity Press.

_____ (1990) Ideology and Modern Culture, Critical Social Theory in the Era of Mass Communication, Cambridge: Polity Press.

Tillman, H.N. (1996) Evaluating Quality on the Net, online: http://www.tiac.net/users/hope/findqual.html (accessed 1997, June 25).

Toffler, Alvin (1970) Future Shock, 2nd ed., London: Pan Books.

Townsville Bulletin, The (1996), n.a., Thuringowa tops State's growth list, July 11, 1.

Townsville City Council (1992), n.a., Living Today for Tomorrow, An Environmental Conservation Strategy for Townsville.

Turkle, S. (1984) The Second Self. Computers and the Human Spirit, New York: Simon and Schuster.

Tyner, K. (1994) Access in a Digital Age, University of Oregon, Media Literacy Project. Online:http://interact.uoregon.edu/MediaLit/FA/MLArticleFolder/

access (accessed 1996 Apr 2).

Vandermeulen, J. (1995) The Impacts of Public Information Technology on Local Land Use Decision-Making, Ph.D. thesis, DAI, Vol. 56-04A, Page 1553-1726, University of Michigan.

Van Liere, K.D., Dunlap. R.E. (1978) The "New Environmental Paradigm": A Proposed Measuring Instrument and Preliminary Results, The Journal of Environmental Education, 9, 10-19.

_____ (1981) Environmental Concern: Does It Make a Difference How It's Measured? Environment and Behavior, 13, 6, 651-676.

Vining, E., Ebreo, A. (1990) What Makes A Recycler? A Comparison of Recyclers and Nonrecyclers, Environment and Behavior, 22, 1, 55-73.

Vansini, J. (1965) Oral Tradition, A Study in Historical Methodology, London: Routledge and Keagan Paul.

Vujakovic, P. (1996) The Nature of Fantasy, Geographical Magazine, 68, 3, 18-21.

Walker, N.S. (1996) How can Artists and Environmental Scientists Work Together to Promote Environmental Awareness ?, pilot study, C.S.A. Center for International Studies, Cairns.

Walls, T. (ed) (1995) Educating for ecologically sustainable development, Background Briefs, Australia: Department of the Environment, Sport and Territories.

Walther J.B., Burgoon J.D. (1992) Relational Communication in Computer-Mediated Interaction, Human Communication Research, 19, 1, 50-88.

Ward, K. (1989) Mass Communications and the Modern World, Themes in Comparative History, London: MacMillan Education.

Wark M. (1994) Third Nature, Cultural Studies, 8, 1, 115-132.
_____ (1995) The MultiMedia Thing, Metro, 103, 78-80.

Weekend Australian, The (1996) n.a., Large Dose of Reality in Brave New World, March 30-31, 31.

_____ (1997) n.a., Quick Facts, October 11-12, Syte, 8.

_____ (1997a), n.a., Quick Facts, October 18-19, Syte, 8.

Weigel R., Weigel, J. (1978) Environmental concern: The development of a measure. Environment and Behavior, 10, 3-15.

Weis.C.N., Knudson D.M. (1980) Naturalists and the Mass Media: Reaching beyond the Parks, The Journal of Environmental Education, 5, 1, 58-62.

Westmancoat, J. (1985) Newspapers, London: The British Library.

Whelan, M. (1994) Trilogy. Contextualizing and Creating Music Theatre in the 1990s, M.CA. thesis, Department of Creative Arts, James Cook University.

Whitelaw, M. (1996) Is There Art on the Web?, Artlink, 16, 2&3, 29-32.

Wicker, A. (1969) Attitudes vs. Actions: The relationship of verbal and overt, behavioral responses to attitude objects, Journal of Social Issues, 25, 41-78.

_____ (1971) An examination of the "other variables" explanation of attitude behavior inconsistency, Journal of Personality and Social Psychology, 19, 1, 18-30.

Yang G., Kubicek, H., Redder V. (1995) Driving the Citizen-Oriented Information on the Electronic Highway, Proceedings of the International Conference on Multimedia Computing and Systems, Washington D.C., 15-18 May, Cat. No. 95TH8066, xv+347, 131-138.