Net results: knowledge, information and learning on the Internet

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Abstract

This paper considers the rapid uptake of information technologies in the higher education sector, in particular the increasing use of the Internet as a resource for academic research. It argues that very little fundamental research is currently being undertaken into the consequences of Internet research, and poses some serious questions that may arise unless serious efforts are put into assessing the nature of the process. The paper puts forward arguments indicating that Internet-researched papers in the humanities and social sciences are increasingly devoid of reflexivity and criticality. The author puts forward the argument that in a worst-case scenario, the higher education sector in the developed economies is producing not only a generation of students who lack 'cultural literacy' and the problems that arise from this, but over the long-term this will pose serious problems for the functioning of a healthy civic-democratic society.

Voices in the wider society speak of knowledge, breadth, critical reason, freedom and even critical conscience, but voices speak more loudly of skills, impact, standards, accountability and efficiency. (Barnett 2000, p 34)

Introduction

As we are continually being reminded, information technology (IT) is transforming not only the ways in which we live our lives, but the ways in which economies work (Gates 1999). The arrival of the NASDAQ/Internet-powered 'new economy' over the last decade or so was supposedly poised to change, solve and rearticulate much that constituted 'normal life' over the 20th century. Gone, or rapidly going, is the 'boom-and-bust' cycles that has pock-marked the last 100 years and more of the history of the western economies; dead or dying is the 'beast' inflation, with low rates recorded across the west for over a decade; and diminished or diminishing is the 'scourge' of

unemployment, with single-digit figures something of a constant in western Europe, North America and Australia.

On the macro scale, if we use 'performability' (see Barnett 2000 *passim*) as a benchmark for success, IT appears, over the relatively short-term at least, to have come up with the goods for business and economic growth. Indeed, the 1990s saw the longest peacetime boom in history, with economies such as that of the US and those of western Europe benefiting from - and contributing to - the revolution in information technology. A lexicographical consequence of this economic and technological revolution is that 'e' has begun to prefix more and more words, signalling the suffusion of IT into more and more aspects of our lives. 'E-commerce', 'e-trade', 'e-business' and so forth have rapidly entered the lingua franca, and are the stuff of everything from new business ventures to degree courses.

IT clearly has transformative capabilities that have rapidly diffused across and impacted upon almost every facet of society (Dunlop & Kling 1991). However, the media and industry hype that surround these technologies make it difficult to quantify the precise nature of these changes. The 2000-2001 collapse of the NASDAQ 'bubble' that had propelled much of the early success of the IT industry serves as a timely caution about viewing computerisation and the Internet as panaceas. This paper examines and makes speculations about social, cultural and pedagogical implications of the informationalisation of the education sectors, with particular reference to the developed economies of Northern Europe, North America and Australasia, where these processes are most advanced.

IT and education

The transformative dynamics of IT have reached into the western education sector with particular ardour; we now have at least a decade of IT-driven change behind us. Buzzwords such as 'interactive learning', 'learning networks', the 'virtual university' and the 'electronic classroom' have, like the 'paperless office' before it, become almost clichés (Hazemi et al 1998). More concretely, the PC, email and – increasingly - the Internet have become essential tools for academics, administrators and students alike. IT and its many applications have changed the higher education sector beyond recognition in many different ways. An important indication of the nature of the recent changes is that through IT, the higher education sector has achieved an almost seamless convergence with the business sector in that many universities now offer e-business as a curriculum topic and as a commercialised form of education delivery.

As a pedagogical tool, the Internet has a relatively long history; in fact, education and information-sharing was built into its inception and development (Schiller 2000). As long ago as 1994 (just prior to the generalised Internet take-up), it was being lauded by Jill Ellsworth as '… the largest reservoir of knowledge ever known to this planet', where students are able to 'develop more sophisticated search and retrieval strategies' (1994, p

6). Ellsworth is unambiguous about the social and educational value of the Internet. Indeed, as far as the learning process goes, '…the Net *is* the future' (emphasis in original). She adds:

> … students gravitate to the Net like nothing before in their lives. While the Net is unlikely to completely replace athletics and/or music lessons, for some students it is the best opportunity ever made available to them. The children soon realise that their rewards on the Internet will be in proportion to their investment in learning Net skills, and learn all the more for it … Both teachers and students can be invigorated by the freshness and immediacy of the Net. (1994, p 5)

In a more abstract sense, Ellsworth also argues that the Internet will help students become 'prepared citizens'. This point, together with Ellsworth's comments on the 'immediacy' of the Internet are important, and is something to which I shall return.

E-mania?

There is no doubt that the exuberance of Ellsworth and many others in the early days of Internet fever was catching and is still extremely contagious, notwithstanding the 2000-2001 NASDAQ meltdown. Figures vary, but by any standard, Internet access and Internet use has grown exponentially since the mid-1990s. For example, the US Internet Council (USIC) calculates that in 2000, there were more than 300 million active Internet users globally; 136 million in North America, 83 million in Europe, 69 million in Asia, 11 million users in Latin America and about 2.5 million in Africa. This number is up 133 million from 1999. In comparison, the USIC estimates that in 1993 there were less than 90, 000 Internet users across the world, concentrated mainly in and between a narrow strata of university researchers (US Internet Council 2000).

Over subsequent years, the general take-up rate in the university sector has been extremely high. From being a tool for academics in aspects of their research (Usenet, bulletin-boards, etc), the Internet has grown to be almost indispensable for the average university student today in the developed economies of western Europe, North America, Japan and Australia. Indispensable, but also inescapable. From an early age, computer literacy is now deemed almost a basic survival skill, with billions of dollars being spent by governments across the education sectors of the developed countries to make sure schools, colleges and universities are 'wired' for the Internet. Students can now enroll online, obtain course materials online, do entire degrees online, and communicate online with lecturers and fellow students through email, bulletin-boards, personalised websites and so on. Being off-line, increasingly, means being outside the mainstream.

The process is far from finished. Spurred by the growing market power of companies such as Microsoft, Intel, Novell, Compaq and a self-interested media sector that is itself becoming more and more Internet-dependent, politicians, government bureaucrats and higher education administrators are digitising the higher education sector with the zeal of the newly converted. Comprehensive online delivery of curricula,

the university's own e-business, has become something of a Holy Grail in terms of the potential for profit and expansion. Indeed, as the 'mission statements' of global higher education projects such as Universitas 21 indicate, the entire planet is their oyster - a '… growing global e-education market' (Universitas 21 2000). Amid the aggrandising corporate-speak that surrounds much of the nexus between education and the Internet, nobody really seems to be asking the question: where is this 'e-mania' leading?

Knowledge, information and the internet

Notwithstanding the rapid pace of change and the continuing organisational and ontological state of flux that constitute the universities today, there is much, somewhat surprisingly, that remains (on the surface at least) the same. In most cases lecturers still stand in front of classrooms full of students, using old-fashioned technologies such as marker pens, whiteboards, overhead projectors and live speech. Students, now in many more numbers, still cram lecture theatres to experience this archaic process – and learn from it by listening, taking notes and asking questions. Online learning, in most cases, is still somewhat supplementary to the traditional method. In fact, in terms of the bottom line, Merrill-Lynch analysts note that online courses constitute just $US350 million of the $US240 billion US education market, but are set to grow to about $US2 billion by 2003 (USIC 2000).

The cyber-visions of the university administrators, whereby lecturers become disembodied talking heads on RealVideo or RealAudio addressing a dispersed audience sitting in front of their PCs, is thus still a pipe dream. Even digital technology-driven courses that have evolved out of the perceived needs of the 'new economy' - such as e-business, multimedia, software development and so on - still have a fair degree of traditional pedagogy attached to them.

The real changes are much more subtle and subterranean – and possibly more far-reaching in their consequences. Teaching and learning, of course, have been the core *raison d'être* of the university, but things are changing. The ideology of teaching and leaning has changed, and the traditional approach is gradually being jettisoned in favour of a much more business-oriented approach. As Joseph Boyle notes:

> An important role of education, especially higher education, has traditionally been to develop in students a critical ability, together with a sense of concern for society. At the intellectual level, an informed sense of judgement, and at the moral level, a refined quality of care, still remain the core goals of education, properly understood. However, under pressure from business, abetted by science and technology, these central values of education have been challenged, and the uncritical application of business criteria to other educational fields has increased. (2000, p 78)

Digitisation, e-learning, e-education and so on are, rhetorically at least, supposed to enhance the practices of teaching and learning. Research is about applying teaching and learning to fields of inquiry to enhance teaching and enrich learning in a virtuous

cycle of knowledge building. And it is knowledge, as distinct from information, that makes societies and the individuals who populate them self-reflexive, able to assimilate, contextualise, understand and make sense of the information they encounter in the learning process (Brown and Duguid 2000, pp 118-121). This reflexive dialectic is an extremely important function, as it is an integral part of how we form identities, opinions and reasoning power and develop an understanding of functional autonomy in society. Without this, society is open to domination by technocratic 'expert systems' that would re-order social life along instrumental, technoscientific lines as opposed to more social-democratic forms of development (Beck, 1992). Over the last decade or so, in tandem with broader cultural, economic and social changes, there has been a shift in this process and a skewing of the virtuous cycle of changing research into information, and information into knowledge – and using accumulated knowledge as the basis for conducting further research.

As an example of what I will tentatively describe here as 'degenerated research' that the changes I have described have wrought, I will concentrate on the student essay. Over the last five-to-ten years, the essay has changed. Gradually, there has been a shift in the ways many of these papers are researched. They look different, they read different, they 'feel' different – and they signify a change in the learning process at university.

There are no raw data on the numbers of students who use the Internet for their research. Indeed, the whole IT-education nexus is dominated by research that is conducted on the basis of optimistic and unfounded assumptions regarding the utility of unconstrained computerisation of the processes of teaching and learning. Notwithstanding the huge capital, social and policy investment in IT in the education sector across the developed world and beyond, there is still hardly any understanding of what we are really doing, and/or the consequences of such rapid and massive investments. As Miriam Bar-on, chairwoman of the American Academy of Pediatrics' Committee on Public Education argues, we '… spend a lot of time surfing the Net but there is no real research to date on the effect' (Weiner 2000).

In many university libraries today, banks of networked computers fill space once occupied by bookshelves. This computerisation is in part a consequence of what a 1998 paper entitled 'To publish and perish' in the journal *Policy Perspectives* noted. It said that:

> Research libraries that once sought to support an array of specialties within and among academic disciplines now find it necessary to ration their purchases of monographs and subscriptions to journals. While a university library could once build a powerful collection to support its faculty's research and teaching, most must now settle for inadequate assemblages that exist at the intersection of what scholars deem critical and librarians judge they can afford.

Alongside the number of computers available for research, the number of university students who do the major part of their research on the Internet have risen

considerably. There are many established factors that have a bearing upon this. One is the general suffusion of IT into the education sector, offering 'ease of use' and 'immediacy' in terms of research 'results'. This increasingly seems an appealing (if unavoidable) alternative to waiting for library books out on loan, having to buy books the library has 'rationed', or journals that have gone online, and so on. What is in many ways a resource deficit for students, neatly dovetails with the Internet actually being touted as 'the largest reservoir of knowledge' in human history.

Moreover, as I have just suggested, computer literacy and Internet competency are fast becoming essential life skills, anyway. Demographic research supports this assumption. As Nielsen Net Ratings surveys have shown, far and away the biggest age demographic of Internet users is the 18-34 year-olds. This is the crucial demographic in many ways; these users have higher levels of disposable income, are more IT literate, and 'naturally' view information technologies as central to everyday life (Nielsen Net Ratings 2000). Cumulatively, these and many other factors make the Internet almost unavoidable for many aspects of university research.

What does this shift mean for the learning process and the gaining of 'knowledge' and critical skills (as Boyle (2000) points out, the supposed objective of a university education)? It has been noted that research in this area is very thin on the ground, and that some hard questions need to be asked. How, for example, does 'knowledge' reside in digital form across the non-space of the Internet? The implications of the use of IT for research is something that has not greatly exercised the minds of university management increasingly concerned with finding ways to attract non-government funding. The same applies (though for very different reasons) for many lecturers and researchers, who reel under the stresses of larger classes, increased administrative workloads and the unremitting search for sources of funding.

Civil society versus the network society?

It should be stated that this is not a simple Luddite denunciation of Internet research and online learning. The potentialities are limitless and exciting. Personally, I find the Internet increasingly indispensable. Moreover, in research and in administration, universities have integrated IT generally into almost all the functions. My worry is that in the headlong rush to computerise, cut costs and achieve 'efficiencies' in all aspects of the functioning of the university - from enrolment and curriculum delivery through to student graduation - we may be making enormous mistakes. It is entirely possible that over the latter part of the 1990s we have lit a slow-burning fuse on a social time-bomb. Taken to its extreme, it poses problems for the development of a healthy civil society and a reasonably functioning democracy. Too negative a projection? I hope so. The problem is we that don't really know.

As just noted, the Internet is in fact extremely useful for all kinds of things in academic research. For example, opinion and analysis of current events, research

findings, policy statements, official statistics, etc on all kinds of things, from almost any country - are a few keystrokes away from a couple of skilled index fingers. Indeed, several of the sources cited in this paper come from the Internet, fully downloadable in PDF or Word format - for free. And there's much more. Science students can swap data, exchange ideas and collaborate on projects, entirely online. Similarly, budding technologists, designers, architects and engineers can utilise the Internet in ways that make their study and learning more interesting, challenging and rewarding. And all this can be done in real time and is very efficient. However, real time for many disciplines within the humanities and social sciences is where much of the problem may lie.

It is in disciplines such as politics, philosophy, sociology, media studies, journalism, film studies, cultural studies, feminism etc that much of the corrosion may be taking place right now – in real time. In these disciplines, the markers of excellence, of worthiness - their *raison d'être* - is the development of a facility for critical thinking; a reflexivity in students and their approach to issues arising from essay questions. As a general social practice, as theorists such as Ulrich Beck, Anthony Giddens and others have argued, this flows over into a reflexive understanding of society in general, its politics and its civic-democratic culture (Beck 1992, 1996; Beck et al 1995). The benefits that stem from a reflexive society that is able to consistently regenerate itself through the learning process and knowledge-building are as precious as they are intangible. Individuals become more empowered, vibrant civic-democratic cultures are formed and re-formed, societies are enriched and human experience and its horizons of being and seeing are expanded instead of narrowed.

These rich social dynamics are developed and sustained through time, reflection and a certain commitment; something that the Internet with all its immediacy is not ideally suited to. To usefully evaluate the masses of exponentially growing information available on the Internet and shape it into knowledge takes the application of critical, reflexive thinking.

Increasingly, students in the humanities and social science, in the main, are just not geared for it. As Ross Todd (2000) has observed in some of the relatively scarce fundamental research that has been done in this area:

> … there is a conception that people, especially young people in particular are gurus in this vast digital world … emerging research evidence is clearly suggesting that the intuitiveness, ease, certainty, and success as input and output attributes of searching the World Wide Web are highly questionable.

Somewhat less questionable are the massive social and economic changes that have occurred in western societies over the last ten to fifteen years (Castells 1996, 1997). These changes have been reflected in the profile of the 'average' university student. For example, as developed economies moved towards the provision of 'mass' higher education, they inevitably attracted many more working-class students who did not necessarily have the family income support that has for generations sustained many

middle-class students through their university years. A consequence is that the overwhelming majority of students work at some sort of job as a source of income. This trend has been exacerbated by the shift towards introduction of fee-based higher education, student loans and so on. Increasingly, many of these jobs are full-time positions, held down alongside full-time study. Thus the demands placed upon today's average student, from all sides, are growing. However, the dynamics that have created these pressures, such as economic globalisation, also cater to some of these burdens. Demands of work, academic assignments, trying to comprehend new ideas and new concepts, as well as everything else that comes with living in the 'age of insecurity' (Elliott & Atkinson 1998), has conspired to make the approach to learning – and life in general – much more instrumentalist. Pragmatic coping strategies such as 'time-management' are developed and honed to achieve the desired outcome with as little 'collateral damage' as possible to other facets of a pressured life.

The Internet is instrumentalism taken to the highest pitch. It is, according to Todd (2000, p 2), 'goal-oriented' and thus ideally suited for obtaining much information on a particular subject in very short order. Critical thinking and reflexivity, as has been argued, require time, evaluation and distillation. Deadlines and lack of time means that knowledge-building, reflexive thinking and the gradual building of a 'critical literacy' are likely to suffer. What this means in practice is that students trained in 'time-management' and 'prioritisation' (also obligatory life-skills) can attend a lecture or two, get the general gist of the subject, and put together a research paper the afternoon prior to the deadline. This is not necessarily bad-faith on the part of the increasing numbers of students who resort to this practice, but simply a pragmatic coping strategy within a demanding environment.

Nevertheless, this practice, much of it amounting to plagiarism, is burgeoning. Indeed, plagiarism is a dot.com industry that flourishes in the new economy. For example, students are able to log on to SchoolSucks.net, ezwrite.com or something similar, and download a completed essay on almost any subject. Of course, these sites display disclaimers stating that what they offer is for 'research and reference' purposes only and are not intended to be handed in as completed assignments – but that in fact is what they are offering.

The range is fairly comprehensive. Depending on the essay question, students can choose from essays such as: 'Revolution in the 20th century'; 'Cognition and thought amongst the gifted and talented'; or, ironically, for the postmodern philosophy student putting in twenty hours a week at McDonald's, a selection of pre-cooked essays on 'Ethics' - for an average of $US70.00 each.

Students with more time and slightly more conscience can easily 'cut and paste' an essay together from a variety of different sources, a job which is hard to spot from the hundreds of millions of possible web pages the texts may have come from. To be fair, at this stage, more common is the student with a yet more ethical approach and a bit more

time still, who will put together, in his or her own words, an essay informed by web research, with diligently footnoted URLs, dates accessed and so on. As a result, the plagiarised ones will be formally excellent, but ethically and intellectually void; the 'cut and paste' an arbitrary jumble of half understood or completely misplaced ideas; and the web-essay a thin soup of one-dimensional cliché, description and vaguely comprehended notions.

In a world where commercial opportunity is the motivation behind increasing amounts of human endeavor, the plagiarism industry has inevitably spawned its commercial antithesis – and alleged nemesis. Websites such as plagiarism.com offer 'software programs to help detect and deter plagiarism'. There are three levels of software on offer: a simple 'tutorial guide' on what constitutes plagiarism; a 'highly sophisticated Screening Program to detect plagiarism'; and - vaguely disturbingly - a 'Screening Program to help detect inadvertent instances of plagiarism'.

Plagiarism, 'inadvertent plagiarism' or even earnest trying in difficult circumstances, however, is not the point. It not about the 'dumbing down' of culture and society either – although this may be a consequence over the longer term (Mosley 2000). Sociologist Zygmunt Bauman laments in his book, *Globalization*, that we have lost the capacity for reflection (1998, p 35). Bauman is perhaps too early in his prognosis, but the writing - so to speak - is on the wall. What we face is an emerging generation of unreflective, uncritical citizens. Indeed, ideas of what 'citizenship' may stand for could also be lost. Generation X may well be morphing into Generation Z - for zero comprehension of the world and its social and political dynamics, and the underpinnings of economic globalisation.

If we use the criteria of 'performability' as critiqued by Barnett, then developed economies such as those of North America, western Europe, Japan, Australia and so on, may indeed become superficially 'clever countries' creating shiny 'new economies'. These economies may indeed benefit from the actions of skilled entrepreneurs, technologists, scientists and others who are able, real-time, to seize the moment and exploit the commercial opportunities. However, having to operate in a continuous present, with a consequent lack of a sense of history, continuity and interrelatedness, means that we diminish the capacity to know ourselves and the society we live in.

It has often been argued that, historically speaking, the introduction of new technologies seems automatically to set off a moral panic within certain sections of elite opinion. Socrates, for example, imagined that writing would weaken the memory, and the introduction of Gutenberg's printing press was seen as catastrophic, signaling the end of the world as the medieval elites knew it. More recently, alarm bells sounded over the introduction of significant communications technologies such as the telegraph, radio, telephone and television - all of which proved either unfounded or much too pessimistic.

The objective of this paper is not to raise yet another moral panic, or to suggest that western values and western institutions are about collapse under the onslaught of value-free global corporate power and its revolutionary technologies. But there is a difference; something that is unique regarding the introduction of information technologies today. The difference is that information and communications technologies are not a single device or innovation, but a burgeoning of techniques, appliances and processes (some based on older technologies, some radically new) that pervade almost every nook and cranny of social, cultural and economic life. Earlier innovations impacted upon certain strata of society and took some time to diffuse across other parts of life - if at all. Information technologies, by contrast, have had an almost immediate and transformative impact upon much of contemporary society. As Mark Geise (1998) puts it:

> Unaugmented oral communication by its very nature is geographically bounded. It is limited both by the physical properties of sound and ephemeral nature. These new technologies tend to radically alter the cultural ecosystems they have arisen in and spread to. This causes radical realignments of the relationships between the inhabitants of these cultural ecosystems.

By their very nature, these 'cultural ecosystems' are informationalised ecosystems of 'immediacy'; 'friction- free' in a way opposite to what Bill Gates has in mind when he refers to unproblematic 'friction-free capitalism' (Gates 1995). As Ronald E Purser observes, the pervading digital ecosystem 'remove[s] the friction of the real-world' (2000, p 3), arguing that it is in the spaces of 'friction in the real-world' where difference, experience and knowledge-building can resonate and become fruitful. Moreover, the information-based 'cultural ecosystem' consists not merely (or even primarily) of the Internet, but of a growing array of digital accoutrements: Palm Pilots, Hotmail, electronic cash-points, mobile phones, text-messaging, Web-TV, plastic money, e-commerce, etc – all of which make up this new and unprecedented digital environment. At a fairly superficial level, these developments have been lauded as unambiguously positive. They are seen as the emergence of 'new kinds of communities' (Dyson 1997); as community-building 'online social networks' (Rheingold & Kimball 2000). Here, as in so many other accounts, those who point out the problems are seen simply as being too Luddite or naive to see the opportunities. Informationalisation, then, is by implication *inherently unproblematic.*

At a somewhat deeper level, cultural theorist Fredric Jameson has described such an outcome as an instance of almost pure alienation, where we cannot any longer '… draw back from our immersion in the here and now' (1995, p 284). The immediacy of the Internet and other digital technologies, the information overload that is its propensity, the social and cultural dynamics of globalisation and the debilitating effects these have upon on capacity for self-reflection, are issues that we need to think seriously about. Ellsworth's aspiration quoted at the beginning of this paper - that the Internet is set to be the vector for the intellectual fashioning of 'prepared citizens' - begins to look rather dubious if viewed from this perspective.

If and when we reach the point of diminished cultural literacy, the great loss will not simply that we may have lost the capacity to compare, discuss and contextualise cultural artifacts such as Madonna and Modigliani. Vastly more important questions such as ethnic cleansing, human rights and the meaning(s) of 'citizenship', will also be lost to a reflexive scrutiny. Cultural literacy and the capacity to examine ourselves and our institutions from a critical perspective will be diminished. Society will end up on autopilot, propelled by market forces and steered by computers; and, having lost our collective capacity to 'draw back from our immersion in the here and now' - most of us will be unaware of it.

As in many things, the US may present a vision of the future. In an interview on Australia's ABC Radio National, David Brookes, the editor of the *Weekly Standard*, speculated upon the ping-pong polls in the 2000 presidential race between Al Gore and George W Bush. Part of the reason for the mercurial polls, he mused, is due to voter inability to think critically and the tendency to agree with the last thing they read. In Britain, a recent survey by ICM for *The Guardian* newspaper found that 18-24 year olds are 'measurably 'dumber' than older age groups', forcing Chris Smith, the Culture Secretary, to fret that the findings '… may represent a slippage of knowledge'.

Of course, the Internet has also been used resourcefully to counter these tendencies. Activists across the world, in a multitude of coalitions, harbouring a plethora of grievances from child labour in free trade zones to the 'MacDonaldisation' of the world, use the Internet to trade information, develop strategies and to organise resistance to corporate-driven globalisation (Klein 2000, pp 393-395). However, these are the politics of backlash and frustration, not of deep analysis and the persistent articulation of alternatives to predatory globalisation.

Reflexive analysis and plurality of articulation are (and increasingly used to be) a central function of the university. If the trends towards corporatisation in the university - towards bending over backwards to accommodate the needs of industry and away from the inculcation of critical thinking in students – continues, then the university will cease to be the place where ideas are conceived and developed. Before the rot sets in irrevocably, the scale of the loss of cultural literacy needs to be assessed. Universities need to be persuaded to take seriously their traditional roles as centres of intellectual discovery, of research, of innovation and of creativity - and look seriously at ways in which IT can be used to enhance this process. In a collection of essays published to raise the debate about the 'destruction of Australian universities', academic Rob Watts called for nothing less than a 'public inquiry' into the state of the higher education sector. Watts argues that the 'degradation' in academic standards be just part of a wide-ranging brief (Watts 2000, p 31).

Poor research based on web-surfing by harassed students may be a symptom of a much wider malaise, but is a symptom which can debilitate the functioning of critical thinking in student generations to come. Society's loss of a critical faculty may turn out

to be something akin to progressive dementia in the individual; the worse it gets, the less it matters to the victim. These individuals become gradually oblivious to the personal catastrophe that has befallen them. Unless proper research is done to ascertain the extent of what may be the beginnings of our collective intellectual dementia, the prognosis is bleak. When we reach a certain point in this process, we will have, to use the metaphor of dementia once more, become almost unaware of it – but as far as the functioning of a healthy, pluralistic society and civic-democratic culture is concerned, the reality will be far from blissful.

It is never entirely helpful to end on a bleak note, and this paper was not intended to be bleak or pessimistic - it is a call for vigilance in the face of the corporatisation of the university, and an appeal for much more research to be done in this area. Domination by technology can never be complete. Human beings have always been able to think reflexively about the technologies they develop and encounter; working with them, working against them and constantly shaping them to better suit society's needs.

I will end by quoting at some length from a report by the President's Information Technology Advisory Committee (PITAC) in the Federal Republic of Germany. The Report listed 'Ten critical national challenge transformations' arising from the impact of information technologies. Number three on this list of 'challenge transformations' is 'Transforming the way we learn', and may act as a reflexive and confident guide for the way all developed and developing economies could approach technology and learning - emphasising more social control over market forces. The report declares that:

> Information technology is already changing how we teach, learn, and conduct research, but important research challenges in the field of education remain. In addition to research to meet the scalability and reliability requirements for information infrastructure, improvements are needed in the software technologies to enable development of educational materials quickly and easily and to support their modification and maintenance. *We know too little about the best ways to use computing and communications technology for effective teaching and learning, in particular, how to effectively use multimedia capabilities to create a richer, and more appealing learning experience.* We need to better understand what aspects of learning can be effectively facilitated by technology and which aspects require traditional classroom interactions with the accompanying social and interactive contexts. We also need to determine the best ways to teach our citizens the powers and limitations of the new technologies and how to use these technologies effectively in their personal and professional lives. [italics added] (PITAC 1999)

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