Computer Technology: An Academic Cargo Cult?

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Communications Technologies and the "Information Revolution"

In the 1620s Francis Bacon, in search of a new scientific method, looked forward to the day when "the mind itself be from the very outset not left to take its own course, but be guided at every step, and the business be done as if by machinery." Bacon articulated the hope of "building in the human understanding a true model of the world, such as it is in fact, not such as man's own reason would have it to be...those foolish and apish images of worlds which the fancies of men have created in philosophical systems, must be utterly scattered to the winds."[i] Descartes (1968) was gripped by a similar passion for a mode of thought which would be stripped of all its most personal qualities. Leibniz dreamed of a machine which, programmed with a question, would immediately flash the answer on a screen. In 1958 two of the prime movers in the push to develop so-called artificial intelligence wrote:

> There are now in the world machines that think, that learn and create. Moreover, their ability to do these things is going to increase rapidly until - in the visible future - the range of problems they can handle will be co-extensive with the range to which the human mind has been applied.[ii]

The dream of an infallible, universal scientific method finds an echo today in the pursuit of a theory of everything and a machine for everything. It seems to many that science has brought us to a new frontier of knowledge, and that the dream of "intelligent" machines is now a reality. I refer, of course, to the computer.

We now live, we are told, in the Information Age, one in which new forms of technology will transform our lives; we are in a transition period which is bringing upheavals no less momentous than those brought by the Industrial Revolution. Leonard Sussman (1989), an American expert on international communications, is an unexceptional and representative champion of these changes. In a recent article he tells us that

> Nearly every man and woman on earth will [soon] be able to communicate in a few moments with someone continents away. Everyone will have immediate access, at home or at the workplace, or through a nearby communal telephone, to a vast volume of diverse information - a volume such as even the world's finest libraries or news services cannot provide today. The cultures of even the smallest, least familiar peoples will be preserved, and made accessible to everyone, everywhere. New comunications will induce the human mind to think more clearly, to test new possibilities, to gain confidence and even exhiliration from the process of idea- discovery. (p.60)

New technologies bring new educational imperatives. 'The core of the problem and the key to its solution [Sussman tells us] is the need to computerise information, make it

accessible to the broad public, and put hundreds of millions to work in the post-industrial information era.' (p.61) Communications technology, he asserts, is altering every form of human relationship and activity.

> No aspect of humankind can any longer escape the influence of the new communications technologies. They will soon alter all the natural and social sciences, all levels of education, all forms of cultural activity, all geopolitics. Everywhere. (p.65)

He enthuses about the fact that every eight years computer science doubles the entire volume of information available to us. He is hugely excited by the educational possibilities:

> The new technologies are the conduit for generating vast information-power. Almost simultaneously, world-wide, they convey, store or retrieve current speech, text, data or pictures, and information from all of human history. They also facilitate problem-solving in all human disciplines...widen the horizons of individuals through far greater cultural and educational opportunities... encourage the user to develop greater electronic literacy and the power of logical thinking...By mastering intricacies of the computer, we train our biologic brains to think. And perhaps one day we will programme the computer to develop artificial intelligence. (p.61)

In much the same vein, John Naisbitt in *Megatrends* tells us that

> ...we now mass-produce information the way we used to mass-produce cars. In the information society, we have systematized the production of knowledge and amplified our brain power....we now mass-produce knowledge and this knowledge is the driving force of our economy.[iii]

One could catalogue such commonplaces more or less indefinitely. On all sides we are being told of the wonders of these new technologies and of the almost miraculous feats of the latest "generation" of computers. As Theodore Roszak (1986) has remarked

> ...in the presence of so ingenious a technology, it is easy to conclude that because we have the ability to transmit more electronic bits more rapidly to more people than ever before, we are making real cultural progress - and that the essence of that progress is information technology.(p29)

The widespread and rather breathless enthusiasm for these new technologies is really a kind of technological fundamentalism.

Computers as Cargo Cult

In the Western cultural tradition of the last few hundred years we can discern a line of thought running from Bacon and Descartes to the present apostles of the so-called "information revolution". But there is another current in the Western tradition, one which resists the ever more totalitarian claims of the sciences and which is suspicious about the claims made for machines of one kind and another. The Faust myth in its various forms, Blake's prophetic poems, Mary Shelley's*Frankenstein*, various works of the English and German Romantics, Dickens's novel *Hard Times*, the work of the great French metaphysician Rene Guenon[iv] and more recently Kurt Vonnegut's anti-Utopia *Piano Player,* are amongst the many landmarks in this counter-tradition. To some it will no doubt seem fanciful that such writers have anything to tell us about our current situation.[v] Others will mutter about Luddites and self-interested cranks - to which one

answer is that history has proved the Luddites right in their fundamental intuition that machinery would indeed destroy many traditional arts and crafts, and and thus annihilate many honourable vocations in which countless generations found dignified work.

The title of my paper suggests that, in an educational context, the enthusiasm for the computer in particular, and for other forms of technological whizz-bangery, really amounts to a kind of cargo cult. A cargo cult is a quasi-religious movement deriving from a mistaken attribution of supernatural powers to some quite mundane entity and from the belief that the paying of homage to it will bring a superabundance of material benefits. Something of the kind is going on in academia. Not only do we look to these technologies to solve problems which are quite outside their competence but our technophilia constitutes a much more serious problem than those which we hope can be so solved.

I am not an expert on computers or on any other form of technology which might be turned to educational ends. I am not embarrassed by this fact. It is important that ordinary people involve themselves the debate: it will certainly not do to leave it all in the hands of the experts. As Roszak remarks in *The Cult of Information* (1986)

> ...the discussion of computers and information is awash with commercially motivated exaggeration and the opportunistic mystifications of the computer science establishment. The hucksters...have polluted our understanding of information technology with loose metaphors, facile comparisons, and a good deal of out-and-out obfuscation. There are billions of dollars in profit and a windfall of social power to account for why they should wish to do this. Already there may be a large public that believes it not only cannot make judgements about computers, but has no right to do so because computers are superior to its own intelligence - a position of absolute deference which human beings have never assumed with respect to any technology of the past. (p.61)

I am not blind to the limited but important benefits these new technologies can confer. Indeed I typed this paper on a Macintosh: its advantages over the typewriter are considerable. But I do share Roszak's view that the educational claims made for computers are not only grotesquely inflated but dangerous. I hope to make clear some of the grounds of my concern to explore a few ideas which, in my view, we should resist a strenuously as possible.

Thinking Machines?

The first such idea is that the computer is analogous to the human mind, that it can properly be called "intelligent", that it can replicate the higher functions of the human mind. The anthropomorphizing of machines, betrayed by the attribution of such qualities as "intelligence", "memory", and "friendliness", is by no means insignificant. Not only does the jargon endow computers with qualities they do not possess but it is often used to affirm the superiority of the computer to the human mind which, John Naisbitt tells us, 'not only is limited in its storage and processing capacity, but it also has known bugs; it is easily misled, stubborn and even blind to the truth...'[vi] Conversely, 'The subliminal lesson that is being taught whenever the computer is used (unless a careful effort is to be made to offset that effect) is the data processing model of the mind.'(Roszak, 1986, p.246)

Another contemporary line of thinking leads us to Robert Jastrow's vision of a not-far-distant future where

> At last the human brain, ensconced in a computer, has been liberated from the weakness of the mortal flesh...It is in control of its own destiny. The machine is its body; it is the machine's mind...It seems to me that this must be the mature form of intelligent life in the Universe. Housed in indestructible lattices of silicon, and no longer constrained in the span of its years by the life and death cycle of a biological organism, such a kind of life could live forever.[vii]

I wish I could dismiss this as a nightmarish vision from a science fiction novel. But this is no such thing: it is the project, as bizarre as anything in science fiction, of some of the world's best computer scientists.

No one denies that computers can *store* vast amounts of data, far more than can be accommodated in the mind of any individual. Computers are also able to *process* this data with astonishing rapidity. Here indeed is an invention which can perform computational tasks with extraordinary speed and efficiency. No denying that the computer is hugely useful for administrative and data-sorting tasks - in university administrations and in libraries, for instance. But to move from here to the notion that computers can be developed to perform some of the higher functions of the human mind is, in my view, a very dangerous move indeed. It is then not such a big step to such absurd lucubrations as the following, written by Marvin Minsky in 1970:

> In from three to eight years, we will have a machine with the general intelligence of a human being. I mean a machine that will be able to read Shakespeare, grease a car, play office politics, tell a joke, have a fight. At that point, the machine will begin to educate itself with fantastic speed. In a few months, it will be at genius level, and a few months after that, its power will be incalculable.[viii]

He went on to add that such machines might well decide to keep humans as pets. Minsky's colleagues at MIT thought this scenario was a bit reckless: the general feeling was that such a machine might take up to fifteen years to develop.

The mind-computer analogy depends on another confusion: the notion there is some common measure between information and knowledge. Much discussion of the possibilities of the computer blurs the crucial distinctions between information and information-processing on one hand, and on the other those many capacities of the human mind which no computer could possibly replicate - memory, imagination, intuition, the creation of ideas, the ability to interpret - all of which all play their part in the development of what can properly be called knowledge. Unhappily,

> The word [information] has received ambitious, global definitions that make it all good things to all people. Words that come to mean everything may finally come to mean nothing; yet their very emptiness may allow them to be filled with a mesmerizing glamour. The loose but exuberant talk we hear on all sides these days about the 'information economy', 'the information society', is coming to have exactly that function. These oft-repeated catchphrases and cliches are the mumbo jumbo of a widespread public cult. (Roszak, 1986,p.10)

The computational mode is sequential, regulated, predictable, formal, quantitative. But human experience, imagination, thought and creativity are not amenable to this model:

to reduce the complexities of the mind, and the processes of knowing and understanding to a computational model is to surrender to a reductionist and mechanistic scientism.

Computers cannot deal with the very stuff of human thought. They can only offer us mechanical counterfeits. Contrary to much contemporary opinion, thought is generated and organized not by data or information but by ideas. What are ideas? They are images, metaphors, organizing patterns which connect and make meaningful disparate phenomena and areas of experience. They derive from our subjective experiences, from the creative interplay of imagination and memory and feeling as well as from the rational workings of the mind. Human memory is nothing like the so-called "memory" of computers which is simply the capacity to retrieve data. Human memory represses, distorts, projects, embellishes. It works through the mind, the senses, the feelings. Creative thought is supple, unpredictable, fluent, mysterious - in short, not at all computer-like. As Thomas Kuhn (1963) has shown, even scientific thought, at least in its higher reaches, is not at all computational. The great scientific discoveries have proceeded through astonishing leaps of the imagination, through intuitions, through flashes of insight rather than through either the accumulation of empirical data or the workings of an apparently objective rationality.

Ideas do not grow out of empirical observation or from raw data; they are not based on information. Granted information may shape and colour our ideas but certainly cannot constitute them. Ideas are created by a consciousness in search of meaning. We cannot think without ideas. As Roszak (1986) has pointed out ideas actually generate information rather than vice versa, as is so often thought. The mind works with ideas not information. Ideas contain, define and produce information but are by no means identical with it.

> Every fact grows from an idea; it is the answer to a question we could not ask in the first place if an idea had not been invented which isolated some portion of the world, made it important, focused our attention, and stimulated enquiry.(p.126)

Information can only be gathered and organized in response to questions which are governed by ideas and values. "In the long run, no ideas, no information." (p.128.)

If we accept a recent definition of knowledge as the capacity to interpret and'to establish relevant relationships or connections between facts, data, and other information in some coherent form and to explain the reasons for those generalisations' (Bell, 1985, p.17) then the word "knowledge" cannot properly be applied to any of the computer's capacities. Computers are utterly incapable of generating either ideas or values or meaning , just as a computer is incapable of intuition or imagination or of human sympathies of any kind. Likewise computers are utterly incapable of interpretation. Interpretation, if it is to mean anything, must mean the making of judgements - aesthetic, moral, ideological, intellectual. Learning should consist, among other things, in becoming familiar with and learning to handle a diversity of interpretations - interpretations of the human condition, of the social order, of art, of philosophy and science, of the natural world, and so on. Only thus can we create our own interpretations. There can, by definition, be no objectively correct interpretation of anything.

To speak and write of computers offering us "interpretations" is a nonsense: 'The prospect of machine interpretation is not only whimsical; it is absurd. Interpretation

belongs to a living mind in exactly the same way that birth belongs solely to a living body.' (Roszak, 1986,p.154) Let us also not forget the lesson encapsulated in Plotinus's dictum of nearly two and a half thousand years ago, no less true now that it was then: 'Knowing demands the organ fitted to the object.'[ix]

One of the most fundamental questions, and one which is all too frequently ignored in the general enthusiasm for information, is 'What is worth knowing?'. It is also well to remember that there are many problems which cannot be addressed let alone solved by any amount of information. As one commentator recently put it, 'Our ignorance of the few things that matter is as prodigious as our knowledge of trivialities.'[x] Or, as Frithjof Schuon (1984) has remarked, "That which is lacking in the present world is a profound knowledge of the nature of things."(p.28) That ignorance can certainly not be remedied by information of any kind whatsoever.

If you accept what I have been saying about the divide between information and ideas, between computational processes and the movements of the human mind, and if you believe, as I do, that the principal task of education is to teach young minds to deal with ideas then you begin to understand some of my misgivings about the place of computers in education.

Computers in the Classroom

An eminent American educationalist articulates a common hope when he writes that

> ...in the long run, electronic teachers may provide exchanges of information, ideas, and experiences more effectively..than the traditional classroom or the teacher. The promise of the new technology is to enrich the study of literature, science and mathematics, and the arts through words, pictures, and auditory messages.[xi]

I am much more sympathetic to Theodore Roszak's response to this claim:

> My own taste runs to another image: that of teachers and students in one another's face-to-face company, perhaps pondering a book, a work of art, even a crude scrawl on the blackboard. At the very least, that image reminds us of how marvellously simple, even primitive, education is. It is the *unmediated* encounter of two minds, one needing to learn, the other wanting to teach. ..Too much apparatus, like too much bureaucracy, only inhibits the natural flow. Free human dialogue, wandering wherever the agility of mind allows, lies at the heart of education. (Roszak, 1986,pp.79-80; emphasis mine]

I cannot claim to be familiar with much of the research done on the educational use of computers. However the evidence with which I am familiar (eg: Beattie, 1988, pp.177-199) and my own experience suggest that when computers are used as a teaching tool several things are bound to happen: an inordinate amount of time is spent on overcoming technical difficulties and on mastering the software; students work largely in isolation from each other; contact between student and teacher is most often about procedural problems; almost inevitably the mastery of the software and of the machine come to be seen not as means towards some more significant educational end, but as ends in themselves. Consequently the ability to manipulate data through a mastery of techniques comes to be grossly over-valued. It as if the filing cabinet, the counting machine and the typewriter had become not useful but humble tools but rather the very object of study.

The technology also comes to determine the kind of tasks put in front of students. It has been claimed (Schostak,1988) that "the computer can be as much associated with play, fun, imagination, sharing ideas, self-expression as it can with rational information manipulation and the routine mindless repetition of predefined outputs...the difference depends upon how the computer is used and interpreted." (p.18) This strikes me as a very sanguine view indeed. It is much more likely that the computer is the last step in a process which began with the scientific revolution of the 17th century. The mystique of the computer and of computer-based paradigms derives in part from the philosophical traditions of empiricism and rationalism which we noted at the start of this paper.

> ["Smart" machines] have a seductive appeal to the scientific imagination, which has freely borrowed them as models of the universe at large, often reshaping our experience of the world to make it fit that model. And in this there can be the real danger that we fall prey to a technological idolatry, allowing an invention of our own hands to become an image that dominates our understanding of ourselves and all nature around us. (Roszak, 1986, 55)

The triumph of Cartesianism in particular and the new ideology of science in general has meant

> the expulsion from scientific thought of all considerations based on value, perfection, harmony, meaning, beauty, purpose, for such considerations are now regarded as merely subjective and so as irrelevant to a scientific understanding of the real 'objective' world - the world of quantity, of reified geometry, of a nature that is impersonal and purely functional. (Sherrard,1987,p.69)

Those modes of thought and understanding which go beyond the logical and the mechanical, already radically devalued by modern scientism, will be even further diminished by our infatuation with the computer. The perfect computer-driven classroom project may well be the production of the phone book or a railway timetable - a vast amount of data, highly organized into a "user-friendly" package! The surrender to scientific paradigms of knowledge does indeed lead to a kind of learning bleached of all questions of taste and value, and strips human thought of "its most intimately personal qualities - its ethical vision, its metaphysical resonance, its existential meaning' (Roszak, 1972, p.159). Where in the domain of the computer is the place for metaphor, allegory, symbol, myth, analogy? How is a computer to engender these value-laden, unpredictable and intensely personal modes of thought and experience? What becomes of questions concerning meaning, beauty, ethics, value? How are we to use a computer in the teaching of Homer? I have yet to see cogent answers to such questions.

Nor do I find much to commend the argument that computers allow students to take control of their own learning. Within a very prescribed and limited arena they may well do so.But on this issue I agree with the observations of the American poet Wendell Berry (1987):

> The responsibility to decide what to teach the young is an adult responsibility. When adults transfer this responsibility to the young, whether they do it by indifference or as a grant of freedom, they trap themselves in a kind of childishness. In that failure to accept responsibility, the teacher's own learning and character are disemployed, and, in the contemporary industrialized education system, they are easily replaced by bureaucratic and methodological procedures, "job market" specifications, and tests graded by machines. (p.86)

There is a good deal of talk about the ways in which computers might liberate teachers from some of the tasks which they presently carry out. It is much more likely that in the

long run, as my colleague Roger Sworder (1992) has suggested, the real consequence of this kind of process will be the destruction of the academic and teaching profession.

> For computer scientists, it is no doubt exciting to ask: 'Can we invent a machine that does what a teacher does?' But there is another question one might ask: 'Why should we want to invent a machine to do that in the first place?' There was never any difficulty in answering that question where the machine was intended to take over work that was dirty, dangerous or back-breaking. Teaching is hardly any of these. (Roszak,1986,p.70)

Nor will it do to see in the computer an answer to the problems of incompetent teaching, student alienation, boredom and the like. If teachers do not have the energy, the imagination or the expertise to engage their students, or if students are too alienated or distracted or demoralized to respond, then this is the problem to be addressed and solved 'from inside the experience of the teachers and the students. Defaulting to the computer is not a solution; it is surrender.' (Roszak, 1986,p.79-80) I am reminded of a Cobb cartoon in which a robot standing in front of a bank of computer-like machines addresses a begowned graduate, clutching his newly acquired degree; "Haven't you heard? The Industrial Revolution is over...we won...".

I do not have space here to canvas the ways in which the move towards technology-centered teaching might be connected to the view of education held by the federal government. It is no secret that the universities are increasingly being straitjacketed into a model derived from industrial production.[xii] It does not take much imagination to see how these trends might be related. Nor can I here examine the ways in which the computing industry has penetrated the educational systems in most industrialized countries. The agenda of developing a more or less universal computer "literacy" can perhaps more properly be seen as an attempt to make everyone computer-dependent. The marketing of hi-tech in the educational arena has been highly aggressive, sophisticated and cynical. This massive intrusion has only rarely been challenged from within the education system: more often it has been greeted with either uncritical enthusiasm or by a meek surrender. Let us also not forget that computers are expensive to manufacture, to service and to replace. Like most modern appliances they have a built-in obsolescence which demands constant up-dating - thus a cycle of endless consumption characteristic of our whole industrial system.[xiii] Nowhere is the lure and hypnotic glamour of the new more apparent than in the relentless proliferation of computers and their attendant gadgetry and software.

I will finish with a short scene from Charles Dickens' novel *Hard Times* one in which his concern over a rigorously utilitarian and information-based education is most forcefully expressed. The scene is set in the classroom of a school devoted to the Gradgrind system of education. Sissy Jupe, a young girl who has spent most of her life in a travelling circus and who has an intimate experience of horses and many other animals, is unable to satisfy Mr Gradgrind's demand for a definition of a horse. The star pupil in the class is a robotic boy named Bitzer who has no direct experience of horses. He is able to supply the necessary definition. It goes this way:

> 'Quadruped. Gramnivorous. Forty teeth, namely twenty-four grinders, four eye teeth, and twelve incisive. Sheds coat in spring; in marshy countries, sheds hoofs too. Hoofs hard, but requiring to be shod with iron. Age known by marks in mouth.' Thus (and much more) Bitzer.
> 'Now girl number twenty,' said Mr Gradgrind. 'You know what a horse is.' (p.50)

This, I think, needs no comment.

The computer was once well described as "a solution in search of a problem". The computer is all too often a false solution to a real problem or indeed an apparently real solution to a false problem. Our ideas about and attitudes to such technology constitute the real problem.

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Footnotes

[i] F Bacon *Works IV*. London: Longmans, 1870; ed. J. Spedding, R.L. Ellis & D.D. Heath; pp.157-158; quoted in T. Roszak, 1972; pp.157 & 163.

[ii] Newell and Simon, quoted in T. Roszak, 1986, p.22.

[iii] J. Naisbitt *Megatrends* New York: Warner Brothers, 1982; quoted in T. Roszak, 1986, p.35.

[iv] In particular see *The Reign of Quantity* Harmondsworth: Penguin, 1972; Tr. Lord Northbourne. (First published in french in 1945.)

[v] For a critique of "Ideologies of Anti-Technology" see an article under that title by N.R. Evans in *Quadrant* July 1980

[vi] John Naisbitt Megatrends quoted in T. Roszak, 1986, p.52.

[vii] R. Jastrow *The Enchanted Loom: Mind in the Universe* New York: Simon & Schuster,1984; pp.166-7; quoted in T. Roszak, 1986, p.134.

[viii] *Life*, Nov 20, 1970; p.586; quoted in T. Roszak, 1986; pp.144-5.

[ix] Quoted in E.F. Schumacher, 1977; p.49.

[x] Gai Eaton, cited as an epigraph in *Tomorrow* XII.iii.1964; p.191.

[xi] Dr Ernest Boyer, President of the Carnegie Foundation for the Advancement of Learning, "Education's New Challenge"*Personal Computing* September, 1984; quoted in T. Roszak, 1986; pp.77-78.

[xii] See B. Huppauf, 1987.

[xiii] See W. Berry, 1991, p.171.