The opposite of choice
New technologies and new markets in Australian education

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Once upon a time in the Wes...[1]

Most Australian university teachers can see why the lecture, lab and seminar may sometimes be ineffective ways of teaching an increasingly dispersed and busy body of students. Most are willing to subject themselves to advice on teaching technique, even from progressivist teaching evangelists. Once, it could be claimed that the disciplines were inseparable from traditional routines and drills that made scholars and formed habits useful in other walks of life, even if these were hard to explain to outsiders. That argument seems to have been lost. Rationales for lectures, examinations and the teacher's pastoral authority and scholarly example now seem exotic and 'disempowering'. As universities expand their centres of higher education research on the 'teaching-learning process', using them as agents of change in promotion and tenure rounds, academics have to draw up lesson plans, evaluate their effectiveness and confess in their diaries. University teaching is edging towards teacher training, secondary schools and TAFE, connecting up to local education environments while trying to edge into more lucrative markets and international learning networks. Educational design becomes a process of guessing what the new student-as-client expects from the educational product.

These trends are likely to continue if the West Report (1997) proposals for expanding online teaching and flexible learning are implemented. The Report uses three arguments to promote flexible learning: the needs of international economic competition and skill-building; choice and flexibility for the 'active learner'; and improvements in access and equity across the education system. Universities will go under unless they adapt their teaching to the demands of an international student market reared on the new multimedia technologies. Institutions must adapt to the ways in which students now learn, since they are used to the flexibility, non-linearity and choice offered by digital media.

In this issue, Yoni Ryan questions the assumption that the demand for flexible, off-campus learning technologies is coming from students. She also questions the West Report's assumptions about school leavers' expectations of high-tech teaching, suggesting that many may not be as adept with the new technologies as has been assumed, especially those coming from state and private parochial schools. Despite the homogenising influence of generic distance education models, she notes, universities face the challenge of accommodating students with a wide range of backgrounds, skills and expectations. Many have had little exposure to the new technologies in their classrooms and only some — from well-resourced homes — are the adept experimenters imagined by the flexible learning enthusiasts. This may change as schools implement information technology policies and as home consumption of multimedia increases. For now, higher education institutions can expect to have to offer many students intensive training in information technology, before they can become the discriminating consuming agents for whom the new learning resources are being developed. The question is, how widely distributed are the skills and the resources? Do higher education institutions know what to expect in the local market, much less the international one?

The premise of this article is that the question of technology and changing times in universities needs to be considered in the context of the wider educational system, and especially the construction by government of educational markets. The issue of technology provision, and the play of governmental and market mechanisms, press also on the school and further education sectors. Commentaries on higher education policy fre-

1. Much of this work has benefited from the contributions made by colleagues in the process of a large continuing research project on IT skills in Australian schools. We have drawn on references and suggestions from Patricia Wise, Peter Taylor, Glenice Watson, Liisa Von Hellens, Glen Russell, Neil Russell and Anita Greenhill. We are also grateful to Rhoda Reyes and Sam Bandidt for research assistance. However, none of these colleagues are responsible for the arguments developed and put here.

quently disregard the key points of articulation with the rest of the educational system.

There are two reasons why any discussion of West and new technologies should particularly consider recent change in the school sector. Firstly, the trends now becoming apparent in higher education emerged earlier, and have advanced further, in the school system. Compared to universities, the subsidised educational market is freer and more entrenched in the school sector. Furthermore computers have played a significant pedagogic role for longer in schools. These factors together mean that information technology provision, training and support is now a key determinant of a school's success or failure in the new educational market. This issue is only beginning to emerge at the university level.

Secondly, aside from the opportunity to learn from schools' experience, the consequences of change in schools have enormous implications for universities' own technology strategies. Universities and university policy makers have a basic problem: their aspirations for using technology may be unlimited, but how do they know what their students are capable of? If first year is to be more than an IT skill farm, universities must and do make assumptions about what students know or can very quickly grasp. They make students use computers; they assume a superficial degree of technical aptitude, and then they assume that will be sufficient; they provide fragments of ad hoc training. The tools that would enable them to make better assumptions do not exist.

Goal 6d of the Common and Agreed National Goals of Schooling is 'to develop in students skills of information technology and computing'. It goes without saying that there is no central planning of technology in schooling, nor any agreed system of standards. Setting agreed benchmarks is one useful way to monitor outcomes across competitive and diverse systems. These do not exist in this vitally important field. There are attempts to develop them, but schools and state governments are preoccupied instead with competing over pointless and almost meaningless data such as student to computer ratios, which tell us nothing about what the computers or the students actually have to do with each other.

Join the dots IT policy

The pressure is on all OECD countries to build the knowledge and skills needed for the transition to "knowledge-based" economies (OECD 1997, Dusseldorp 1998). In Australia, recent commentary emphasises a national 'skills shortage' in information technology (DEETYA 1998). It is the fastest growing area of professional work in Australia, with over 72,000 computer professional positions created in the last decade (Australian Information Industry Association 1998), but further growth requires more trained personnel. According to the recent Goldsworthy Report (1997), if the information technology skills market does not improve, Australia will have an "annual trade deficit of $46 billion ... in information industries by the year 2005" (Goldsworthy 1997, p. 2). The skills are also needed more generally. During 1993-94, ninety-nine per cent of non-agricultural businesses employing a hundred or more people had computers and businesses with computers employed 4.3 million people (Australian Bureau of Statistics 1997). More than one million personal computers and 1.5 million workstations were installed by these businesses and they spent $22.3 billion on information technology and technology.

Educationists are wary of an instrumentalist focus on skills and employment outcomes, possibly with very good reason in the case of a rapidly changing industry. Nevertheless, there has been an equally strong emphasis on the pedagogic benefits of 'cyber-culture'. Working in the 'non-linear' modes of the new technologies is expected to make students more flexible, more motivated and more creative, encouraging 'divergent thinking' and new forms of analysis (US Office of Technology Assessment 1995, p.12). The classroom will open up to new forms of individual and collaborative work, transforming the quality and rapidity of teaching and learning (Glennan and Melmed 1996, p. 4). If schools do not adapt to a generation transformed by cybercultures — and if they do not make these cultures available to all — they will have failed (Bigum 1995, Green et al 1996).

Over the past decade, national school systems have pumped resources into the IT area. The expansion is exponential. From the early eighties, national education departments in most OECD countries sought to ensure that there was at least one computer in each primary school and more in secondary schools and that there was some parity in the availability of hardware. In the US, as a result of these early investments, the proportion of children with some access to computers at school rose from 28% in 1984 to over 60% in 1993 (OECD 1997). Most OECD countries are now conducting reviews of IT in national schools systems (Plomp 1996, Pelgrum and Plomp 1991). In the UK, the revised *National Curriculum* (1995) stipulates that information technology must be more consistently integrated into the curriculum (OECD 1997). In New Zealand, information technology education has been identified as a major goal of the current government strategy in education (New Zealand Department of Education 1996, 1995) The US Department of Education is promoting *Getting America's Students Ready for the 21st Century* (1996), a long-range planning program to improve students' school achievement through the use of technology. Networking is a major governmental priority. All US schools, classrooms, libraries, hospitals and law enforcement agencies are to be connected to the 'information superhighway'. The *Strategic Plan, 1998-2002* (US Department of Education 1997) proposes to increase the proportion of networked

public school classrooms from 14% in 1996 to 25% in 1998, with the ultimate goal of connecting every classroom by 2001. The ratio of students to modern multimedia computers in American schools is to decrease to 5:1 by the same year.

The ratio of students to computers is still the main measure used of aggregate levels of school resources and performance in information technology, despite recurrent complaints that such measures exaggerate the importance of spending money on hardware, at the expense of professional development and effective pedagogic tactics. Plainly, the sheer number of grey plastic boxes on desks says very little about how those boxes are used, or what specific benefits accrue to those who use them. Nevertheless, the proportion offers a simple way of demonstrating students' access to technology, if 'access' is defined loosely enough. All a school or a system need do to produce a 'better' result is to refrain from throwing anything out. Based on countries' own estimates for the years 1994/95, the average ratio of students per computer ranges from 50:1 in Portugal and Japan to less than 10:1 in the USA and the United Kingdom. Canada had a ratio of approximately 15:1, New Zealand has 17:1, and many countries (e.g., Finland, France, Netherlands) lie in the range between 20 and 40:1 (OECD 1997). Other research reveals a different picture for the year 1994, with computer to student ratios of approximately 1:14 in the UK (Cole 1997), 1:12 in the USA (Plotnick 1996) and 1:15 in Australia (Tinkler et al 1996).

Australian education systems are as preoccupied as others with the issue of reducing the student to computer ratio. Each Australian State and Territory education department has announced a commitment to improve the ratio, to increase access and to provide Internet access for all schools (e.g. ACT Department of Education and Training 1997a, 1997b; NSW Department of School Education 1997; Qld Department of Education 1997; SA Department of Education and Children's Services 1996; WA Department of Education 1997a, 1997b, 1997c). Each faces problems in meeting expectations, funding expansion and managing the disparities between well and poorly resourced schools. The States' commitments have largely been funded by school communities, often with support from government in the form of grants and subsidies. At the local level there is evidence of greater autonomy for schools within State systems and of entrepreneurial resourcing, such as sponsorship or partnership with local private firms. Sponsorship and partnerships among school districts, State and local government agencies and the business community have become more common ways of boosting the number of computers, amount of software, and access to the Internet.

Victoria has pursued this line most vigorously (Victorian Department of Education 1998, 1997, 1996). The use of corporate sponsorships and partnerships has been central to the State Government's information technology infrastructure strategy. Government subsidy schemes offer $1 for every $3 raised locally. This resulted in $33.2 million being spent on information technology in 1996/7, with a further $26.8 million promised over the subsequent two financial years (Victorian Department of Education 1998). A statewide licensing agreement between Microsoft and the Department of Education is expected to provide government schools with more than $12 million and to give students access to 'most' Microsoft software. Inspired by United States models, in September 1997 the Minister launched *NetDay Victoria 97*, a campaign to encourage businesses and community groups to sponsor network connections for schools (Gude 1997). A pilot scheme has now connected more than 500 network points in 108 classrooms in 16 schools (Gude 1997).

Technological optimism and the market

These strategies of governmental intervention will be familiar to observers of Australian education policy. They have close connections with the neoliberal pattern of choice-driven reform, considered at length in Simon Marginson's recent studies (1998). In the past, changing technology was a key rationale for government planning and expenditure in education, on the basis of human capital arguments linking education to economic growth. State intervention in education was justified on the grounds that people left to themselves under-invest. Guided by the OECD, governments sought to expand 'the reservoir of collective foresight and social capital', investing in mass education and determining optimum educational outcomes. However, over time, doubts emerged about the ability of human capital investment to deliver economic growth and equity objectives. (Marginson 1998, p 108.) According to Marginson, the consequences of the retreat from the old view can now be seen in the operation of quasi-markets in education: in dezoning; in the devolution of school budgets; in the increasing reliance on school-community strategies and parent participation; in the encouragement of entrepreneurial activity and commercial sponsorship; and in the consequent 'socio-economic segregation of schooling', as elite schools seek to maintain and enhance their perceived advantages (Marginson 1998, pp 177-180).

The optimism of planners has probably outpaced the capacity of schools to integrate and develop new systems. Increasing expectations for hardware, software and connectivity in schools may simply be too expensive for governments and schools to meet. In the United States for instance, it is estimated that schools spent about $3.3 billion on technology during the 1995-96

school year. This is only a fraction of the amount (between $10 and $20 billion a year) that would be required to bring up-to-date technology and training into classrooms (US Department of Education 1996). In the United Kingdom, total information technology expenditure in schools since 1988 has been four to five times the amount (£187 million) that the government provided through its information technology grants program (OECD, 1997; cf. UK Department of Education and Science 1990). In New Zealand it is estimated that meeting the government's targets for 2001 will cost $276 million, partly because schools are starting from a low base (NZ Department of Education 1995, 1996). All these numbers represent a significant challenge for governments committed to solutions other than higher taxation.

The call for expenditure tends to escalate as the use of computers grows. Equipment in schools rapidly becomes obsolete in the eyes of parents, students and teachers, as new 'features' drive the market: notebook computers, faster processors, networking capacities, CD-ROM drives... Whether these necessities have strong educational rationales is often unclear. Meanwhile, the emphasis on hardware tends to take priority over teachers' professional development. Computer literacy among educators internationally is still regarded as low, with the majority of teachers lacking the necessary training and many lacking a simple appreciation of information technologies and their classroom potential (OECD 1997; US President's Committee of Advisers on Science and Technology 1997; Fulton 1993). Teachers lack access to appropriate technologies (hardware, software, and connectivity) due to costs, rapid rate of obsolescence, and location decisions. They lack the time to experiment with software and curricular uses of technology, owing to insufficient training, support and models of best practice. Nor do they have sufficient knowledge and support for resolving technical and logistical problems in the classroom. Even in the USA where the computer-student ratio is among the best in the world, teachers have been slow to integrate computers into the curriculum.

Recent US national studies indicated that American students spend an average of only a few minutes a day using computers for learning (US Department of Education 1996). The Office of Technology Assessment's *Teachers and Technology: Making the Connection* report (1995, p20) found that in US schools, computers are used for about two hours per student per week, and that only 9% of secondary school students report using computers for English class and 3% for social studies class. At the elementary school level, technology tended to be used for basic skill practice and at the middle and high school level, for word processing (US Department of Education 1997a).

Furthermore, technology is used very unevenly across school and education sectors, depending on resources. There is now considerable international and local research that suggests that overall the use of information technology in education has maintained and even exacerbated existing inequities (Chambers and Clarke 1987; Sutton 1991). The International Commission on Education for the 21st Century has identified a disturbing tendency for "fast and slow tracks" in information technology skill attainment to develop within nations, tracing this to disparities in individuals' access to technologies. This is recognised as an international problem of comparative disadvantage, strongly related to school demographics and school locality (Lockheed 1985). In the Australian context, the research suggests that this should be understood in terms of differences between and within schools, as well as between and within households.

The costs involved in information technology — particularly infrastructure — mean that governments on their own cannot integrate technology into education. Most national and State governments face the problem of how to maintain the incentive for school systems and self-managing schools to pursue arrangements that can attract funding from outside sources, whilst ensuring equitable information technology resource provision at a system level for all students. As noted above, governments are encouraging schools to be entrepreneurial in seeking community and private sector support.

These factors are contributing to the division between information technology 'have and have-not' schools. Subsidy schemes and sponsorships probably favour schools in reasonably affluent areas, and arrangements involving family provision of laptops probably advantage children from affluent families. But if schools do not promote technology they fall behind in the local race to win middle-class parents. Schools know that 'white-collar' educated parents regard information technology as important to their children's future. So they market themselves as technology-rich, and the cost pressures of acquiring, maintaining and updating equipment make them more reliant than ever on parental contributions and fund-raising (Marginson 1998; Fitzclarence and Kenway 1997; Kenway 1995).

The danger of widening the divide between 'have and have-not' schools is clear when we consider additional factors: the greater costs of infrastructure to support information technology for rural schools; the difficulties in attracting private sector sponsorship in small or poor communities; and isolation in many communities. These inequalities may be exacerbated by the strategy adopted in a number of States of encouraging schools to integrate information technology by giving better resources—support staff and professional development for teachers—to schools considered 'technologically ready'.

The importance of the household, and other equity effects

The important point is that students' attitudes and skills in the classroom are directly related to their access to computers at home. Students with home access do most of their learning about computers at home (Martinez and Mead 1988; Kersteen, Linn, Clancy and Hardyck 1988). This has important ramifications for children from low socio-economic backgrounds as well as for gender equity. Differences in access to information technology outside the school environment compound inequalities in the classroom (Laferrierre 1997).

It is clear that home consumption of information technology equipment is directly linked to income. For instance, in Canada in 1996, the 20% of households with the highest income were four times more likely to have a home computer than the 20% with the lowest household income (56.6% compared to 13.7%) (Canada. Council of Ministers of Education 1997). Similar results have been found in recent studies investigating computer use in Australian households (Apple Computer, 1996; ABS 1996, 1994). In 1994, Australians enjoyed relatively high ownership of computers (23% of Australian households: ABS 1996) when compared to other OECD countries. However, there were considerable disparities found, based on variables such as geographic location and socio-economic status. For instance, while 33% of households in capital cities have computers, only 24% of households elsewhere in Australia do (ABS 1996); and 43% of households with white-collar workers owned computers compared with 26% of blue-collar workers (Apple 1996). While households with dependant children and particularly older children enjoyed a comparatively high level of computer ownership (45%), there was considerable disparity due to income. Computer ownership ranged from 23% in households with less than $14,000 p.a. income to 70% in households with over $66,000 p.a. income.

In addition to income-related disparities in home consumption of computers, research is also showing some disturbing patterns of domestic computer use (ABS 1996; Apple 1996). The two key factors that appeared to influence who used the computer were age (use increasing with age till the mid- teens) and gender. In all age groups, males were much more likely than their age cohort females to be designated as the person who used the computer most. Furthermore, where the computer was situated in a 'private space' within the home, this space was more likely to belong to a male (Apple 1996).

Emerging patterns in classroom practice may be exacerbating the effects of differences between households in computer ownership. As a sign of what may be to come, in 1998 at Frankston High School in Victoria, half of the Year 7 students arrived at school with notebook computers. These students were streamed separately to the other half of the Year 7 students who did not have a notebook computer. The reason given was that "it is not possible to teach children with and without computers simultaneously because different teaching methods are required" (*Australian* 2-3 May 1998, p. 14).

There are still policy choices to be made in the school sector. Deregulated education systems, as Marginson reminds us, are still the effects of strategies of government, even if central funding and planning mechanisms have been devolved to a number of agencies including parents and private companies (Marginson 1998 p 84). The choice lies between resourcing the expansion of the education system through subsidising technology or developing mixed funding and planning systems of government subsidy and market supplementation. Each of these is an alternative to greater liberalisation of the education market. Such choices are likely to be made on a case by case basis by States and within sectors. Nevertheless, there remain arguments for national-level policy programmes concerned with resourcing and planning information technology. One long-standing rationale is the need to modernise industry training standards in the interests of economic competition, flexibility and mobility. Another is the need to moderate the effects of market competition by addressing disparities in the distribution of information technology skills through the school and training sectors.

Marginson's argument is that marketisation does not create more responsiveness to consumers. Established institutions are insulated from market pressure, and competition only operates in an orthodox manner in the bottom segment of the market, where positional values are relatively low (Marginson 1998, p 45). Marginson understands relative advantage in the education systems in terms of positional goods (following Hirsch). Positions in elite schools and positions of social leadership are goods that are in scarce supply and that are scarce in absolute terms. It is impossible to alter this through changes in education: there cannot be universal access to such positions 'except when education has no positional advantage'. Furthermore, widening access can exacerbate this, since '[t]he greater the level of participation in education, the wider its role as an allocator of position. But there remains an absolute scarcity of positional goods at each level of position' (Marginson 1998) Elsewhere in this issue, John Frow and Mike Emmison raise equivalent issues in discussing ways in which 'cultural capital' might apply to the effects of cultural privilege and access in domestic uses of information technology.

Back to universities

Information technology now provides powerful positional goods for schools: it will do the same for universities. As market mechanisms become entrenched in the

higher education sector, there will inevitably be greater scope for some universities to offer students and parents better local or internet network access than other institutions, hardware at concessional prices, more low or no-cost site-licensed software, and more and better content through the network. The provision of these services will be a critical differentiating element for institutions positioning themselves as higher quality institutions operating in the more expensive national and international fee-paying market. For such institutions technology will be a very useful way of adding value to existing courses or services: it is unlikely to substitute for traditional face-to-face contact. Poorer institutions, however, may well find technology attractive for other reasons: access to wider markets outside regional or suburban home territories; lower cost delivery in comparison with traditional teaching; and perhaps local networks with schools and TAFE, to shore up local markets from entrepreneurial foreign raiders.

Those concerned with how universities can adjust to what the West report calls the 'revolutionary' impact of new technologies may learn much from the school sector. The report itself anticipates this in its emphasis on the rapidity and totality of change. Its strategy is to replicate the school system within the university: academics must become teachers, able to respond to the diversity of contemporary students. The report does acknowledge the current climate of scepticism about flexible learning and new technology, but it essentially brushes aside questions about equity and the costs of new teaching methods: these issues are presented as backward-looking, not quite relevant to the main priorities of securing flexibility and choice.

There are however other things to be gained from an observation of events in the school sector. The school sector shows just how uncertain futures can be; and that there are be real risks for universities in adopting far-reaching new delivery systems in new and uncertain market conditions where the primary justification for everything is expansion. Schools do demonstrate the adaptability of institutions, curriculum frameworks, pedagogic techniques, resourceful teachers and local communities. But they also exhibit serious problems. Those who have invested substantially in technology have discovered a cycle of growing financial pressures. While governments have articulated the demand for technology, they have in the main left it to schools to pay. And those problems have made the balance of funding equipment and funding training very difficult.

The West report makes a great virtue of the diversity of school leavers and their demands for new creative, active ways of learning. But what about students who aren't 'diverse' in this positive and optimistic sense: students with uniform problems in the basic skills of academic comprehension and research? Non-linear thinking is a plus as long as you can do linear when it's really needed. The most disadvantaged students are unlikely to benefit from a system driven by an evangelical commitment to flexibility, interactivity and choice.

That is the debate that raged around West. The argument has now moved on. Universities are attempting to incorporate flexibility into their strategic planning for the new competitive higher education market. The school system demonstrates the difficulty of such planning. The problems schools encounter in retaining and expanding their communities of consumers and supporters will be similar for universities, especially if we assume growing dependence on parents. Then there is the problem of planning around widely variable and unpredictable school-leaver skills in technology, while competing for the most capable. Finally, if significant resources are being diverted by universities into new technologies, how do they justify such expenditures over time? What measurable benefits will be identified as important? Universities are used to a great degree of autonomy over allocating resources: but they are not used to gauging risk in quasi-commercial situations.

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