TURNING DATA INTO WISDOM: WHO DECIDES?

John Peet and Katherine Peet

The introduction of new technologies is associated with a major change of employment in society, from the traditional agricultural and manufacturing sectors, to the service sector. The availability of more and better services will, according to some analysts, generate wealth that will absorb the surplus labour made available from the traditional sectors. We believe this will be at best a short-term phenomenon. In the longer term, many service sector jobs will be taken over by computer-based systems. In addition, for most people employment also provides security, a pattern for their day, social relationships, a place to belong, and the opportunity to be involved in learning. These will be difficult to achieve in the newer jobs, and much more difficult for the jobless or those in short-term employment. It is critical that the meaning of 'work' in society be re-examined.

Under a regime in which 'hard', technological systems are programmed to treat society as a collection of individuals, we see the need to develop social, political and economic decision-making tools from the 'soft' systems viewpoint. These are not predictable from the sum of individual properties; they are properties of the system, and of the system alone. We also discuss analogies between societies and nonequilibrium thermodynamic systems, which we believe can be helpful when looking at questions involving invention of futures.

INTRODUCTION

Much of the enthusiasm behind use of the term 'New Technology' is misleading and unhelpful, because it hides the fact that there are enormous problems, as well as potential benefits associated with introduction of new technologies in our society. What we attempt to do in this paper is emphasise the need for us to understand, not only the reality which faces us in 1987, but also what sort of society we want to be part of. Our personal perspective is that the reality of today needs to be transformed, in order to produce the kind of society that *we* want to be part of. We see education as a non-violent way for citizens to work together towards that transformation.

The decision has to be made about whether the function of education is only to reproduce the status quo or whether it can be an agent of transformation. The notion that education can be a significant agent of social change is now frowned upon; nonetheless, it is clear that education can be a catalyst for change, or else it can be an obstacle to change. We believe that unless the education system becomes part of a coherent social policy it will continue to offer hopes it cannot fulfil. That they are empty promises may be the secret weapon of the powerful.[1]

In order to determine the effects of new technology on work, we need to be much more specific in defining the meaning of the word 'work'. As with 'education', 'work' has a great deal to do with people's values. We pose some key questions, in order to illuminate the meaning of 'work'.

DIRECT EFFECTS OF NEW TECHNOLOGIES

The subject has potential social impacts that span a spectrum from Utopia to Purgatory, and is therefore deeply political in all its ramifications. For this reason we should not be fooled by the 'Gee-Whizzery' of new technology, but instead open our minds to the totality of what faces us.

What is new technology anyway, and how is it likely to affect us? In our opinion, there are many such new technologies, but probably the most important relate to information and communications. US President Reagan had this to say when he proclaimed World Communications Year in 1983:

> As we describe the world in which we live today and the world we are building for tomorrow, we see two trends growing side by side, a universal quest for more and better information, and new opportunities and technologies sprouting up to meet this quest almost faster than we can imagine. We Americans have an unprecedented opportunity. We can embark on a noble journey to reach our dreams and to serve mankind, and we can do it through communications, creating new growth, jobs and hope for our people and for the rest of the world. This is our challenge for the 1980s.[2]

It seems that New Zealand is being asked to accept that sort of view, as the basis for our great leap forward. Is it such a leap, or is it just political hyperbole? An attempt to answer this and other questions forms the basis of our paper. We then discuss some perspectives which we believe may be of value in synthesising a response to the question in our title.

WHO BENEFITS? WHO LOSES?

Good or bad, the new technologies are here, and some of their effects are already apparent. So very important direct questions which must be asked are "Who Benefits? and Who Loses? The application of technology has liberated a lot of people from drudgery, and has enabled many dirty, dangerous and degrading jobs to be mechanised — these are all credits. But its introduction has also separated many people from a form of participation in society, and has taken away much of what is creative from work. Together with its associated myths and ideologies, technology has to a considerable extent assisted in the process that Illich has referred to as the reduction of people to economic neuters — items of production, consumption and exchange. It seems that it is only within such a context that industrialism is able to succeed (this is common ground on which both capitalism and socialism meet in practice).

The most obvious beneficiaries of new technology will of course be those who use it to improve productivity and profit. There will also be spinoff benefits for those who are employed as a direct or indirect result of its installation, but not that many. After all, one cannot keep on installing labour-saving equipment in society without eventually saving labour! The net effect of much of the new technology is simply to displace labour — at a time when unemployment is high. The point hardly needs making, that while freedom of choice is available to those who install new technology, those who are displaced are not free to choose redundancy. So the next question which must be answered is "Who Makes the Decisions?"

TECHNOLOGICAL CHANGE AND EMPLOYMENT

In the past, major changes in employment brought about by the introduction of new technologies were eventually overtaken by growth in other industries which took up the slack of employment, and continued the processes of economic growth. The idea that this will occur again is typical of conservatives (of whatever party political position). Their faith in the future is largely inferred from (perhaps ideologically-coloured) perceptions of what went on in the past. They often forget or ignore the fact that there were decades of agony for the unemployed and under-privileged, during earlier stages of economic restructuring. They also ignore the fact that much of the capital equipment which replaced earlier technologies could be made locally, or be paid for by increases in trade of other commodities which were made locally. This possibility is no longer as clear-cut as in the past.

Jobs are being created as a result of installation of new technologies in countries such as New Zealand, but many of those jobs are situated in the electronic sweatshops of Taiwan, South Korea and the Philippines. The real beneficiaries appear to be a small elite, both here and in those countries. Some new wealth will be created by these more efficient technologies, but a lot will simply be transferred, as greater rewards to capital and less to labour. The new jobs that will arise as a result of this wealth will probably be in new industries, mainly in the service sector.

In manufacturing there is the likelihood of significant developments, but while there may be growth in some areas, new technologies will probably be used there too. In many cases the overall effect is likely to be jobless growth. Commerce is an area where there are enormous possibilities for increases in productivity and labour replacement by new machines. There will be significant numbers of short-term jobs during the interim stages of transition from 'traditional' people-driven activities to machine-driven commerce, using electronic funds transfer and similar technologies. Similar job-replacing technologies will be applied in many areas of the economy. Whether new jobs will be created in anything like the same numbers as those which are lost is doubtful.[3]

The main areas of growth anticipated by most people are in the service sector, especially in commercially-related communications and information technology. Some people believe that the sky is the limit here, and that we are moving towards a society in which all our primary output (food and so on) is produced by say 5-10 per cent of the workforce (11 per cent in 1984),[4] and manufacturing, construction and so on are done by say 15-25 per cent (about 30 per cent in 1984). The remaining 65-80 per cent will need to find jobs somewhere else. Currently, some 53 per cent work in the service and related sectors. If we remember that large numbers of existing service sector jobs are already in line for replacement by higher productivity machines, and that many people are severely limited in their ability to pay for services, can we really expect a massive increase in conventional jobs in this area? We do not think so, and in spite of brave words in some places, neither do a lot of other people. Consider, for example, the following passage:

> As the types of jobs change, so will the definition of full employment. Currently, a 4.5% unemployment rate is considered full employment. But by 1990, 8.5% unemployment will be considered full employment.[5]

Clearly, if unemployment increases, one can just redefine the meaning of the term 'full employment', and one's problem disappears! Already in New Zealand we are becoming accustomed to levels of unemployment that were unthinkable a decade or so ago. Answers to

our basic questions "Who Benefits? and Who Loses?" and "Who Makes the Decisions?" are becoming apparent.

SOCIAL FACTORS

New Growth Areas

Communications and information technology are claimed to hold out the joint possibilities of substantial new economic growth and significant job prospects. Before looking at these areas, however, it is important to make the point that people cannot eat silicon chips, and they cannot be housed, clothed, washed or kept warm by video terminals. In other words, there are basic material needs of people which should be satisfied before we start looking at longer-term, less defined goals.

Developments in electronics, and in particular the mass production of cheap devices using integrated circuits, are the basis for a revolutionary change in the way in which our society is developing. In the past, technological developments occurred mainly by increasing the power of human muscle. For the first time in history, new technology provides the means of enhancing and even modifying the power of the human nervous system. It enables extremely advanced and reliable self-regulating machines to be constructed, and to run unattended for long periods. This new technology is genuinely different, in principle and applications, from previous technologies, and for this reason we doubt whether the lessons of the past have much relevance for the future. They are not really lessons anyway — they are at best imperfect analogies which if put properly into context can help us understand the present a little better. There is, however, one lesson of the past which may have something to tell us. That is, that the last 50 years have given us a highly developed system for turning physical resources into rubbish. We must be on our guard against the use of the silicon chip to produce and disseminate informational rubbish at megabaud rates![6]

We would then ask the question — Who generates, and who makes available, and who controls the availability of critical data? According to Cant:

> News has now become a commodity and the media are predominantly large commercial corporations. These corporations are primarily responsible to their investors and they get the bulk of their income from advertising placed by other corporations. News has thus made the transition from being a 'social good' to being a 'commodity'; events can be selected, processed and packaged to meet the demands of the market. Those who meet the greatest part of the bill are not the television viewers nor the newspaper readers who are the recipients of the information . . .

those who provide the news and those who receive the news are not represented when the decisions are made as to what news will be selected and how it will be presented.[7]

In a context such as this, how do we define "education"? Is education only for children, or for adults too? Who decides what is to be taught and learned?

Information and Decision-Making

We believe that improvements in communications technology are simply not enough, if they are not reflected in better identification and communication of the 'real' messages which enable a society to work effectively towards achieving its goals. More and faster communication of imperfect information does not necessarily generate wisdom.

We find the comment of one author quite frightening. He suggests that "Some thinkers estimate that over 95 per cent of all the knowledge we will possess in 2020 will have been acquired just since the 1970s." We cannot accept that only 5 per cent of what we call knowledge — wisdom — will be all that is left as an inheritance from our ancestors. Another author puts it well: "The modern fetish for collecting information is creating an overinformed yet woefully unenlightened Society."[9] In our opinion, as a society we seem to be learning more and more about everything except that which really matters. Again, we ask the basic questions "Who Benefits? and Who Loses?", "Who Makes the Decisions?", and "Who controls the availability of critical data?"

Social Control

We ask also the question "Who Controls Whom?", and "Where do the People come into the Picture?" Where does ultimate authority lie in society? Can the elite who make most of the real decisions be trusted? People are being expected to be satisfied with the mindless stream of electronic garbage which fills the readily-available channels of communication, and to listen or watch every quarter hour, for encouragement either to buy the latest goodies, or to envy those who can. This sort of communication has little to do with empowering the population to turn data into wisdom.

It seems to us that control of the nature and direction of change in society is falling into a steadily smaller number of hands. The vast majority of people either do not have access to much important information, or else cannot understand that which is highly specialised. In addition, they are conditioned not to ask awkward questions. We have, as a society, reduced the understanding of the

meaning of 'democracy', to its simplistic subset, 'parliamentary representation'. A more participatory democracy would enable those people who are affected by decisions to be involved in making those decisions. It is in decisions that are already being made that we see the greatest problems for democracy and for our society. These are being made according to criteria that have never been properly exposed or debated, and are seldom if ever subjected to the clear light of an open, fully democratic audit.

Work and Employment

'Work', in the conventional sense of a paid job, has been used as a means of distributing income in society. In our opinion, other methods of income distrubution will need consideration for the future. We cannot see any of the conventional responses by government (job subsidies, training programmes, job sharing, etc.) as being more than temporarily successful. New technologies in most cases enable cheaper and better quality goods and services to be produced, and many labour-intensive jobs can be expected to be lost over the next decade or two.

We suggest that the primary function of 'work' for most people is to supply: personal security; access to income; a pattern for their day; social relationships; social status; a place to belong; and the opportunity to be involved in learning. These will be more difficult to achieve in many of the newer jobs, and will be much more difficult for the jobless or those in short term employment. It is, therefore, critical for our society to re-examine the meaning of 'work'. It is no answer to rely on 'welfare' to provide an income for 'unemployed' people to survive on. A full response to people's needs goes far beyond a simplistic welfare payment. Welfare also induces a state of dependence, which can paralyse, not only citizens' hopes and aspirations, but also their ability to make meaningful contributions to society.

Power and Purpose

Everywhere there are means, nowhere ends. Everywhere market prices, nowhere moral values. In our opinion, unless we as a society can first face up to the question of purpose, and only then reason our way towards some moral consensus, it is dishonest even to try to develop policies (such as on work and education) relating to new technology. But it would be even worse to leave matters alone. The reductionist world view that guides most of our decision-makers has at the same time increased the kind of knowledge that yields power, and diminished or undercut the kind of knowledge that yields purpose.[10]

We are dangerously close to developing all the structure of a social system in which availability and communication of the information that is the source of power, wealth and authority is effectively controlled by a small elite of politicians, financiers and technologists. Information, education and work are treated as commodities. The machines which the elite use are programmed to serve them, their ideologies and models, and their goals. Such a society could, we feel, be validly described as 'Techno-Fascist'.

Social Change

Society as we know it is under strain, and we think the strain is showing. Current social structures can be expected to undergo major changes over the next decade or two. These changes will run the risk of involving civil unrest and repressive reaction. Within limits, this is not necessarily a bad thing. Conflict can be creative, but there are costs which must be borne by society. (We also remember theologian Bloch's comment that nothing new would ever have come to exist in history, if it had not first existed in man's imagination and haunted her daydreams!)

As with the original Luddites, the reaction of many of those affected by the changes will be to attack the machines, whereas we suggest it is the systems and the myths and ideologies which are really in control. But since these systems are powerless without the machines, much more so than in the 18th century, we can expect also steady increases in the degree of physical and legal protection afforded these machines and their information networks.

> The computerised environment will be highly structured; one of the most structured in history. So structured will it . . . be that from the standpoint of traditional freedom, a perfectly computerised environment will be a form of electronic prison. Every exchange will have to be performed according to the rules of the computers; no room for spontaneity, improvisation, quirkiness, the unexpected, the unstructured. As Ivan Illich says: 'Whatever structurally does not fit the logic of machines is effectively filtered from a culture dominated by their use'.[11]

ALTERNATIVE PERSPECTIVES

Systems Thinking and Non-Equilibrium Thermodynamics

The logic of machines has deeply affected our social structures. Indeed, it has contributed to the acceptance of an ideology from which we seem unable to break free. As scientists, we believe this has come from the Cartesian scientific viewpoint. In such a context, reality is static and stable; cause and effect are directly and simply

related; deviations from 'equilibrium' are soon corrected; and any change occurs slowly and linearly. The theory of 'hard' systems (such as those in engineering) depends upon deterministic behaviour, in which outcomes are clearly predictable from causal factors. More modern scientific understanding, particularly that coming from 'soft' systems thinking, ecology and the new physics (especially the thermodynamics of nonequilibrium systems) recognises that real natural (and social) systems actually exist in a state of dynamic instability.

The world contains interrelated hierarchies of activity systems and subsystems, human and non-human, all in states of continuous movement and change, and open to flows of matter, energy and information from all directions.[12,13] Within these systems, there is an uneasy balance between two processes; the one of adaptation to the environment, the other characterised by fluctuations which tend to drive the system into states of disorder. Each system is thus simultaneously engaged, both in maintaining the status quo and oriented towards change and transformation. General systems thinking provides a framework for looking at the dynamic characteristics of complex structures such as ecosystems and societies. Nonequilibrium thermodynamics exposes us to the fact that there is a large component of indeterminacy involved in looking at the future behaviour of such systems, and that this is not at all the same as statistical uncertainty of outcomes (as found in 'hard' systems).

The systems approach[12,14] is general, in that it is not limited in scope and applicability to any specific discipline. It involves studying the whole of a system, in terms of the organisation, processes, relations, dynamic tensions, etc., that characterise the components that make up the system. The systems approach thus encourages the perspective shift from an object-oriented model to a process-oriented model. The Cartesian search for the solid objects of reality is replaced by the understanding that at higher levels of organisation (or hierarchy) in systems, emergent properties arise which are not always directly predictable from the separate properties of its parts. When the related ideas of communication and control are also included, we see why a system has properties which are functions of the system as a whole, going far beyond those which are predictable from the sum of its component parts.

We believe that, when the 'hard' Cartesian viewpoint is complemented with the 'soft' systems viewpoint, social reality is more easily understood. Further understanding is gained by acknowledging the limitations on growth of physical (and social) systems, also obtained from ecological and thermodynamic arguments. Together with ideas obtained from the thermodynamics of nonequilibrium systems,[13] we achieve a perspective of options for the future which is

markedly different from that of most decision-makers, and which we feel can restore a degree of hope to people.

A New Framework

By describing tools such as these, and indicating the perspectives they illuminate, we hope to have shown that scientists have an obligation to complement the traditional methods which have dominated our ideas and affected our thinking about social mechanisms, by those of systems thinking and thermodynamics. In so widening the framework for the development of social policy, we believe we can empower citizens to transform their despair into hope. People will then discover their commitment and how to achieve it.

> We say that life is indeed darkness save when there is urge
> And all urge is blind save when there is wisdom
> And all wisdom is vain save when there is work
> And all work is empty save when there is love . . .
> Teachers . . . give not of their wisdom but rather of their faith and their lovingness
> If they are indeed wise they do not bid you enter the house of their wisdom, but rather lead you to the threshold of your own mind.[15]

The 'new' physics has freed us to develop a new framework for thinking about the world. As Zukav observes, we have accumulated evidence which indicates that the key to understanding the universe is YOU.[16] The old Cartesian model, that the whole comprises the sum of its parts, with simple interrelationships between cause and effect, is demonstrably inadequate in the physical and natural sciences. We believe this is also true in the social sciences.

The Role of Education

Some people argue that the idea that education can be a significant agent of social change is now inappropriate. We do not agree. We believe it can be such an agent, and indeed must be, if violent conflict is to be avoided. This is not the same thing as suggesting that change does not involve some forms of conflict. The very act of recognition of conflict, and preparation to deal with it, can be a trigger for initiating the learning process. It is in any case clear that education can be either a catalyst for change or an obstacle to change. We challenge people to play the catalytic role. The purpose of a catalyst, after all, is to provide a pathway of lower activation energy, so that a desired change can proceed more easily.

The 4th Unesco Adult Education Conference in 1985 pointed a general direction for such a pathway, in its unanimous adoption of a *Declaration on the Right to Learn:*

"The act of learning, lying as it does at the heart of all educational activity, changes human beings from objects at the mercy of events to subjects who create their own history." It challenges citizens ". . . despite or indeed because of the scale of contemporary problems, to make a determined and imaginative effort to bring about the intensive and specific development of adult education activities, so that women and men, both individually and collectively, can equip themselves with the educational, cultural, scientific and technological resources necessary for a type of development whose aims, requirements and practical procedures they themselves will have chosen".

According to the Declaration this Right to Learn is:

the right to read and write; the right to question and analyse; the right to imagine and create; the right to read one's own world and to write history; the right to have access to educational resources; the right to develop individual and collective skills.

We see the need to go beyond teaching individuals to change (e.g., by providing employability skills) or teaching people to 'cope' (e.g., by providing "survival" or "leisure" skills). To talk of 'flexibility' or 'adaptability', as if they can be extracted from social contexts, is delusory. Further, there is a danger that such attitudes to education will mean that unemployment gets passed from one, relatively weak group to another, without addressing the underlying problem. Some positive suggestions are indicated in the report, *Action for Learning and Equity: Opportunity for Change.*[17] The next move in non-formal education is to devise mechanisms to resource lifelong learning.

The Role of Work

To bring about the redefinition of work is a major task of education. Paradoxically, the existing bonds between education and jobs have been strengthened by the response to unemployment which provides individualised training. But these strengthened bonds devalue those aspects of education which cannot be reduced to individualised training for jobs. Therefore, we suggest that education must be broadened, not narrowed, so that it may provide a view for the future, not simply a response to the past.

Work is fundamentally about values. The social status attached to citizens' predominantly social roles, and how they achieve access to income, must, we believe, be the basis for evaluating the merits of proposals which redefine work. If we are to avoid the 'techno-fascist' scenario painted earlier, we must ensure that this redefinition of work is a priority. The reduction of work to 'wage labour' or 'market work', dependent upon profit in a deregulated labour market is clearly

inadequate; too many people are hurting. The notion of a guaranteed minimum income offers some hope, in that it breaks the cycle of control by the marketplace.

We believe it is more helpful to use the systems approach, in redefining work and in the development of social policy. At the moment, society accepts that the distribution of wealth is achieved by the job market and welfare payments. In the future, we see a more complex mechanism being required. A "Right to Work" which would extend the status of being employed to more citizens, does, however, require those currently in jobs to give up some of their power and wealth. New social institutions would be needed, to meet human and social needs. For example, the implications of working without direct monetary reward for effort suggest some form of dependency. Sex-role definition of this dependency will no doubt lead to definition of a more explicit role for such new social institutions.

Work occurs in the black, communal and household economies, as well as within the marketplace. The relationships between these are of critical concern in redefining work. Priority must be given to going beyond the monocultural dominance and racism evident in New Zealand-Aotearoa. Ecological criteria, relationships between men and women, and new types of decision-making also need to be taken into account in this redefinition of work. Some key questions are posed by Watts,[18] in developing a context for work in a society within which individual choices can be made:

What relative value do we attach to work and leisure?
What relative value do we attach to paid work and unpaid work?
What are the forms of work we are prepared to pay for?
How are these forms of work to be distributed?
How is this distribution to be related to the generation and distribution of wealth?

CONCLUSIONS — THE CHALLENGE

Part of the challenge which faces us is to recognise, first that we need to decide whether the function of the education system is simply to reproduce the status quo, or whether it is to be part of a process of transforming the status quo into an exciting future. Another part of the challenge is to examine the place of models. This is particularly relevant in those areas of social planning which derive some of their legitimacy from the use of 'scientific' tools. Major paradigm shifts have occurred in the physical and natural sciences over recent years, and these new frameworks (e.g., systems thinking, nonequilibrium thermodynamics) must be contrasted with the traditional (e.g., Cartesian) ones. The new perceptions can markedly enhance our

understanding of the detail of social systems, and thereby allow us to avoid imposing simplistic structural relationships onto the parts of a system. In doing so they also encourage us to think about soft systems in a way that frees us to see some of the complexity and richness of interactions between the parts, that our Cartesian inheritance so often denies.

There is a widespread feeling of hopelessness in the community, in that for many, there is no light at the end of the tunnel, unless it is that of an oncoming train. We believe the atmosphere engendered by these feelings is damaging our society, especially the young. We suggest that social priorities must focus on turning data into wisdom. We can benefit from many of the new technologies, but only if we use them wisely, not blindly. The effect of new technologies on work and eduction will in large measure be determined by answers to the question "Who Decides?"

The challenge exposes the urgent need to match developments in the physical and natural sciences, with demythologising the models used in social planning. Indeterminacy must be distinguished clearly from uncertainty. It also exposes the danger of reducing education to individualised training. The 'Right to Learn' is, indeed, an indispensable tool for the survival of humanity. Such a challenge allows us to take a proactive role, in cases where a simple reactive role puts us at the mercy of events. Acknowledgement of the 'Right to Learn' promotes citizens as the subjects of their own history. We cannot predict the future, but we can invent it. If we do not do so, it may invent us!

NOTES AND REFERENCES

1. Jack Shallcrass, 'Small futures for posterity', *NZ Listener*, 95, 2119, 23 August 1980, p. 78.
2. President Ronald Reagan, 'A pathway to progress', *Economic Impact*, 42, 2, 1983, p. 20.
3. Alan Porter, 'Work in the new information age', *The Futurist*, 20, 5, September-October 1986, pp. 9-14.
4. Data obtained from the NZ Department of Statistics, *Monthly Abstracts*.
5. Marvin J. Cetron, 'Getting ready for the jobs of the future', *The Futurist*, 17, 3 June 1983, p. 16.
6. H. Skolimowski, 'Information — Yes, but where has all our wisdom gone?', *The Ecologist*, 14, 5-6, 1984, reprinted in *NZ Environment*, 50, winter 1986, pp. 16-18.
7. Garth Cant, 'Towards the third millenium: the geography of information and the world of work', in I.F. Owens and A.P. Sturman (eds), *Geography for the 1980s*, Proceedings of 12th NZ Geography Conference, NZ Geography Society Conference Proceedings Series, no 12, 1984, p. 9.
8. Ken Marsh, *The Way the New Technology Works*, Century Publishing Co., London, 1982, p. 19.

9. Skolimowski, *op.cit.*
10. C.E. Herman Daly, 'On thinking about future energy requirements', *CONAES Supporting Paper 5,* National Research Council, National Academy of Sciences, Washington, 1979, pp. 230-241.
11. Skolimowski, *op.cit.*
12. Singa Sandelin, 'Nationwide Planning as a Motivating Factor', paper to European Conference on Motivation for Adult Education, Hamburg, February/March 1983.
13. Ilya Prigogine and Isabelle Stengers, *Order Out of Chaos,* Heinemann, London, 1984.
14. Peter Checkland, *Systems Thinking, Systems Practice,* Wiley, New York, 1981; T. Downing Bowler, *General Systems Thinking: Its Scope and Applicability,* North-Holland, Amsterdam, 1981.
15. Kahlil Gibran, *The Prophet,* Heinemann/Pan Books, London, 1980, p. 33 — language desexised.
16. Gary Zukav, *The Dancing Wu Li Masters: An Overview of the New Physics,* Flamingo 1982.
17. National Council for Adult Education, *Action for Learning and Equity: Opportunity for Change,* report for the NZ Minister of Education, prepared by the Lifelong Learning Task Force, Wellington NZ, November 1985.
18. A.G. Watts, *Education, Unemployment and the Future of Work,* Open University Press, Milton Keynes, 1983, p. 174.