

## Education and the shift from knowledge to information: Virtual classrooms or automated diploma mills?

Michael Peters

### ABSTRACT

This paper begins by introducing the philosophy of technology of Martin Heidegger. Heidegger maintained that technology is not neutral and he talked of the 'technological understanding of Being' as the last stage in the Western metaphysical tradition where people are treated as resources. In the next section, the work of Jean-François Lyotard and Mark Poster are used to discuss in critical terms certain changes in the nature of capitalism and the consequent shift from knowledge to information. Finally, in terms of the educational consequences of the shift from knowledge to information the paper contrasts two possible scenarios: one referred to as 'the search for the virtual classroom'; the other referred to as 'automated diploma mills'.

### Martin Heidegger's philosophy of technology

Everywhere we remain unfree and chained to technology, whether we passionately affirm or deny it. But we are delivered over to it in the worst possible way when we regard it as something neutral; for this conception of it, to which today we particularly like to do homage, makes us utterly blind to the essence of technology.

Martin Heidegger, 'The Question Concerning Technology', in *The Question Concerning Technology and Other Essays*, trans. William Lovitt. New York: Harper & Row, 1997 (p. 4).

I begin with a quotation from Martin Heidegger because even though the essay 'The Question Concerning Technology' was delivered in 1953 - some 45 years ago - it remains one of the most profound statements concerning technology that has been made. Heidegger's essay has not only become a philosophical classic but also has remained an important source of inspiration for a generation of philosophers writing of the nature of technology, including Herbert Marcuse and Jürgen Habermas of the Frankfurt School, and those like Michel Foucault and Jacques Derrida whom we might call 'poststructuralists'.

I begin with Heidegger also because I want to avoid an approach that seeks to develop explanations of technology in relation to education from within the field of education, so to speak. If anything, the nature of technology and its relation to education, it seems to me, needs to be explained in terms of a very broad picture. Heidegger provides resources for considering technology in this way and in doing so he confounds our taken-for-granted assumptions about modern technology. In terms of the received view technology is something that stands in a subsidiary, instrumental, and temporal relation with modern science. Modern physical science begins in the

seventeenth century, historically it is seen as achieving a kind of take-off by 1750, and its institutionalisation through royal societies and universities also dates from that period. Machinic technology, by contrast, chronologically speaking, begins in the eighteenth century and is pictured essentially as the 'handmaiden' to science: it is regarded as an application of 'pure' science or applied science.

Heidegger, however, reverses the chronological order of the received view. He distinguishes technology in its various manifestations from its essence that is not technological and describes this essence by returning to the Greek concept of *techne*, which relates to the activities and skills of the artisan. The essence of technology, Heidegger maintains, is a *poiesis* or 'bringing forth' which is grounded in revealing (*aletheia*). As he says: 'The essence of modern technology shows itself in what we call Enframing . . . It is the way in which the real reveals itself as standing-reserve' (Heidegger, 1977: 23). This has been a 'productionist metaphysics' because the concept of 'standing reserve' refers to resources which are stored in anticipation of consumption. Ingrid Scheibler (1993: 116) explains that modern technology, for Heidegger, 'is linked to a particular mode of conceiving our relation to the world - of bringing forth - through a process that objectifies the world'. Scheibler explains, then, that for Heidegger the essence of technology is part of the broader project of understanding the relation of this mode of objectifying experience to the tradition of Western metaphysics, which means that the question concerning technology cannot be thought apart from the critique of Western metaphysics.

Heidegger (1977: 4) poses the question quite forthrightly:

According to ancient doctrine, the essence of a thing is considered to be what the thing is. We ask the question concerning technology when we ask what it is. Everyone knows the two statements that answer our question. One says: Technology is a means to an end. The other says: Technology is a human activity.

Two definitions: the instrumental and the anthropological. Heidegger goes on to question the instrumental and the will to mastery that such a conception entails. This is the source, in part, for the notion of instrumental rationality, a purely technical reason, that Habermas, along with other members of the Frankfurt School, contrast strongly to practical reason. Heidegger's account, no doubt, also strongly influenced Foucault's notions of technologies of domination and of self, and is central to the way in which new information and communications technologies have the power to restructure or reformat our subjectivities and identities.

The Question Concerning Technology was one of Heidegger's later works. Based on four lectures delivered in 1949 the book captured Heidegger's ontological approach to a war-torn Europe and elaborated his concern for a technical nihilism. The question of European nihilism he inherited directly from Nietzsche and the catastrophe of Europe after the war, he described in terms of the confrontation with global technology. Yet as we have seen for Heidegger, 'technology's essence is nothing technological' (1977: 4). It is a system - *Gestell* - an all-encompassing view of technology, described as a mode of human existence. Heidegger is careful not to pose as an optimist or pessimist; his account is an account which relates technology back to a critique of the Western metaphysical tradition and focuses upon the way machinic technology can alter our mode of being, distorting our actions and aspirations.

Heidegger's account of technology has been criticised on a number of grounds. Andrew Feenberg, for instance, writes:

Translated out of Heidegger's own ontological language, he seems to be saying that technology constitutes a new type of cultural system that restructures the entire social world as an object of control. This system is characterised by an expansive dynamic which invades every pretechnological enclave and shapes the whole of social life. The instrumentalization of man and society is thus a destiny from which there is no escape other than retreat. The only hope is a vaguely evoked spiritual renewal that is too abstract to inform a new technical practice. As

Heidegger explained in his last interview, 'Only a god can save us' from the juggernaut of progress...

Feenberg's criticism is that Heidegger's argument is so abstract that it does not permit him to 'discriminate between electricity and atom bombs, agricultural techniques and the Holocaust.' All different forms and instances of technology are merely different expressions of an identical enframing, which we can only transcend through the recovery of a deeper relation to being: 'And since he rejects technical regression while leaving no room for a modern alternative, it is difficult to see in what that relation would consist beyond a mere change of attitude.'

I think that Feenberg's criticism are largely misplaced. Granted, Heidegger's account of technology is dressed up in the ontological language of Being and related to the question of European nihilism and a critique of the Western metaphysical tradition, more generally. His account is inherently a very general philosophical account and it is not, therefore, appropriate to criticise him for the level of abstraction or generality of his argument - its inability to discriminate between different forms of technology. (He was writing before the PC revolution and well before the development of the widespread use of the new communications and information technologies.) One should judge the fecundity of philosophical argument by its richness and complexity, on the one hand, and by the different levels of interpretation it permits, on the other. On these criteria we can appreciate the way in which Heidegger's text (and writings more generally) have stimulated a critical philosophy of technology.

### The shift from knowledge to information

Part of the inspiration for this paper also springs directly from the work of Jean-François Lyotard (1984) and his analysis of 'knowledge in computerised societies'. As he argues in *The Postmodern Condition*: 'Our working hypothesis is that the status of knowledge is altered as societies enter what is known as the postindustrial age and cultures enter what is known as the postmodern age' (Lyotard, 1984: 3). His now famous analysis in terms of the logic of performativity is prophetic for anyone who has lived through the last decade in so-called advanced liberal or neo-liberal states. As he says:

Knowledge is and will be produced in order to be sold, it is and will be consumed in order to be valorized in a new production; in both cases, the goal is exchange (p. 4)

Lyotard's analysis of the 'postmodern condition' is a report on the status of knowledge in advanced societies under the impact of technological transformation. As such Lyotard's prophetic and strategic analysis accomplishes the same end as Heidegger's philosophy in that it clearly involves a critique of the Western metaphysical tradition, a tradition in which Lyotard sees technology playing a fundamental role. And yet Lyotard is more specific than Heidegger, and, at the same time, provides an account of the way in which technological developments underwrite the expansion of global capitalism.

He uses the term 'postmodern condition' to describe the state of knowledge and the problem of its legitimation in the most highly developed societies. In this he follows sociologists and critics who have used the term to designate the state of Western culture 'following the transformations which, since the end of the nineteenth century, have altered the game rules for science, literature and the arts' (Lyotard, 1984: 3). Lyotard places these transformations within the context of the crisis of narratives, especially those Enlightenment metanarratives concerning meaning, truth and emancipation which have been used to legitimate both the rules of knowledge of the sciences and the foundations of modern institutions.

By 'transformations' Lyotard is referring to the effects of the new technologies since the 1950s and their combined impact on the two principal functions of knowledge - research and the transmission of learning. Significantly, he maintains, the leading sciences and technologies have all

been based on language-related developments - theories of linguistics, cybernetics, informatics, computer languages, telematics, theories of algebra - and their miniaturisation and commercialisation. In this context, Lyotard argues that the status of knowledge is permanently altered: its availability as an international commodity becomes the basis for national and commercial advantage within the global economy; its computerised uses in the military is the basis for enhanced State security and international monitoring. Knowledge, as he acknowledges, has already become the principal force of production, changing the composition of the workforce in developed countries. The commercialisation of knowledge and its new forms of media circulation, he suggests, will raise new ethico-legal problems between the nation-state and the information-rich multinationals, as well as widening the gap between the so-called developed societies and the Third World.

Here is a critical account theorising the status of knowledge and education in the postmodern condition which focuses upon the most highly developed societies. It constitutes a seminal contribution and important point of departure to what has become known - in part due to Lyotard's work - as the modernity/postmodernity debate, a debate which has involved many of the most prominent contemporary philosophers and social theorists (see Peters, 1995, 1996a). Lyotard's *The Postmodern Condition* is a book which directly addresses the concerns of education, and in a way which bears on the future status and role of education and knowledge in what has proved to be a prophetic analysis. Many of the features of Lyotard's analysis of the 'postmodern condition' - an analysis almost two decades old - now appears to be accepted aspects of our experiences in Western advanced liberal societies.

His critique leads us directly to the central question of legitimation of knowledge and education. If the Enlightenment idealist and humanist metanarratives have become bankrupt and the State and Corporation must abandon or renounce them, wherein can legitimacy reside? Lyotard, in his critique of capitalism, suggests that the State has found its only credible goal in power. Science and education are to be legitimated, in de facto terms, through the principle of performativity, that is, through the logic of maximisation of the system's performance, which becomes self-legitimizing in Niklas Luhmann's sense.

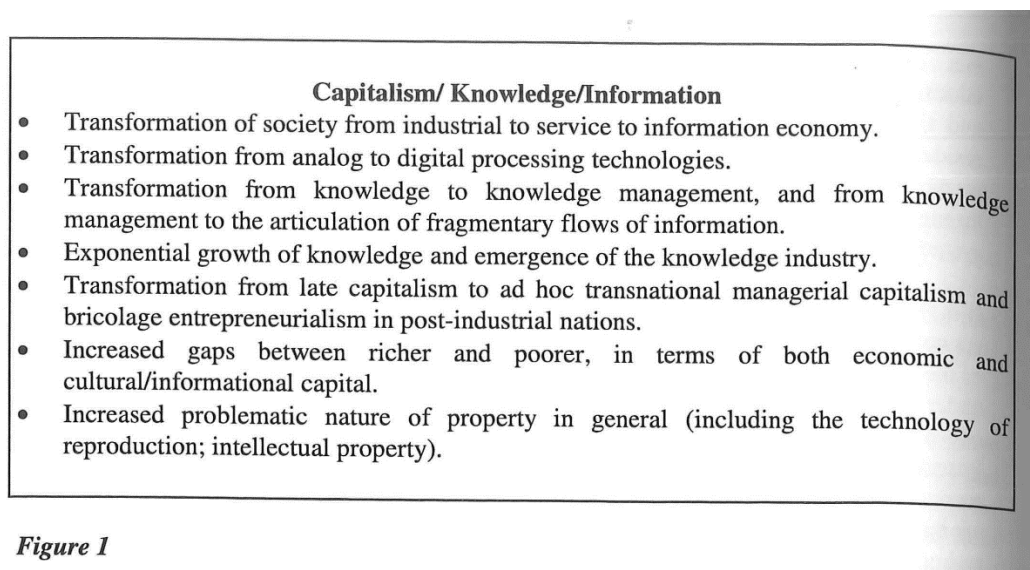
It is this account which has proved so potent in prophesying and analysing the changes to economic and social policy which have taken place in the Western world with the ascendancy of the so-called 'new right'. Education, not so long ago regarded as a universal welfare right under a social democratic model, has been recast as a leading sub-sector of the economy and one of the main enterprises of the future 'postindustrial' economy. Lyotard's (1984) *The Postmodern Condition* provides an understanding and critique of the neo-liberal marketisation of education in terms of the systemic, self-regulatory nature of global capitalism. His work in general provides a clear account of the way in which the 'new technologies' concern language. The substitution of automata for natural sequences carried out by the cortex renders language 'informational' and, at the same time, it recenters science, technology and economy in the following ways:

- the exteriorization of knowledge in relation to the knower; the introduction of fragmented activities and strongly hierarchized organization in research, and the laboratory become industrial workshop;
- an increased technological component in the formation of knowledge: the new machines (particle accelerators, supercomputers, electronic telescopes, lasers), their servants, their schedules of availability, the tasks of management, and the new kinds of research they require;
- the spread of automata to the so-called tertiary sectors of production: the 'elevation' of qualifications (new metiers), specialization in the tasks of the 'employees,' of the 'inferior and average ranks of management,' of the 'ideas people' and 'decision makers';

- the multiplication of commodities with integrated automata and, more generally, with an integrated language (the logical language of microprocessors) used in both production and consumption (Lyotard, 1993: 16).

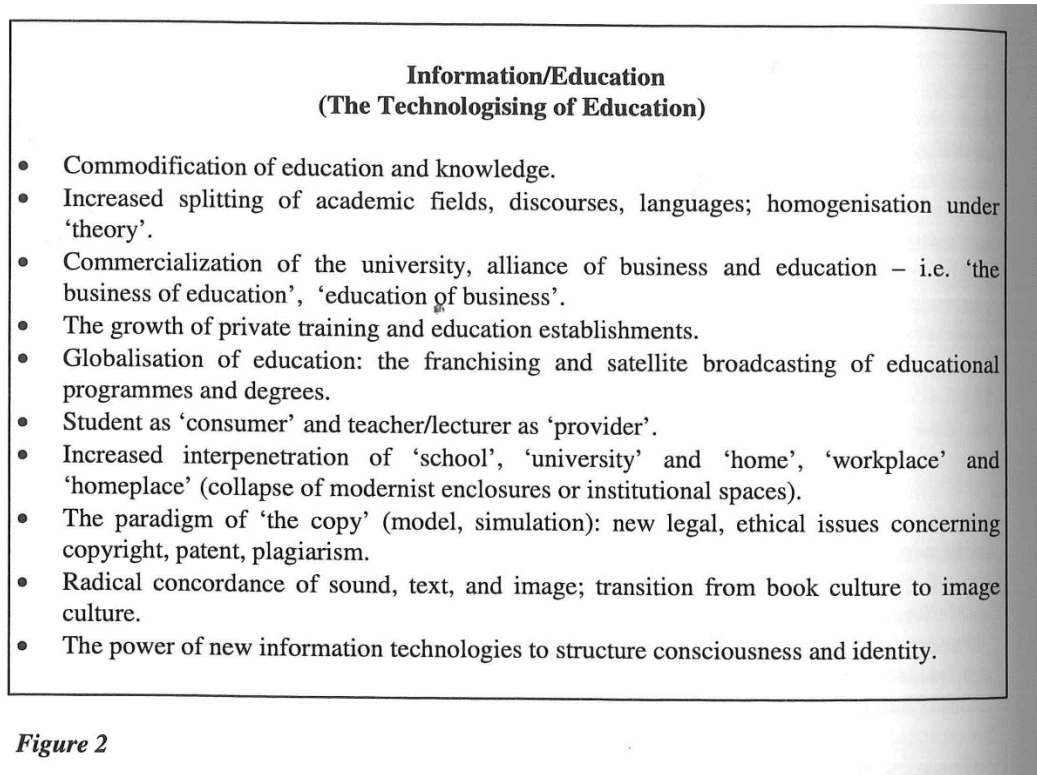
'Informatisation' increases the concentration of the means of production of knowledge while allowing for its decentralisation; it causes 'technological unemployment' and devalues the productive labour; and it disperses the horizons of everyday life by transforming the relationship to wealth, encouraging the individual initiative of the user. Perhaps, most importantly, and rekindling the inspiration of Heidegger, Lyotard asserts that by informatising language, the new technologies informatise the social bond, transforming our (inter)subjectivities.

These points and conceptual relationships can be summarised further in table form (see Figures 1 and 2 below). Figure 1 emphasises the importance of information in a so-called global information economy; it hypothesises both a new kind of information capitalism and the shift from knowledge to information.



*Figure 1*

Figure 2 maps the importance of these shifts specifically for education and begins to provide a basis for theorising what I have called the 'technologising of education'.



*Figure 2*

In this context Mark Poster's (1990) *The Mode of Information* provides an important set of arguments for consideration by anyone interested in the relation between education and technology. Poster is interested in developing a poststructuralist strategy for writing the contemporary history of the new communications. He wants to reconfigure 'in theory certain phenomenon so that their disruptive potential can be recognised and perhaps in time be acted upon' (p. 20). This leads him to invoke Marx's concept of the mode of production in relation to the history of communications to suggest that 'history may be periodised by variations in the structure . . . of symbolic exchange, but also that the current situation gives a certain fetishistic importance to 'information' (p. 6). His main thesis, which he then investigates in relation to the work of Daniel Bell, Michel Foucault, Jacques Derrida, and Lyotard, is summarised in the following:

Every age employs forms of symbolic exchange which contain internal and external structures, means and relations of signification. Stages in the mode of information may be tentatively designated as follows: face-to-face, orally mediated exchange; written exchanges mediated by print; and electronically mediated exchange. If the first stage is characterized by symbolic correspondences, and the second stage is characterized by the representation of signs, the third is characterized by informational simulations. In the first, oral stage, the self is constituted as a position of enunciation through its embeddedness in a totality of face-to-face relations. In the second, print stage the self is constructed as an agent centered in rational/imaginary autonomy. In the third, electronic stage the self is decentered, dispersed, and multiplied in continuous stability (p. 6).

If Poster is doing history here it is a kind of Foucauldian 'philosophical' history for he defines himself primarily in relation to the history of the philosophy of the subject. When Mark Poster was in New Zealand in 1994 I conducted two interviews with him: the first in conjunction with James Marshall for an experimental local cable TV company (Peters & Marshall, 1995); the second, conducted through the medium of e-mail during May and June, 1994 (Peters, 1996a). I questioned his notion of 'the mode of information' and inquired of him whether he thought the history of education was also governed and to some extent determined by these same stages. He replied that he thought the stages were applicable to history of education (while acknowledging that such history was not reducible to them) and stated that he believed that electronic technologies will profoundly affect the 'modern student', agreeing with Richard Lanham (1993) that 'the multimedia computer,

hypertext programs and internet connectivity will likely undermine existing forms of authority, encourage visual over textual literacy and open new forms of communications'. In the interview I was interested to test to what extent his thesis still shared some features with a Marxist philosophy of history and to what extent he was committed to technologically-derived stages of history. In particular, I was interested in the extent to which historical 'stages' implied a linear progression of development (of 'progress') and the way in which the notion of 'stages' runs against the explicit rejection of periodising that characterises Lyotard's work. Poster answered in a cautious register. He admitted that stage theories of history are associated with grand narratives of progress and indicated that he had used 'stage theory' in *The Mode of Information* for analytic purposes only. He seemed to think that a stage theory can avoid the suggestion of progress and the function of legitimation, while still serving as a heuristic for empirical study and pointed to Foucault's theory of genealogy as one strong solution for configuring succeeding epochs as differential or discontinuous. Poster wanted to expand Foucault's notion to include simultaneity as well as discontinuity. By doing so, he suggested, we 'might somehow envision periods not cancelling each other but introducing possibilities of reconfiguration in which combinations of repetition and difference result in, to allude to Benjamin's term, new constellations'.

In the interview I focused on Poster's interpretation of Lyotard, ('Lyotard and Computer Science') in *The Mode of Information*. At one point in Poster's discussion he indicates that Lyotard distinguishes two narratives which furnish science with legitimation: the idea of progress in Britain, France, and the United States on the one hand, and the idea of education 'as promoting the health of the nation ... in Germany' (1990: 143), on the other. While there have existed metanarratives for the legitimation of science and education in the past it seemed clear that in the 'postmodern condition' computerization and new communications technologies provide a new ground or a re-legitimizing narrative for science and development through education. In pursuing this thought I was referring to the way in which education is now regarded less as a universal welfare right of all citizens of a community and more as the means for the development of human capital in the 'productive' areas of science and technology, which is seen as necessary for national competition within an increasingly global economy. This kind of discursive recasting of education policy according to the economic imperatives of science and technology, in part, lay behind the past popular iconography surrounding an ideology that motivated American educational reformers in the 1960s during the 'sputnik' era, the 'Space Wars' scenario of the 1980s, and the more recent perceived threat to the world competitiveness of American enterprise in the 1990s. Within the discourse of 'the second media age', focusing upon the economic benefits of the 'information superhighway', education has been recast in terms of policy discourse as a new legitimizing metanarrative for 'technoscience', to use Lyotard's term. In other words, far from encouraging a suspicion of metanarratives (Lyotard's famous definition of the postmodern condition), neo-liberal governments have developed new master narratives of national development that seem to wield great discursive power.

Poster, in response to this observation, referred to Lyotard's concern of the instrumentalisation of education and he acknowledged that the exact status of what Lyotard calls 'performativity' is left somewhat ambiguous. Poster agrees that 'performativity is part of the modern metanarrative, but one that de-emphasizes the values of freedom and equality. It is sort of an illegitimate legitimacy, an effort to be self-justifying without any adequate attention to justice as a category'. He also agreed that there is a strong current of technoscientific utopianism in the United States which constituted a new metanarrative.

Neo-liberal economic theory is just catching up with the approach to 'knowledge institutions' developed by Lyotard nearly two decades ago, albeit in a different register. Much of what has been written on the new communications technologies by educationalists, including philosophers of education, tends towards accepting an instrumentalising view of the educational use of the new communications technologies - a view which Heidegger, Lyotard and Poster, in their different ways, warn us against. There is a disturbing apolitical tendency in much of this work. It is the case that

there is an educational focus to the relations between neo-liberalism, globalisation and the new communications technologies.

### The search for the virtual class

The notion of the 'information society' passed into the sociological literature soon after Daniel Bell (1973) and Alain Touraine (1974) had written on 'post-industrialism' in the late sixties. Bell had focused upon the centrality of theoretical knowledge and the social and institutional changes required for the 'knowledge society'. Touraine predicted the rise of new social movements associated with the shift to post-industrialism. His analysis led him to emphasise the way in which social life, including education, was being increasingly integrated into the realm of production. During the seventies and eighties the notion of the 'information society' became part of a theory-laden and contested discourse about the future of advanced liberal societies. The debate had begun much earlier. The 'cybernetics group', including Norbet Weiner, Claude Shanon, Von Neuman, and, perhaps surprisingly, the anthropologists, Margaret Mead and Gregory Bateson, had met regularly during the 1940s to talk about systems theory and its applications. Together they had helped shape the culture of the Cold War. During the 1960s, Fritz Machlup and Marc Porat charted the employment effects of an emerging US 'information economy' and argued for productivity gains from investment in the information sector. Several generations of sociologists, economists, philosophers of technology, geographers, engineers and politicians have debated the meaning and significance of the technical transformations wrought by communications and information technologies in the post-war period. One of the latest expressions of this talk has been Al Gore's popularisation of the 'information superhighway'.

One particular contemporary variant of this discourse on the 'information society' is closely tied to neo-liberalism; it is wildly utopian; it uses a hyperbolic language of 'revolution' and attempts to conjure up a vision of the future; it emphasises universal and abstract 'techno-fix' solutions to social and economic problems; it focuses upon the technical transformation of society, highlighting the commercial benefits; and it approaches technology in general as something that, in itself, is neutral, denying the necessity of social or political analysis.

Manuel Castells (1989) has argued that there is a historical coincidence of the restructuring of capitalism and the rise of the informational mode of development resulting in the formation of a specific techno-economic paradigm. The restructuring of capital, involving the appropriation of a significantly higher share of surplus from the production process and a changed pattern of state intervention away from political legitimation and social redistribution to establishing conditions that are favourable for capital accumulation, could never have been accomplished without the development of the technological and organisational potential of internationalism. He argues 'There is an interactive effect between the new form of capitalism and the technological revolution and new forms of organisation have been adopted' (p. 29).

John Tiffin and Lalita Rajasingham of the Department of Communications Studies at Victoria University have written a book which 'presents a vision of what education and training could become as information technology develops'. *In Search of the Virtual Class: Education in an Information Society* (1995) is an example of what I describe above. The book promises a great deal but is disappointing in what it delivers. Professor Tiffin holds the David Beattie Chair of Communications Studies at Victoria University and Dr Rajasingham is Senior Lecturer in the same department. They have all the right credentials and experience. The acknowledgements make clear that the Network College of Communication in the Pacific acted as a sounding board and Telecom Corporation of New Zealand and Ameritech supported their research. (As the authors make clear: 'The 1990s is the decade of telecommunications' [p. 102] and 'the learner-centred, market-driven model of education' [p. 85] based on telelearning in cyberspace is their panacea). The book is dedicated to their adopted country - New Zealand - ('First country to give women the vote ... to make



university education universally available ... to develop a national telelearning network'), and yet there is no further reference to New Zealand, nothing that applies distinctively to New Zealand, its society or culture. The vision could be equally applied anywhere in the world; in fact, it is touted as the global solution to the problem of modern education.

The vision that Tiffin and Rajasingham put forward is encapsulated in a little story they tell about Shirley who goes off to school by donning her school helmet to enter the virtual world of her virtual school. Her father is already 'teleworking'; the family are to go 'teleshopping' later; Shirley is 'telelearning'. With nanotechnology the helmet is more likely to be a 'datasuit as a second skin which eliminates the stimuli from the real world and replaces it by stimuli from a computer' (p. 137). Curiously, the authors believe this futuristic long-term vision will sustain us. While they refer to the science fiction of William Gibson (*Neuromancer*) and others, they do not seem to want to acknowledge the implicit critique that bubbles beneath the surface of this genre.

The justification for such a vision lies in systems theory: 'education is communication' - ('the classroom is a communication machine' [p. 20]) - and communication is defined in terms of three functions: transmission of information, its storage and processing. This constitutes the 'new paradigm of education' which is based upon the choice of telecommunications rather than transport. It is a paradigm that is seen to overcome the traditional problems of space, storage and time of conventional education. In addition, it is seen to be learner-centred, problem-focused, flexible, accessible and much cheaper. Anyone can access information at any time and both the home and the workplace will become communication systems for education. Education becomes the global educational utility based upon forms of teleconferencing and the virtual class is the place where, following Buckminster Fuller, 'we can learn to think globally and act locally' (p. 187). Such a global educational utility in New Zealand would presumably be provided and controlled more by Telecom than the State (or perhaps, a consumer-driven education could be contracted-out?).

Frankly, the underlying concept of education here is very technocratic. This is not to suggest that Shannon's work on communication systems is not important or useful or, even, that systems theory has interesting applications in education (for example, Gregory Bateson's notion of 'double-loop learning' and Chris Argyris' work). It is to say that technically-driven understandings of education, or technologically deterministic concepts, require careful scrutiny. There is a huge literature that deals with these questions in a theoretically sophisticated way. I would like to briefly mention in this context the work of Mark Poster (1990), Anthony Smith (1996) and Tim Luke (1989, 1998), all of whom have visited New Zealand in the last few years.

Inadvertently, Tiffin and Rajasingham have provided a forbidding vision; one which frightening in its technical simplicity and one seemingly unaware of the political context or social consequences of the rationalistic cybernetic epistemology underlying it. This is a great pity given the opportunity for critique, especially when it is most required. The Minister of Education, in the Foreword to the Tertiary Review green paper, defines information technology as one of the three forces that will shape tertiary education in the 21st century (along with increased demand and internationalisation). While Wyatt Creech mentions information technology in terms that implicitly underlie the review as a whole, it is not examined or analysed as a condition of the tertiary education in either the national or international contexts. There is no national strategic vision at the point we desperately need one. Tiffin and Rajasingham's technical vision acts only as a grim reminder of what education might become in the 'brave new world' that is New Zealand in the late 1990s.

### Automated diploma mills?

David Noble (1998) draws our attention to recent events at two large North American universities that signal we have moved into the era of automation of higher education. He mentions that through its 'Instructional Enhancement Initiative' UCLA has become the first major university to make mandatory the use of computer telecommunications technology in the delivery of higher

education. Meanwhile at York University in Toronto, faculty have ended a two-month strike taken partly in response to unilateral administrative initiatives in the implementation of instructional technology. At both universities the administrations had spawned its own subsidiaries, in partnership with the private sector companies, committed to the commercial development of online education.

Noble suggests that 'at the very outset of this new age of higher education, the lines have already been drawn in the struggle which will ultimately determine its shape. On the one side university administrators and their myriad commercial partners, on the other those who constitute the core relation of education: students and teachers.'

He goes on to suggest the campus has been identified as a major site of capital accumulation - a transformation involving two phases focusing upon the conversion of ideas into intellectual property: the first, began twenty years ago with the commodification of the research function of the university and transformed scientific and engineering knowledge into commercially viable proprietary products that could be owned and bought and sold in the market. The second, which has only begun recently, entails the commodification of the educational function of the university, and involves the transformation of courses into courseware, the activity of instruction itself into commercially viable proprietary products that can be owned and bought and sold in the market. As he argues 'In the first phase the universities became the site of production and sale of patents and exclusive licenses. In the second, they are becoming the site of - production of - as well as the chief market for - copyrighted videos, courseware, CD-ROMs, and Web sites.'

The second transformation of higher education is driven by corporate trainers, technozealots, university administrators, and the vendors of the network hardware, software, and 'content', such as Apple, IBM, Bell, the cable companies, Microsoft, and the edutainment and publishing companies Disney, Simon and Schuster, Prentice-Hall, etc. who see higher education as a multi-billion dollar industry.

Universities throughout North America, Noble (1998: 44) warns, are rapidly being overtaken by this second phase of commercialization:

There are the stand-alone virtual institutions like University of Phoenix, the wired private institutions like the New School for Social Research, the campuses of state universities like the University of Maryland and the new Gulf-Coast campus of the University of Florida (which boasts no tenure). On the state level, the states of Arizona and California have initiated their own state-wide virtual university projects, while a consortia of western 'Smart States' have launched their own ambitious effort to wire all of their campuses into an online educational network. In Canada, a national effort has been undertaken, spearheaded by the Telelearning Research Network centered at Simon Fraser University in Vancouver, to bring most of the nation's higher education institutions into a 'Virtual U' network.

The commodification of university instruction raises for the faculty traditional labor issues about the introduction of new technologies of production. As teachers are drawn into a production process designed for the efficient creation of instructional commodities their activity is restructured and, accordingly, their autonomy, independence, and control over their work is reduced. Workplace knowledge and control is concentrated more and more into the hands of the administration.

Noble (1998) explains:

Once faculty and courses go online, administrators gain much greater direct control over faculty performance and course content than ever before and the potential for administrative scrutiny, supervision, regimentation, discipline and even censorship increase dramatically. At the same time, the use of the technology entails an inevitable extension of working time and an intensification of work as faculty struggle at all hours of the day and night to stay on top of the technology and respond, via chat rooms, virtual office hours, and e-mail, to both students and administrators to whom they have now become instantly and continuously accessible. The

technology also allows for much more careful administrative monitoring of faculty availability, activities, and responsiveness.

David Noble provides the antidote to the utopian techno-dreams of Tiffin and Rajasingham. He provides a grounded analysis of a kind of contemporary history of the university which focuses upon a deskilling of faculty and the administrative monitoring and control of their knowledge. Noble's view is based upon his own recent experiences at York University: he thinks we are moving inexorably towards automated diploma mills. I find Noble's analysis consistent with the critical view of technology I outlined above by reference to Heidegger, Lyotard and Poster. But it is not to say that this is the way things must be or that technology will be exploited by capital against labour.

## Notes

1. The part of this paper is based upon a paper (Peters, 1997) presented to the conference Virtual Technologies in Higher Education: A National Vision? which I organised for the Association of University Staff, held at the University of Auckland in November 1997. A substantially revised version of the paper is the basis for the co-authored opening chapter (with Peter Roberts) entitled 'The Question Concerning Virtual Technology in Higher Education - The Shift from Knowledge to Information' which appears in the edited collection based on a selection of papers from the conference (see Peters and Roberts, 1998).
2. Heidegger's analysis of the 'will to will' foreshadows the critical concern with cybernetics and self-regulating system that take on a cultural significance of their own.
3. Feenberg argues in a note (N 3) 'Heidegger envisages change in 'technological thinking,' but how is this change supposed to effect the design of actual devices? The lack of an answer to this question leaves me in some doubt as to the supposed relevance of Heidegger's work to ecology.'

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