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ABSTRACT

This booklet, which was written for adult literacy practitioners in Australia, examines some key issues currently being raised about new information technologies and technological literacy. The following are among the topics discussed in the booklet's nine sections: innovation and dissemination (effects of videocassette recorders, computers, and the Internet on home entertainment, education, workplace practice, and literacy requirements); multiliteracies (print, critical, technological, and information literacy); technologies (their relationship to social activities and relations and the notion of "virtual" communities); the global village and the potential of new information technologies to democratize information; the space-time compression of postmodern technological society; the virtual workplace and the erosion of the old distinctions between the public sphere of work and the private sphere of home and household; hybrid textualities (hypertext, changing reading practices, and the discourse structures of e-mail); body and identity (the invisibility and irrelevance of bodily differences in digital hyperspace and issues of anonymity, privacy, and security in cyberspace); and pedagogy (the role of computers and other new technologies in literacy instruction, second language learning; and distance education programs). Contains 47 references. (MN)

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TECHNOLOGICAL LITERACY

by Carmen Luke

ADULT LITERACY RESEARCH NETWORK

number 4
RESEARCH INTO PRACTICE SERIES

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TECHNOLOGICAL LITERACY

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INTRODUCTION: INNOVATION AND DISSEMINATION

Social commentators tell us we are in the midst of a technological and information revolution which will change forever many of the traditional ways we communicate and conduct our everyday affairs. But what is the information revolution? How do the new technologies impact on our lives now and what might these changes mean for the future? What might all this mean for education, for teachers and students, for teaching and learning?

What I aim to accomplish in this booklet is to give adult literacy practitioners a guided tour of some key issues currently being raised about new information technologies and technological literacy. What is interesting in the current debate is that researchers and social commentators are looking at much broader social and cultural consequences of the impact of computer mediated communication and, even among educationists, concerns are not confined exclusively to pedagogical and curriculum issues. It seems that what is on everyone's mind are questions of significant and permanent social change seeping into every crevasse of our everyday work and private lives. Many of the issues that are being raised today, and which I will sketch out here, deal with abstract notions about the virtual and 'real', about time and space, about 'body-less' interactions and communities of learners, and so forth. I hope, however, that I have brought together the diversity of research, current debates and issues in a concrete way that helps adult literacy professionals to get a baseline familiarity with a range of complex issues. As well, where appropriate, I have provided some practical technology literacy strategies that can be modified to suit specific classroom contexts and the diverse learning styles and needs of students.

Of all the innovations in communications technologies over the past two decades, the video cassette recorder (VCR), computer, and now the global network of the internet have had the most profound effect on home entertainment, education, and workplace practice. The video cassette recorder (VCR) permanently changed the way viewers access broadcast television. No longer tied to network schedules, viewers now take for granted the flexibility of pre-programmed videotaping and delayed viewing. With close to 100% of Australian household TV and about 80% of VCR ownership, the traditional

patterns of this nation's favourite leisure past-time have irrevocably changed.

The computer has brought about the most profound changes in communication, information storage, retrieval, and dissemination. The effects of the computer on workplaces, on international money markets, and on education are incalculable. Not only have ways of doing business and handling information changed, but our everyday social relations that increasingly are electronically mediated are also undergoing profound changes. Yet change has been so rapid that the rate of technological innovation continually outstrips the rate of research output on the social, cultural, and educational consequences of electronic and global communication systems.

What began in the mid 1970s as a relatively slow trickle into the marketplace of home microcomputers, had been transformed by the 1980s into the global and hugely successful phenomenon of the videogame, video arcade, and home entertainment packages for the microcomputer. At the same time, Automatic Teller Machines (ATMs) proliferated in all major urban centres and rapidly proliferated around the globe. Cable TV expanded exponentially in the US throughout the 1980 and debate about 'pay-TV' hit Australian shores in the early 1990s. The accelerated speed of technological developments, and the proliferation of increasingly cheaper electronic commodities and services in the private consumer marketplace, has seemingly made the public reel from one set of responses to the next—from fears of children's "joystick arthritis" from too much videogaming, to concerns over Big Brother surveillance through the electronic trail gathered by ATMs and other electronically monitored financial transactions. In many ways, these concerns parallel public fears over the advent of TV in the 1940s, silent pictures at the turn of the century, or the coming of the book in the late 1400s.

Today, the internet is generating equally profound changes in the way we communicate, and how we access, produce, and distribute information and knowledge. Yet the internet too is generating virulent responses from the public and social critics about its 'anarchic' nature: the inability to control it, to censor it, to manage and limit it. The internet gets a lot of bad press particularly in relation to that age-old concern over various forms of pornography, issues concerning 'electronic stalking', and questions of ownership, monopoly, and unequal access. By the same token, the huge educational (and entrepreneurial) potential of the internet—popularised as the Information Superhighway—often gets lauded to the point of blind faith.

One thing, however, is certain: the shift to interacting electronically, whether with a colleague down the hall or with people we've never met on the other side of the globe, is here to stay. What the changes we are now seeing will mean in ten or twenty years, we have yet to imagine. However, for those of us in the 'information business' -- that is, literacy practitioners and educators passing on knowledge and skills -- it is vital that we are knowledgeable about the many and complex issues at stake in order to develop informed and critical understandings of a whole range of pedagogical, political, social, and economic consequences associated with new technologies. If adult literacy professionals, like all educators, want to participate at their workplaces in discussions with colleagues or administrative staff about, for example, information technology (IT) implementation, professional staff development, best practice models, or the cost benefits and time requirements of going online and getting wired, an informed perspective is required on a whole range of IT issues in order to mount arguments for or against specific initiatives and plans. Importantly, a broad and critical understanding is crucial so that we can formulate pedagogies that will help all students to become both proficient with a range of technology-specific skills, and to become aware of the larger social context and consequences of the role of technologies in their own lives and in contemporary society.

Literacy requirements have changed and will continue to change as new technologies come on the marketplace and quickly blend into our everyday private and work lives. And unless educators take a lead in developing appropriate pedagogies for these new electronic media and forms of communication, corporate experts will be the ones to determine how people will learn, what they learn, and what constitutes literacy. For instance, a quick look through any of today's most popular CD-ROM encyclopedias (e.g., Microsoft's Encarta) shows how limited entries on, for example, 'Australia' or 'Aborigines' are, how ideas are connected by lateral links and pathways which exclude other knowledge options, and how the software in fact 'teaches' the user-learner certain cognitive mapping strategies. In other words, the designers of software can easily become the literacy and pedagogy experts of tomorrow. This is not to say that many educational products on the market today are not pedagogically sound or lack innovative teaching-learning methods. But it is to suggest that educators need to become familiar with the many issues at stake in the 'information revolution' so that we know how and where we must intervene with positive and critical strategies for multi-literacy teaching, and how to make the best and judicious use of the many multi-media resources available.

We begin in this next section with a brief introduction to some key issues associated with the notion of multiliteracies. This will serve as a starting point and framework for the remainder of this booklet. We then step back and take a broader historical look at the debates that have surrounded technological innovations, how technologies in educational contexts have been defined, and how their social uses and consequences are always contextual. We then turn to discuss current debates about 'information superhighway' and the democratising of information access and distribution. Next we consider how new communication technologies are changing concepts of time and space, and how this is changing our social relation and many of our everyday practices including those at the workplace. In the section on 'Hybrid Textualities' we examine how language and literacy are changing as a consequence of electronically mediated reading and writing practices. The rapid and global move to 'cyberspace' -- whether via email or the world wide web on the internet -- means an increasing shift away from face-to-face communication (and teaching-learning relations) to virtual interactions. In the section 'Body and Identity', we discuss the social and cultural implications of 'body-less' communications and what this might mean for 'cyber-education' of the 21st century. In the final section on 'Pedagogy' we review some of the literacy and pedagogical issues raised throughout this volume.

MULTILITERACIES

It takes Hue 45 minutes to get to school on the bus. On rainy days when the traffic is bad, it often takes over an hour. She arrives in her classroom, sits at the keyboard, and logs on to the school's home-page. At the home page she clicks on a 'bookmarked' address button which connects her to a world wide web site where women from around the world are posting information about local services for refugee women. It takes her 20 seconds to connect to the server in Switzerland, and immediately she is sitting at a virtual round-table reading and writing a conversation with women from around the world. The group's aim is to share and collect information about community support programs for refugee women. Hue's interest in finding out more about various support strategies for refugee women stems directly from her own experiences and her desire eventually to find work in a refugee and/or migrant support program. Hue had called her local council and some women's community groups the day before and now types in the information she received over the phone. Later she gets a printout of the information posted on the web site by other women in the last 24 hours. Next week she will present her project -- a written/computer typed portfolio and an oral presentation -- to her classmates in her adult literacy class. Hue's handwriting no longer gets in the way of her ability to produce a readable piece of writing. Even with her limited keyboarding skills, computer and internet access has increased Hue's 'written' output, she reads more 'online', and she has produced work that her classmates have been able to read and comment on. Her developing 'expertise' on this particular topic has also given her a way to connect with some of the other women in the class, some of whom had trouble finding common ground to talk about their own difficult experiences.

What today appear as hybrid and frontier media forms and content will be commonplace in the near future, and will generate new text-based social repertoires, communication styles, and symbolic systems for accessing and participating in new knowledge and cultural configurations. Consider, for instance, that just to get into any basic computer program requires facility with both print literacy and any number of symbolic languages so that we know where to click in order to move through menued choices. Already we take that kind of literacy for granted.

Much has been written on the theory and practice of critical literacy (e.g. Muspratt, A., Freebody, P. & Luke, A., 1996; 1996; Gee, 1996) and critical media literacy (e.g., Alvarado & Boyd-Barrett, 1992; Buckingham, 1990, 1993; Buckingham & Sefton-Green, 1994; Hart, 1991; Luke, C. 1994, 1996a,b,c; Lusted, 1991). However, scholarship on critical print-text and media literacy has barely taken the emergent digital domain of hypertextuality into consideration. (Bigum & Green, 1993). At the classroom level as well, "teaching students about new technologies in their social and cultural work and leisure contexts has not been a high priority in curriculum development" (Kenway, 1995, p.59). Nonetheless, the basic principles of what constitutes a critical literacy are as applicable to computer mediated communication (CMC) and hypertextuality as they are to traditional print and mass media texts.

A rudimentary working definition of critical literacy entails three aspects. First, it involves a meta-knowledge of diverse meaning systems and the socio-cultural contexts in which they are produced and embedded in everyday life. By meta-knowledge I mean having an understanding of how knowledge, ideas and information 'bits' are structured in different media and genres, and how these structures effect people's readings and uses of that information.. Second, it involves mastery of the technical and analytic skills with which to negotiate those systems in diverse contexts. This refers to how the pragmatics of use of literacy are translated into practice in different contexts. Third, it involves the capacity to understand how these systems and skills operate in relations and interests of power within and across social institutions. This means an understanding of how and why various social groups have different and unequal access to literacy (and knowledge), and how access and distribution work in the interests of some groups and can disadvantage others.

Since all meaning is situated relationally -- that is, connected and cross-referenced to other media and genres, and to related meanings in other cultural contexts -- a critical literacy relies on broad-based notions of intertextuality. As I will argue throughout this discussion, in computer mediated communication (CMC), new hybrid or mixed terminologies, new forms of identity (or online 'personas' that people construct for themselves), and new virtual communication are emerging, which require an intertextual understanding of how meanings shift across media, genres, and cultural frames of reference. Whether one 'visits' the Louvre on-line, joins an international newsgroup of parents of Downs Syndrome children, or visits the www site of an agricultural college in Kenya, cross-cultural understanding and 'netiquette' is increasingly crucial for participating effectively in global communications.

A multiliteracy of digital electronic 'texts' is based on notions of hybridity and intertextuality. Meaning making from the multiple linguistic, audio, and symbolic visual graphics of hypertext means that the cyberspace navigator must draw on a range of knowledges about traditional and newly blended genres or representational conventions, cultural and symbolic codes, as well as linguistically coded and software driven meanings. Moreover, the lateral connectedness of hypertext information which users access by clicking on buttons or hotlinks, immerses navigators in an intertextual and multimodal universe of visual, audio, symbolic, and linguistic meaning systems. In hypertext navigation, reading, writing and communicating are not linear or unimodal (i.e., exclusively language and print-based), but demand a multimodal reading of laterally connected, multi-embedded and further hot-linked information resources variously coded in animation, symbols, print text, photos, movie clips, or three-dimensional and manoeuvrable graphics.

In the digital information environment, an understanding of the relations among ideas is as if not more important than mastery of the ideas themselves. Today, the expert is the one who sees and seeks the connection among related pieces of information, not the one who has the bare decontextualised facts. Hence, electronic reading and writing, a sense of intertextual connectivity, relational knowledge, and thinking laterally across associations are fundamental to internet (or CD-ROM) navigation and information sourcing. The dynamics of lateral and cross-linked information of hypertext requires and generates a cognitive orientation akin to what is often termed lateral thinking -- the very skills educators aim to instil in students. The global cross-cultural information flow on the internet and the international composition of many virtual communities, means that any critical technological literacy by definition entails intercultural communication. This means new ways of thinking about and interacting with others from culturally divergent backgrounds. At the 'textual' and interactive level of hypertext reading, writing and communication, then, linear and print-based literacy skills applied to a handful of traditional genres (e.g., the CV, job application form, scientific text, or the western story grammar, etc.) are no longer adequate.

A critical multiliteracy for effective information sourcing from and participation in the new digital datasphere, provides not only the rudimentary and 'functional' skills of, say, keyboarding, file management, CD-ROM searching or internet browsing. It also involves analysis of the power relations of new institutions and worlds: the very issues raised in this paper about the politics of virtual identity and community, about new forms of sociality and changing

concepts of time and spatiality, the hybridisation of media forms, the economics of technological and corporate convergence, and market and governmental discourses of 'technological enhancement' and democratisation. These new relations and corporate alignment operate in and on behalf of particular interests with implications for potentially unequal access and distribution of information, material wealth and resources. A critical multiliteracy, then, requires student debate and understanding of the political and material consequences of technological change. How will IT change our lives? Who will benefit? Who will be disadvantaged? How can that disadvantage be overcome? Students trained in a critical technological literacy that provides them with a balanced curriculum of "cybercitizenship education" (Greenhill and Fletcher (1996, p. 23) as well as the more technical "how-to" skills, tend to gain more from the electronic information economy than those trained exclusively in technical front-end user skills (Goldsworthy, 1992).

TECHNOLOGIES: HISTORIES, DEFINITIONS, CONTEXTS

A commonly accepted explanation for the relationship between technologies and society has been the notion of technological determinism. This view holds that technologies determine human behaviour, social relations and, indeed, social organisation itself. What this position implies is: i) that technologies operate in a contextual vacuum independent of human agents, and ii) that the effects or consequences of technologies on, for instance, literacy or social interaction, are similar for everyone across class, geographic, or cultural differences. Yet, given the history of technologies, we can see that, as was the case with the printing press, effects are never uniform or even. That is, technological diffusion in the social sphere proceeds unevenly, and is mediated by a range of interlocking socio-demographic and cultural factors that variously enable and limit access and participation.

The effects of media and other technologies are never intrinsic to a particular medium, but are always mediated by the uses to which technologies are put and the contexts in which they are used. The TV set in the classroom is invariably used for educational purposes. In that context students are expected to read the

audiovisual text for educational, information gathering purposes which are likely to be tested by a teacher. The TV set in the home, by contrast, is principally used by household members for leisure and entertainment, for background noise or companionship. TV viewing in the home is less purpose driven than in school contexts and certainly does not undergo the kind of testing for learning outcomes typical of teacher-student encounters over media texts.

The uses of technologies, then, vary with context and generate effects in terms of their uses. Computers, for instance, were first put to use in the service of the U.S. military for what many would consider dubious ends. In the early 1970s, the economic need for market expansion and push towards electronic miniaturisation produced computers more suitable to the consumer market, principally businesses. International Business Machines (IBM) had long cornered the manual and electric typewriter market in business and industry, and was among the first to develop, market and saturate the corporate and tertiary education sector with computer soft and hardware. As market competition and penetration increased, computer hard- and software costs decreased and by the 1980s a massive marketing shift from the corporate sector to the home and family market was underway.

As with all technological innovations, it is usually affluent groups who are the first to purchase new technologies: from electricity, telephones, electric washing machines, or automobiles early this century, to TVs, mobile phones, VCRs, videocameras, or computers today. The use of ATMs is a similar case in point. People with limited financial resources -- that is, those without credit cards or bank accounts -- have no need for ATMs. Those living in rural areas where ATM penetration is still patchy, have similar limited access to this technology. Furthermore, some cultural groups may see little value in western technology or the narratives produced by TV or computer videogames. Finally, there are always individuals, groups, or entire communities who refuse to 'buy into' new technologies for a host of reasons ranging from lifestyle choices in favour of a more 'organic' and non-technologically mediated way of life, to religious commitments (e.g., Amish communities), or personal choices which many families make against the household invasion of TV, phones, or computers. In short, then, the social spread and uses of technologies are never uniform and predictable because of structural inequalities of access and participation, and various choices of resistance to technologies and the lifestyles and ideologies that accompany them.

Given the intrinsically social nature of technologies -- at the levels of invention,

production, dissemination, and uses -- we can begin to formulate a definition of technology on at least three levels, all of which involve various dimensions of the social. According to sociologist of technology Judy Wacjman (1995, p. 6),

> *at the most basic level technology refers to a set of physical objects...[but] to see these objects as nothing other than inanimate items...ignores the fact that they are developed, manufactured and marketed as part of economic and social activity.*

The car, Wajcman notes, is more than an "arbitrary lump of matter, because it forms part of a set of human activity" (p. 6), much as a computer is meaningless without programs, programmers, and users. The car is implicated in many layers of social activity from the discourse of road rules and the legal consequences of breaking those rules, to the textual domain and social and economic activity surrounding insurance and licensing; driver training and testing; school-based road safety curricula; new car product research, development, and marketing; advertising; and, not least, the multiple unintended social uses to which vehicles are put. Recall, for example, OJ Simpson's famous and globally televised get-away vehicle -- the Ford Bronco; alternately, most people have anecdotes of a first date or first kiss in somebody's car. The second level of meaning, then, refers to the social activities that derive from and shape the social context around particular technologies. The domestic washing machine, for instance, is located in a radically different (commonly gendered) social context and use patterns than, say, the gendered (and social class) contexts of use of military or commercial flight simulators.

Third, in Wajcman's view, technologies imply knowledge connected to social activities and relations, and to technological objects. The knowledge base within which technologies are situated include: research and development, market research and testing, educational knowledge and testing, critical research into social uses and consequences, the informal sharing of knowledge among groups of users, and the popularisation of technology 'know-how' in the popular cultural realm of TV, special interest and mass audience magazines, cinema, and the internet itself. To elaborate: consider the vast amount of knowledge and the human intellectual labour involved in technological innovations such as remote sensing apparatuses, supersonic aircraft, or the plethora of high-tech medical technology. Market research before and after product release includes not only the accumulation of vast amounts of data on consumer preferences and responses to new products but also involves the development and testing of (often global) advertising campaigns (e.g., the launch of Microsoft 95).

Critical research on the social and cultural impact of new technologies further generates a substantial knowledge base of which this very document is a part. Informal exchanges among technology users (whether teens in the video arcade or office workers in networked systems) create social networks and relations through the sharing of information and, often, 'insider knowledge' about how to 'beat a game', or how to bypass software protocols, or retrieve information at work for private use without 'getting caught'. On another level, workplace and educational training in new technological skills is based on and generates knowledge about appropriate curricula, pedagogy and evaluation. This knowledge is also located in various policy documents which themselves are amalgams of various disciplinary and governmental discourses. In short, there are many social networks and levels of knowledge in which our understandings and uses of technology are embedded. Once we unravel the social relations in which technologies are embedded, we can begin to see the futility of any technological determinist arguments.

Finally, popular culture industries have a way of harnessing the public imaginary and turning technology into narratives of consumption (e.g., specialist consumer magazines), and narratives of the fantastic, the futuristic, and the anarchic, all of which generate their own social dynamics. Increasingly, technology features as a central plot device on which cinematic and TV narratives are built. *Star Trek* is a prime example of a popular cultural text focussed on futuristic space technology and the social relations, social organisation, and moral dilemmas faced by residual 19th century humans on lost planets or space-craft communities, and by humanoids, androids, and cyborgs of new high or 'post'tech societies. The immense popular interest in such programs is evident in *Star Trek* spin-offs such as *Star Trek - Deep Space Nine*, *Star Trek - The Next Generation*, and *Star Trek - Voyager*.

These and the original *Star Trek* series (now called *Classic Star Trek*) have generated their own global (and online) communities of 'trekkies', fanzines, fan clubs and conferences which, together, generate a whole other level of sociality, and the production and exchange of specialised popular cultural knowledge. Popular cultural texts about technology which emanate from the public imaginary, generate knowledges, social exchanges, relationships, and communities (actual and virtual) on several levels which, in turn, are the object of academic interest, research, and knowledge production.

The internet is another popular site for the formation of 'virtual' communities. Thousands of newsgroups or e-mail 'bulletin boards' have formed around

technology-specific interests, some for general non-specialist users, others for the computer whiz-kids and high-tech specialists. Seen as a total entity, the diversity of electronic newsgroups can encompass millions of people logging on from around the globe to discuss their special interest topics. The internet itself has generated countless magazines in the last few years dedicated to the techno-lifestyle of cyberculture as well as to the more technical aspects of computing and hypertext navigation. Most of these magazines are also available on-line to subscribers, but whether in print or electronic versions, these emergent discourses are a whole other level of popular culture derivative of and constituting the social, cultural and technical dimensions of new forms of communications technology.

To sum up then, technologies emerge in specific historical contexts, and become part of the diverse social fabric of everyday life where they shape and are shaped by the social practices through which uses are mediated. Technology education, a topic I will turn to at the end of this paper, cannot ignore these contextual dimensions of technological uses and skills. As I have tried to show so far, technologies encompass a wide range of cultural artefacts from navigation devices to writing systems, from mechanical clocks, solar or laser power to computers, toasters or ATMs. In recent decades, technology has tended to refer to electronic or microchip technology, and in education, technology is usually referenced to communications devices -- most notably computers. Because the educational enterprise is centrally concerned with the teaching of language and print literacy, my focus in the last two sections of this paper will be on literacy and communications technologies, but under an expanded definition of multiliteracy.

In the following sections I outline some aspects of computer mediated communication (CMC) that are producing radically different -- blended, merged, and reshaped -- social practices and conceptions of community, subjectivity, time, space, textuality, and communication from those formulated in traditional print-based models. As I outlined in the earlier section on multiliteracies, these changes and differences point to the need to consider an expanded definition of literacy to accommodate multiple forms of textual, graphic, and symbolic languages.

THE GLOBAL VILLAGE: DEMOCRATISING INFORMATION?

Three decades ago, communications theorist Marshall McLuhan coined the phrase "the global village" in response to the advent of television which he considered to bring the diversity of global nations and communities together in a shrinking, electronically mediated global culture. Much like the telephone, TV promised immediate and instantaneous communication across time zones, national boundaries, and geographic distances. Today, the phenomenon of electronic digital computer mediated communications, what Appendurai (1990) terms the global "mediascape", is said once again by many to erase traditional boundaries of nation, economies, and social organisation thereby making global communications among all peoples a more democratic process (e.g. Rheingold, 1993).

The global mediascape of the recent past was characterised by shifts in mass culture and consumerism wrought by the global diffusion of TV and the global saturation of primarily American TV programming and mass advertising. The contemporary mediascape is substantially different in form and content. Unlike TV which is prepackaged, non-interactive, and broadcast to millions within nations and globally across borders (e.g., Olympics, Miss Universe, Academy Awards, World Cup Soccer), the internet is also potentially accessible to the global community but it differs in several ways. First, it is interactive in the sense that users decide which data bases, newsgroups, or world wide web sites they wish to 'visit'. Second, it requires a still relatively expensive set of hard- and software and, third, it requires more sophisticated skills than those required for switching on a TV. The new mediascape may well, in theory, democratise communication and access to a global library of diverse information sources and knowledge bases. However, access is still fundamentally tied to economic privilege and, given that well over half of the world's population has only limited or no access to electricity (let alone private telephone line access), claims of global audience and of the internet's role in democratising access to communications, information, and knowledge may be somewhat premature (Holderness, 1993; McKie, 1994; Schiller, 1995).

Arguments about the democratisation potential of new communication technologies accompany most pro-technology claims, many of which are woven into federal and state technology policies, as well as corporate

marketing narratives. Techno-utopia visions of the global digital village tend to assume a shared consciousness and understanding among groups and societies differently situated in what is still a world of profoundly hierarchised political and economic orders of power and control over knowledge and resources. Information rich and information poor societies, and groups within those societies, still tend to be demarcated along north-south and east-west axes as well as divides of social class, gender, and racialised differences. It is important, therefore, not to lose sight of differences in people's material conditions despite the formation of virtual cultural and social realms that hold the potential for new and different forms of community and material relations. Hence, arguments about the democratisation of information and global community access enabled by new communications technologies must be viewed with caution.

SPACE-TIME COMPRESSION

Social geographer David Harvey (1989, 1993) speaks of the "space-time compression" of postmodern technological society. Communication technologies, he claims, have so substantially altered traditional, objective categories of place and time that "we are forced to alter...how we represent the world to ourselves" (1989, p. 240). The analogic real time of telephone or face to face communication, or the delayed time of communication through memo or letter writing is substantially different in digital electronic communications. For instance, it takes real time to type messages, search a disk, or access directories. Yet if one has the correct address of a remote site, on can be 'there' in milliseconds; similarly, the transfer of vast amounts of data (depending on modem speed) can be almost instantaneous. This time-compressed relation to virtually any kind of information, coupled with the possibility of instant access and immediate downloading into hardcopy, suggests a radically different orientation to text, information, and the organisation of time than when one had to think about getting organised to go to the local library, check out books, bring them home, handcopy information or, in more recent years, make photocopies of the page one needed. Not only has time taken on new meaning in the ways in which we can now access almost any information instantaneously, but it also has meant a reduction in traditional forms of sociality. Computer mediated access to other people at the end of on-line terminals, to information or consumer goods through tele-shopping, means that we no longer have to leave the screen or our homes to conduct the business of much of everyday life.

As Harvey notes, changes in the ways in which "we represent the world to ourselves" are already well underway. For instance, the concept of privacy has taken on new meanings (Benedikt, 1991; Collins, 1995). E-mail is both private and public, both inside and outside. Unlike paper envelopes, addresses of sender and receiver are not written a public text outside the private message, but are 'inside' as part of the private message body. And since all e-mail messages are assigned traceable number codes, any message can be tracked, encrypted, and made publicly accessible. An accidental wrong keystroke to "send all" similarly unleashes the private note into the public domain. Many critics of the infomatic society are sceptical of the fading of traditional boundaries between public and private spheres and identities.

Bogard (1996), for instance, suggests that when the subject is collapsed into what he calls "telematic society", then private and public collapse into new forms of surveillance. "When you no longer move", he says, when "you make your home a world, without moving, by switching on the power...you become the ideal target, always there, always available to the apparatus, always locatable, isolatable, online" 140). What this suggests is that:

> *when the world becomes our screen (or our bodies become our codes), privacy and publicity dissolve into one another....On the Net, in simulation, in virtual spacetime, everything and nothing is a secret, everything and nothing is seen* (140-41).

The collapse and ambiguity of public and private space, of activity and identity, is also evident in notions of place and spatiality (Robins, 1996). Although we are in 'no place' on the internet, we get a sense of the local, of community, of simultaneity, and of place when we log on to our newsgroups or visit world wide web sites. We refer to 'places' on the fibre optic cables: www sites claim to be "under construction"; www sites or socially friendly newsgroups are referred to as "nice places to visit"; some commentators talk about the superhighway as more of a "dirt road", still "under construction", rather than a superhighway. Students are encouraged to make their school's home page a "nice place to visit", to provide a "friendly community atmosphere" so that visitors stay and check out the resources.

Other virtual sites where people co-construct narrative and social interaction are what are called cyberspace cafes or salons. On-line pubs, cafes or salons are like bulletin boards: you arrive, tell everyone hello, describe where you will sit, what you're going to drink, and then get into the prevailing discussion. Cyber-bar or cyber-cafe patrons organise birthday parties, bon-voyage or promotion parties; people collectively 'redecorate' or 'build' extensions to existing virtual space,

and so on. These narrative collectives can include as many participants, subplots, characters, and 'spaces' as writer-participants can imagine. It is a 'place' where people from different geographic locations and time zones meet, where they conduct social exchange and engage in multilogues in real and delayed time. Many consider these communities 'safe' places to meet and socialise, where 'real' identities, looks, abilities, class or professional status don't matter.

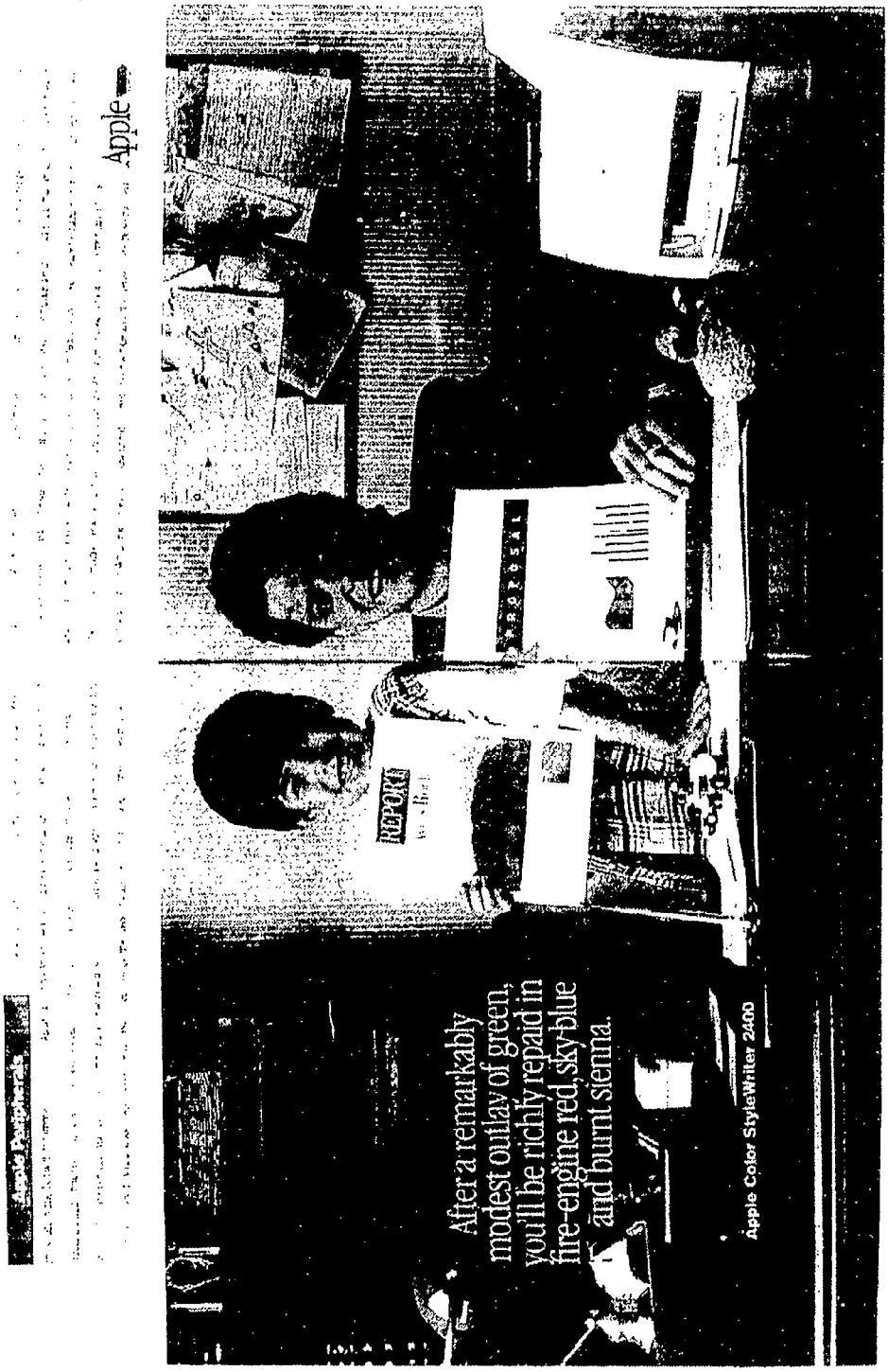
Out of the ether and back in 'real' time, the current vogue in the material world are actual cafes and bars that provide terminals and pay-per-hour on-line services so that netsurfing can be accompanied by a cappuccino on the mousemat. These cybercafes are springing up in cities across Australia, and they give many people who don't have internet access a chance to try out virtual cyberspace. Virtual and actual cybercafes constitute a whole new cultural realm of 'play' and sociality which go beyond the phenomenal world: the materiality of place and the linearity of analog time.

THE VIRTUAL WORKPLACE

Another important shift in social practice and relations is evident in the workplace. Already people are working from home as part of virtual organisations or offices -- business around the corner, across town, or on the other side of the globe is in the next room on a screen and yet a world away, accessible in seconds. For those with childcare responsibilities and for people with limited physical mobility, telecommuting offers huge opportunities for new ways of workplace participation. This relocation of work is beginning to erode the old distinctions between the public sphere of work and the private sphere of home and household. And, along the same lines of argument, schooling and post-compulsory education similarly need no longer be exclusively 'public' -- tied to physical structures and places called schools or universities. The increasing internationalisation and globalisation of education made possible by electronic delivery of subjects, diploma and degree programs is testimony to this blurring of private and public domains.

On another level of representation, these shifts are increasingly evident in the way computers and new computer literate subjects are being marketed in the popular culture discourses of computing magazines (See Figure 1 opposite).

Figure1. Apple Printer Advertisement



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BEST COPY AVAILABLE

In advertisements sprinkled across a range of family computing and lifestyle magazines, ads that show the computer as part of a new lifestyle orientation are not uncommon. In many of these ads, the computer is positioned within a happy family unit where family members are variously portrayed as pursuing educational, entertainment, work or home management activities. Figure 1 exemplifies the blurring of public and private space: Is this a home office or is the son visiting his father's work office? Figure 2 illustrates another example of the positioning of technology, the IBM Thinkpad, in the privacy of fashion designer Versace's home -- in fact, in the ultimate private zone of the bedroom. The message here is that the high-tech creative potential and portability of the technology can make 'work' so easy and pleasurable that it can be done in the bedroom. In this ad, the visual absence of computer users centres the technology as focal and exclusive object of desire in its own right, embedded in signifiers of artistic creativity and imagination, affluence, European 'style', and 'class'.

Following this kind of analysis -- a simple interpretive exposition without any high theory technical jargon -- adult literacy learners could well conduct their own 'research' on representations of information technologies in popular magazines. This could serve as a starter exercise for the kind of critical 'cybercitizenship education' I referred to at the beginning of this booklet. Questions students could address include: What market segment is being targetted by a particular ad? What information is excluded and included? What emotional appeals do the text and pictures make? What kind of a social environment is being created in an ad? Who are the technology users? Why are they predominantly white, Anglo-Saxon, and seemingly middle-class? How are women portrayed as technology users?

Much as the computer has become a new educational tool for use in home-based learning, moving pedagogy, learning, and instruction away from its traditional school base, so has work undergone a subtle relocation from traditional places and routines of the 'workplace' to the privacy of the home. But the blurring of traditional distinctions and difference have also effected the language with which we talk about and operate the new technologies. Language and conventional concepts of text, reading and writing -- all of which are derived from print culture and print-based textual forms and practices -- are changing and blending into new 'hybrid' terms, textual forms and practices.

Figure 2 IBM Thinkpad Advertisement

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HYBRID TEXTUALITIES

New forms of literate practice are not simply a matter of technology: a kind of hardware and software determinism that prescribes people's communications and information management skills. Rather, technologies always emerge as products of specific cultural practices, literate traditions, and the interests and desires of those groups who design and name them. Just as early mechanised print technology in the 15th century emerged in hybrid form as part scribal part print discourse, so CMC is emerging as a blend of print text, sound and graphic imagery: a hybrid of the language of the book and the language of computer technology.

Consider the following hybrid forms of meaning that signify new forms of hypertextuality. In CMC, book-based practices and the naming of these practices are changing: "click" or "double-click" is replacing "turn the page". The term "bookmark" is common menu currency for clicking on and recording a world wide web site address -- that is, putting an electronic bookmark where there is no book in the traditional sense of the term. The "home page" refers to the opening screen display of a www site or "document". Yet the "document" or hypertext, which consists of "pages" and can be "bookmarked", is itself paperless and pageless. The electronic "desktop" is the interface between the phenomenal and the virtual, the material and the symbolic, from where we launch ourselves through our textual constructs from our "desks" into an electronic realm of pure information.

Reading practices also are in flux: we don't read electronic text on-screen in the exclusively bookish direction from left to right but we scroll text vertically with increasing speed and visual acuity in order to identify the gist of a message and locate keywords on which to click. Or, consider the ubiquitous trash bin icon used to denote deletion of text and files, common in numerous text processing software programs. The trash bin is a distinctively western signifier because only in societies affluent enough to generate garbage, can the concept of trash have any meaningful association with choice to discard excess. From the point of view of societies feeding off first world refuse -- many of whom literally build communities on garbage dumps -- the garbage can carries very different cultural meanings. The terms and language of use for negotiating electronically coded information, then, borrows from traditional (western) print and

bookbased culture which suggests new forms of cultural imperialism. These blended vocabularies and reading -writing practices require new multi-modal and multi-media literacies that combine the horizontal linearity of print with the vertical scrolling and laterally connected (button 'hot links') features of electronic texts.

The discourse structures of e-mail combine aspects of face-to-face and written communication in new textual forms of conversational turn taking. E-mail writing is unlike any other form of writing, combining the immediacy of talk (the need to reply to a conversational turn) with the permanence of text. Yet electronic 'permanence' is ephemeral and unlike the durability and materiality of print text on paper. Unlike face-to-face or print-on-paper communication, e-mail writing tends towards more informal and conversational modes but also generates more abusive and opinionated textual productions (Miller, 1993). Short messages, abbreviated writing, acronyms and iconic symbols ('smilies' such as :-) ;-/ :-( ) characterise e-mail writing which some critics consider detrimental to reflective language practice. However, the millions of on-line participants who write in collaborative environments such as e-mail based chatgroups or bulletin boards, are constructing new writing and communication strategies developed through negotiating texts and meaning among a collective of often culturally diverse writers. For instance, the universal smilie :-) cuts across linguistic and cultural differences, boundaries of geography or nation.

BODY AND IDENTITY

In the social sciences it is the body -- the social subject -- that is the fundamental unit of sociality and of social analysis. However, in digital hyperspace, bodily difference and the social values attached to visible differences are invisible and irrelevant. In the hypermedia realm of pure information -- where we construct ourselves still primarily through text (e.g., email or bulletin boards) -- distinctions of gender, ethnicity, body shape or impairment, accent or speech styles don't matter. We know from decades of research that the student with an accent or wearing a turban, the one with the lisp, the overweight or the indigenous student, often is treated differently from the mainstream 'ideal' student by teachers and peers. But in virtual

communities, since one's identity is wholly textually constructed, such differences vanish which means that traditional categories the social subject and social differentiation may no longer be useful. For instance, Bourdieu's concept of habitus as a site for the politics of difference may no longer be an adequate tool of analysis for investigating 'disadvantage' or 'difference' in pedagogical relations. What this means for pedagogy is that CMC eliminates a whole range of 'informal' often unconscious, assessments educators make of student ability based on visible cues of difference. On one hand then, cybersociality (or cyberpedagogy for that matter) can free up a whole range of cultural and gender politics and yet the lack of embodied and gestural cues that accompany face-to-face communication (or pedagogy), can fail to alert us to the special circumstances or needs of the people we communicate with on-line.

Despite widespread claims that CMC democratises access to and participation in the information revolution by eliminating the visibility of and social values attributed to differences of gender, race, ethnicity, dialect, and other embodied features, the discourse of CMC is unmistakably male. The gendered register, style, imagery and content of much of on-line communications, computer software language, CD-ROM entertainment, and the adjunct print discourse on cyberculture, computing, and net surfing gear, is decidedly male (Cherny & Weise, 1996; McKie, 1994). Estimates vary, but it is generally agreed that about 80% to 90% of internet users are white, male and mostly between ages 17 to 45 (Baym, 1995; Hayles; 1993). With more than 30 million users worldwide (predicted to double by 1997) and close to 2.5 million computers on the internet, it's obvious that the electronic frontier is overwhelmingly a male society (Spender, 1995). So despite a new 'body-less' realm where actual material differences can remain invisible or interpreted into almost any fictional virtual identity, cyberspace remains a realm that women navigate with caution (Balsamo, 1994; Spender, 1995).

However, this is not to suggest that all women are intimidated by potential e-mail stalkers, abusive flaming, or electronic cross-dressers. There are indeed hundreds of women's newsgroups, Bulletin Boards, and www sites that are safe, friendly and "nice places to visit and chat" (Cherny & Weise, 1996; Kramarae & Taylor, 1993). Moreover, hundreds of thousands of women worldwide are part of cyberpunk virtual subcultures (Herz, 1995). Much feminist political work gets done on the internet among women who see cyberspace as a place to be heard, for free speech, and as means to share information and gain support. Women have been vocal on the internet for years bringing to the attention of the world issues that do not always get taken up by

the popular press. For example, during the breakup of the Baltic states, the conflict in Chiapas, Mexico, and the year leading up to the 1995 Fourth UN Conference on Women in Beijing, women have been active on-line alerting the west about issues including human rights violations, rape as widespread weapons of war and, in the case of the Beijing U.N. Conference, Chinese efforts to exclude Tibetan women. In short, the overwhelmingly male population of cyberspace, the distinctively gendered dimension of cyberculture discourse, the body-less and ostensibly gender-less presence on the internet, does not preclude women's very vocal and 'visible' presence (Kramarae & Taylor, 1993; Spender, 1995; *European Journal of Women's Studies*/'Special Issue on Technology', 1995).

In summary, then, it is clear that new technological innovations are shifting the boundaries of what used to be clear cut divisions between the real and the symbolic, the material and the virtual. The new mediascapes provide access -- although still uneven -- for cultural representation and public sphere debate to many diverse groups previously excluded from the airwaves and microwaves of traditional mass media such as radio and TV. Electronic communication with culturally diverse groups with whom we have no actual, physical or social connection, requires new ways of thinking about and interacting with others, new language and representational codes, new forms of social and cultural 'netiquette'. These new kinds of multilogues, and new forms of print and symbol-systems literacies, have profound implications for the conduct of technologically mediated social relations and communications, pedagogy and literacy.

We have now considered some of the 'big picture' issues related to the social and cultural consequences of the information revolution. I hope that it has become clear that these issues are complex, and that the long-term consequences are still unfolding. There are no simple solutions or quick fixes to the many questions being raised by teachers about IT implementation, structuring new learning environments, and developing new roles for themselves as facilitors and mediators between technology and students. Increasingly teachers at all levels of compulsory and post-compulsory schooling are turning to the net where they connect with other teachers in the sharing of resources and information about teachers' experiences with the new cyberpedagogy. In the next and final section, I outline some of the main issues in the educational debate about pedagogy and CMC, and provide some generic practical strategies for a technological literacy that can be adapted to a variety of learner needs, interests and abilities in the adult literacy classroom .

PEDAGOGY

John and Crajek are men in their forties and recent arrivals to Australia. Somehow they struck a friendship early in the term and it turns out they both have a keen interest in volcanoes and meteorology. Crajek was a geography teacher before he came to Australia and John has always considered himself a bit of an amateur vulcanologist. Each day, as soon as they arrive in class, they sit at one computer together and head 'out' to NASA's web site where they click on the global weather web site and NASA's graphically brilliant and colourful volcano home page. They search and download the latest global weather reports, including the cities and regions of all the 'home' countries of their classmates. They also do a quick scan of a few active volcanoes and get printouts of graphic and text information of any latest developments. After morning tea, the class regroups for the daily 'global weather report' and volcano update by John and Crajek who give an oral, OHT and blackboard presentation of the web searched information. The teacher in this class is committed to getting all her students reading, writing and speaking on topics of interest to them. She has made John and Crajek's daily 'research' a topic of interest to the whole class by organising a daily weather report that includes all the students' home cities and/or regions. The 'weather report' has generated a collaborative learning environment in which students work together and develop their English language speaking, writing, and reading skills, as well as rudimentary computer literacy skills.

Students connected to an on-line site can work with classmates down the hall, across the country or from around the world. Students and teachers working in networked classrooms consistently report that computers encourage group learning and collaborative problem-solving (Berston & Moont, 1996; Becker, 1992; Educational Leadership,1995, Special Issue 'How Technology is Transforming Teaching'). Unlike the solitary student at her desk in the traditional teacher-centred classroom, students in networked classrooms tend to prefer working together to pool their knowledge and skills in the search for information, navigating www sites and data bases (Gruber, Peyton & Bruce, 1995). The ability to import, download, drop and drag text and imagery from an inexhaustible global library of information creates new skills, processes and multimodal forms of 'textual' production that encourage interdisciplinarity,

creativity and imagination, collaborative authorship, editing, reading and writing, and problem based learning. The multimodal and iconographic nature of the www and CD-ROMs appeals to learners of all ages by mediating the difficulty and apprehension many first and second language learners often have. For LOTE learners, for example, the multi-lingual www, the possibility of international e-mail exchanges, and the countless international chatgroups or bulletin boards, provide ideal opportunities for 'authentic' language experiences (Felix & Askew, 1996). According to Ron Watts (1995, p. 73) of the Open Net,

> *some of the biggest advantages are going to come in language training. Once you start to put image and voice together -- and you can do it right now -- you can give students very good examples of speech and foreign languages along with images associated with the words, which we know is a very powerful way of language training.*

For adult literacy instruction or second language learning, the interactive and visually dynamic nature of networked CMC has tremendous potential to minimise the difficulties many students experience in language and literacy learning that is exclusively print and book based and augmented by static pictures, illustrations, or pre-recorded audio tapes. Setting students up with e-mail partners, for instance, who could in adult literacy classes in another city or state, is one simple way to encourage reading and writing. Many primary schools have used first year university English students as email partners with primary school students to 'talk' about the books they are reading in and out of school (Curtiss & Curtiss, 1995). There is no reason why such a strategy would not also work with adult literacy learners. Topics for email exchanges can range as widely as discussions about movies or TV with film students, early childhood or parenting issues with education students, health issues with nursing students, or topics related to construction and building with engineering students. The opportunities are limitless and can include 'student experts' in high school or TAFE colleges. What may start off as a weekly exchange about a favourite trade book, can quickly turn into daily correspondences.

In one study of email partnerships organised around the concept of peer tutoring, teachers found that the primary students couldn't wait to hear from their university partners and always wrote back immediately. The more frequent the responses, the longer and more detailed each email post became. The primary students enjoyed the experience because they discovered how to use a computer while also engaging in 'real life' communication with 'adult' students who took the children's writing seriously. In response to one child's

message: "I rote a book called The 4 People football team and Its a real story". a university email partner commented: "I learned that children don't need to learn to read before they learn to write. I now know that it is a simultaneous process" (p. 63). What this illustrates is that using CMC as a teaching-learning device doesn't just have to rest on the teacher's shoulder. There are many pedagogical resources available -- including university students in this case -- that can be used in peer tutoring contexts which can benefit all those involved. But it also illustrates one important principle which applies to beginning reader-writers of all ages: the simultaneity and fluid overlap of reading and writing development which is best encouraged and nurtured with genuinely interesting and diverse (material and human) resources. As the email partnership project shows, the use of computers as a different medium of classroom communication which enabled different ways of writing (i.e., keyboarding), and the use of community resources such as university students, served as a powerful motivational device and learning tool for the primary school students.

The pedagogical key for adult literacy learners, as with all learners, is to start with student resources: their skills, interests and contexts. This might mean logging in with other adult literacy classes in other cities or states, guiding some students to web sites on car remodelling, parent-care groups, or hobby collectors' groups, or devising group projects on topics of their choice where students search and collect information from virtual museums, libraries, movie studios, or tourist offices from around the world. Unlike the traditional library, the virtual library is open 24 hours a day, 365 days of the year. One doesn't need a swipe card or proof of enrolment to get into the best libraries in the world at any time of day.

Imagine that we are conducting a group project on, for instance, a hypothetical class trip to Thailand. Our Thai students will probably be able to provide a lot of local information on their home communities, but we also would want the class to visit the best libraries in the world to get more detailed and general information. In addition, we would recommend that a group of students find their way to the Thailand Tourist Office website for information on roads, weather, shopping, and vaccination requirements. Another group should visit some airline websites to get flight schedule and air fare information, and those who want to backpack should probably consult the website of Harvard Let's Go guide on backpacking hints. As a problem-based learning project, our hypothetical class trip to Thailand, requires that students work in collaboration, that they organise and delegate various information gathering tasks among themselves, that they use a range of internet resources and download materials,

and finally prepare a group presentation: perhaps a little booklet or a series of brochures augmented by posters, talks, video, and various displays. Each of these tasks requires oral communication, reading and writing, keyboarding and internet (and CD-ROM) searching skills, and cooperative teamwork skills. Moreover, students are engaged in interdisciplinary learning, connecting content areas related to the general topic of 'A Trip to Thailand'. A 'virtual class holiday' can be as diverse as teachers and students can imagine.

Navigating the net requires writing and reading, but the interactivity and ease of button click hypertext navigation, coupled with the blending of graphics and print, eliminates reliance on the abstract and static nature of print-only text. Moreover, since computer mediated learning tends to generate group rather than solitary learning, it encourages collective risk taking ("let's click here and see what happens"), collaborative problem solving and information sharing. Collaborative learning can substantially minimise student performance anxiety associated with teacher demands of individual responses so common in the traditional Initiation-Response-Evaluation sequence of most classroom pedagogies (Becker, 1992; Worthen, Van Dusen & Sailor, 1994).

The virtual classroom will not replace the teacher or classroom but it certainly challenges traditional concepts of teacher authority, timetabling, disciplinary divisions, curriculum, and pedagogy founded on the linearity of pint-based textbook learning. Cyberpedagogy eliminates the teacher 'talking head' and puts an end to collection code curriculum wherein each content area is comprised of a collection of discrete facts and skills disconnected from other related disciplinary domains. Education at all levels, from primary to tertiary, is at a cross-roads. Information technology is no longer an option for schools or teachers. As Dale Spender (1995, p. 115) comments:
No aspect of education will remain untouched by electronic information. The emphasis will move (and has already moved) from the teachers and what they are teaching, to the students and what they are doing...computer mediated education will be a whole new world to teachers; one where teaching is subordinated to learning.

Rather than view the implications of learning and teaching in cyberspace on teachers' work as threatening, it has the potential to enhance and expand teacher repertoires by taking tremendous pressure off their shoulders to be the sole source of classroom knowledge and interpretation. Once teachers are freed from the 'batch processing' of students through a "mass-market basic curriculum", they will be in better positions to guide students "to manage the pace of

their online learning [which] will inevitably change the speed at which they progress through their education" (Petre & Harrington, 1996, p. 107). This is as relevant for primary school students as it is for adult learners. Letting go of long cherished tenets of teacher authority and control over all aspects of student learning may not be easy for many teachers trained in chalk and talk pedagogy, even in its 'student-centred learning' variant. But cybereducation benefits not only students. The networked teacher -- the 'infonaut' charting a course with her students across the vast terrain of internet communities, databases, and www sites -- can connect with other teachers in on-line professional communities and thereby mediate the sense of isolation inherent in teachers' work. (Williams & Bigum, 1994).

The 'information revolution is here and it's here to stay. It is therefore incumbent upon educators to be informed about the many issues at stake in order to support arguments for the implementation of electronic interactive learning systems into their teaching areas. Equally important is the need to give all students the critical analytic tools with which to assess the socio-cultural and political consequences of technological change. As discussed earlier, not all groups will have ready access to the new technologies and, in consequence, many will be disadvantaged in an increasingly competitive and shrinking labor market where computing and a range of communication and technological skills are considered fundamental. In that regard, social justice issues become even more crucial. Schooling cannot compensate for the profound structural inequities in society. However, the provision for all students -- regardless of social circumstance, age, geographic location, or ability -- of the technological and literacy skills requisite for equitable workforce competition and meaningful participation in society, is both a social responsibility and entitlement of all Australian students in the impending Information Age.

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The publication of the Research into Practice Series is one strategy to implement the dissemination of research. The aim is to provide a series of booklets on different aspects of adult literacy in order to:

- *establish a knowledge base regarding adult literacy practice and research*
- *raise awareness about adult literacy*
- *bring research and practice together*

The authors of the booklets, who are recognised experts in their field, were invited to write for an audience of literacy practitioners in the community, TAFE, university, Skillshare, ACTU, industry and private providers.

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