Improving teaching and learning through the use of information and communications technologies:

the EdNA collaborative framework

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Preparing young people for the knowledge society

In preparing young people for their individual futures, and for their participation as citizens and workers in the society of the future, educators have always had to make assumptions about the nature of that society and how young people will best be able to participate in and contribute to that society.

While it is difficult to make such assumptions in this period of very rapid change, there are factors and trends that we can identify.

We see that "the tendency towards an increasingly interconnected and inter-dependent global economy will intensify. The fortunes of nations, regions, cities, neighbourhoods, failies and individual will continue to be strongly influenced by their position in the (international) network. In a rapidly shrinking and interconnected world there is no hiding place."  

We see that information and communications technologies are being used in all sectors of economic and social life, to improve productivity. A paper prepared for the Education Network Australia (EdNA) Schools Advisory Group, suggest that "Successful organisations in the knowledge society will be:
- global in approach and attitude, regardless of geographic location
- networked at many levels inside and outside the organisation
- able to make the most of their intellectual capital and seek employees who do too
- flexible and able to adapt quickly to changing circumstances"2

We see that patterns of employment have fundamentally changed, with the decline of employment in the agricultural and manufacturing sectors and the rapid growth of the services sector and what is coming to be referred to as 'knowledge work'. Knowledge work supports a society " whose means of production, wealth, organisation and sustainability is derived from a process of knowledge generation and utilisation. In the knowledge society the sustainability of the society is dependent on the development and continuity of knowledge processes – the capacity to generate knowledge, store, retrieve, organise it, build on it, link components of it, leverage new knowledge from it, buy it, sell it, apply it to social, economic, civic and communal processes."3

Associated with these changes we see increasing disparities of income within the technologically advanced societies. Those with high levels of skill in the emerging knowledge economy are increasingly rich and powerful while those at the bottom of the societal hour glass are increasingly poor and disempowered.

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1 Peter Dicken, quoted in Civilising Global Capital, Mark Latham 1998
3 Jillian Dellit, Restructuring Education in the Knowledge Society, ACE SA Conference, Adelaide, 1999
In such a society, participation and success are based will be based on the application of knowledge and a capacity to continue learning throughout life. Can the school education curriculum of the early 21st century prepare young people to act and create meaning for themselves within such a society, to participate and contribute to it, to ameliorate its alienating features?

Where the tools of the information age are applied in thoughtful and constructive ways, they have great potential to assist in this endeavour. The *United Nations Convention on the Rights of the Child* states that the child has the right to express his or her views, obtain information, make ideas or information known, regardless of frontiers. New technologies provide unprecedented opportunities for children to do these things - and parents and teachers have an obligation to support them in doing these things in ways in ethical and empowering ways.

Children entering school in the new millennium will take new technologies for granted. Students in the 21st century school are likely to be non-linear thinkers, comfortable with multiple sensory input, have new technological literacies and expect to have control over their own learning. For educators, if they do not want what they offer to be increasingly irrelevant, it should not be a matter of whether new technologies should be applied in school education but a matter of how, and how effectively.

**Education Network Australia**

Education Network Australia - EdNA - represents a major collaborative commitment by Australian governments to the use of the Internet in education - and is thus vitally concerned with these questions.

Originally conceived in the mid-nineties as a physical network, EdNA has evolved to be a strong, national collaborative network focussing on the application of online services in schools, vocational education and training, adult and community education and higher education.

The EdNA framework consists of a set of formal structures:

- A not-for-profit company established and funded by all education and training ministers in Australia - **Education.Au**, to implement the functions of EdNA

- The **EdNA Reference Committee** (ERC) with representatives of all state schooling systems in Australia, the Catholic and independent school education sectors, VET and higher education

- **Sectoral Advisory Groups** (school education, vocational education and training, and higher education)

- The EdNA Reference Committee also reports directly to the Ministerial Council for Education, Employment, Training and Youth Affairs and the

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*UN Convention on the Rights of the Child, Article 17*
Schools Advisory Group also reports to the Conference of Education Systems Chief Executive Officers (CESCEO).

This may seem unwieldy, but it seems to work well. Certainly within the school sector - or within the bureaucracies at least - there is a strong sense of EdNA as a collaborative network, an effective mechanism for government and non-government school education authorities to work together to achieve agreed outcomes for their common interests. And increasingly, there is a realisation of a complex grass-roots EdNA community - EdNA Online users and professional communities that are using the resources, tools and services that EdNA Online offers. These groups will gradually redefine the meaning of Education Network Australia.

**Strategic Framework for the Information Economy**

In early 1998 the EdNA Schools Advisory Group (SAG) spent some time examining its strategic priorities. It reaffirmed its mission - improving education in Australian schools through collaborative efforts that maximised the benefits of information and communications technologies in teaching and learning.

At around the same time, school systems were being drawn into a new context for discussion, through what became known as the *Strategic Framework for the Information Economy*. The Commonwealth government had established the National Office for the Information Economy (NOIE) as part of its response to the need to position Australia in the global economy that was increasingly knowledge based, information driven and underpinned by mechanisms of exchange and trade that relied on advanced technical infrastructure, particularly through the Internet. There is now a similar push in a number of Australian states to advance their position in a competitive global economy through the use of IT products and services.

Initially, the focus of early Commonwealth government statements was on doing business online - e-commerce. Certainly, getting education and training "online" was seen as an important strategy, but there was little sense in the early documents that education and training was anything more than another participant and consumer in the information economy and a supplier of skills for Australia's IT industries.

Through the EdNA Reference Committee, all stakeholders articulated a position that argued strongly that the capacity to manage, share and create knowledge is a fundamental requirement for Australia’s prosperity in a global economy and that the education and training sector is the key knowledge industry. The challenge for educators is how best to change and improve the quality of teaching and learning in order to contribute to Australia's development as an equitable, imaginative and economically strong knowledge society.

In December 1998, the Commonwealth published the *Strategic Framework for the Information Economy: Priorities for Action*, in which education and training was identified as a key area for action. The Commonwealth Department of Education, Training and Youth Affairs (DETYA) was charged with developing an Action Plan.

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5 *Strategic Framework for the Information Economy: Priorities for Action*, Dec 1998 (National Office for the Information Economy)
for the Education and Training sector for the Information Economy and commenced consultations through the EdNA Reference Committee.

It was in this context that the SAG decided to commission a paper, an analysis of the key issues facing Australian school education systems in introducing information and communications technologies through the use of information and communications technologies. The outcome was the paper: A Strategic Analysis: Improving Teaching and Learning in Australian School Education through the Use of Information and Communications Technologies, prepared for the SAG by the consultants, Lifelong Learning Associates. The paper is available through EdNA Online.

In undertaking their analysis, the consultants undertook several complementary research and analysis tasks. These included a literature review, consultations with members of the EdNA Schools Advisory Group (individually and collectively) and consultation with 10 'expert practitioners', including principals, resource teachers and information technology coordinators in urban and rural schools, at primary and secondary levels. The paper also drew heavily on the unpublished report, Real Time: Computers, Change and Schooling, a national study of the information technology skills of Australia school students and teachers undertaken for the Ministerial Council for Employment, Education, Training and Youth Affairs (MCEETYA) Taskforce on the National Report on Australian Schooling.  

The overall conclusion of the paper was that, while all education authorities agree on the need to introduce new technologies and all have plans in place to do so, backed with considerable resources, leaders often fail to appreciate the transformative potential of the new technologies. Merely adding them to the existing pedagogical resource repertoire will mean that opportunities for change - and particularly opportunities to empower learners - are missed.

The paper developed a table indicating changes in paradigms of teaching and learning, arguing that improvements in teaching and learning will occur not through the introduction of new technologies per se, but through the integration of these technologies into teaching practices in ways that draw on the best current understandings of effective pedagogy and curriculum practice and open up new ways of working and learning.

**School Education Action Plan for the Information Economy**

The paper has been a major contribution to the development, by the EdNA SAG, of a School Education Action Plan for the Information Economy, which is to be considered for endorsement by school sector CEOs at the CESCEO meeting of 30 September 1999.

The Action Plan provides a shared national vision and a framework which all stakeholders – Commonwealth, State and Territory governments, government and  

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6 Commonwealth unpublished report  

7 See Attachment A
non-government school education authorities and individual schools and their communities – can use to take change forward. The Action Plan identifies key action areas of People, Infrastructure and Content, within an enabling policy and regulatory framework.

The Action Plan reflects the widespread international agreement on the set of interconnecting factors that build for success in integrating new learning technologies. These have been identified as the 'Four Pillars' in the United States and as the components of the National Grid for Learning in the United Kingdom. Adequate hardware and connectivity are essential. So is digital curriculum content in various forms. And, most important of all, the development of skills and confidence in the people using the technologies - the students and those that teach them and lead the schools in which they learn.

Moreover, the interconnectedness of these factors is the key. We have all seen examples of a failure to have an integrated strategy for building success: connecting schools to the Internet without internal school networking to provide classroom access; providing hardware to schools without the necessary technical support infrastructure; providing equipment without principals having a vision to implement an effective curriculum program or without the professional development of staff to use equipment well; staff development without access to good quality digital content relevant to Australian school curriculum - the list goes on. Strategic planning is needed at all levels - at school, system and national level, with policies and regulations that support rather than inhibit progress.

People

Getting the people issues right in this, as in so many other areas of endeavour, is the most critical factor of all. Boxes and wires are necessary but insufficient conditions for success. Without the skills and confidence to use, manage and apply technology, the boxes will sit in corners and the wires will carry administrative traffic but not data that builds and supports learning. To change teaching and learning for students, there is a need to fundamentally change the mindset and skills set of school leaders and teachers.

The Senate Committee report, A Class Act (1998) recognises technology as just one of the major changes that are impacting on the teaching profession. For many teachers, coming to terms with major changes related to outcomes-based curriculum and school-based management has more direct and inescapable impact on their professional lives. Unless they have been captured by the excitement of the new technologies, many hope it will be just one more fad that will, with time, pass.

Those with responsibility for school education know that the impact of new technologies will not pass and that professional development of teachers and school leaders is crucial if desired outcomes for students are to be achieved. All education systems in Australia have programs in place to develop teachers and school leaders although levels of investment and approaches to teacher development vary. Many

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States and Territories are using "leading schools" and "leading practitioners" and/or "teacher coaches". Some systems have centrally developed programs, others devolve decisions on professional development to the school level and others have a mix of these approaches.

The limited evidence available from both national and State-based studies indicates that progress is taking place but not at the pace or depth required to make a major shift in practice. Teachers are developing basic skills in using learning technologies but the main challenge of integrating new technologies into teaching practice still lies ahead for the bulk of the profession. Some point to an ageing teaching profession as both the problem and the potential solution (assuming a major wave of imminent retirements). However, age is no barrier to the uptake of new teaching tools and many new teachers are entering the profession without the skills required.

The US report, *Professional Development: A link to better learning*\(^9\), has found that, while the majority of teachers are now using information and communications technologies, only 20% of teachers surveyed felt well prepared to integrate technologies into their classroom practice. The situation in Australia appears similar.

The report's findings indicate that currently US schools spend 5% of their technology budgets on professional development in relation to professional development on IT. The report suggests that major change will not occur until this proportion increases to 30%.

Research in Australia and overseas supports the US report's recommendations for teacher-directed professional development to be supported by coherent programs sanctioned by education authorities. "The most effective in-service career development activities focus on providing instruction to improve student learning. They are site-based, rigorous, sustained and designed and directed by teachers."\(^{10}\)

Research also suggests close links between learning to use a computer and the Internet at home and using it for learning at school. Opening the school and its information technologies to parents and the wider community appears to be a particularly effective way of reaching disadvantaged students. In Australia and internationally, school education is becoming a central agent within new community networks that facilitate lifelong learning and new employment opportunities.

**Infrastructure**

There are two broad sets of issues and critical success factors in relation to infrastructure: \(^{11}\)

- school and student access to increasingly high capacity bandwidth; and
- reliable and sustainable infrastructure within the school. With the increasing use of multimedia and telecommunications, a complex and integrated set of hardware

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\(^9\) *Professional Development: a link to better learning*, The CEO Forum School Technology and Readiness (StaR) Report; [http://www.ceoforum.orgn/welcome.html](http://www.ceoforum.orgn/welcome.html)

\(^{10}\) StaR Report

\(^{11}\) Lifelong Learning report p32
and software systems accessible from many locations within and beyond school boundaries is needed.

**Bandwidth (telecommunications capacity)**

There appears to be insufficient recognition by many governments of the needs of schools for high speed, high capacity telecommunications services. For too long the connection of all schools to the Internet (a matter for the political scorecard) was one dial-up networking connection, located in the school administration area. Some schools had a second connection in the library. The need for schools to download information was recognised, but not the crucial need for two-way communication with the bandwidth to facilitate multiple access points so that the use of the Internet would become a routine and integral part of teaching and learning.

Fortunately this is changing. Most schools now have access to ISDN (Integrated Services Digital Network), which gives greater capacity - but at a price. While prices are dropping, and some school systems, either through education-specific or whole-of-government arrangements, have achieved excellent deals for schools, costs far exceed equivalent services in other countries such as the US.\(^\text{12}\)

Unlike the US, Australia does not make any special provision for education within its telecommunications policies and legislation. An open, competitive telecommunications market is intended to deliver the results, with some support mechanisms being introduced, for example for rural areas. The school sector, through the EdNA Schools Advisory Group, has been arguing strongly that the Commonwealth government should re-examine options for supporting school education connectivity, either through a levy on telecommunications carriers or through direct subsidies.

While growth in Internet usage is difficult to predict, the evidence from schools that are using online technologies more and more routinely is that demand quickly reaches capacity and 'pushes the limits'. The recent report on *Bandwidth Requirements for the Australian Education and Training Sector*\(^\text{13}\) has recommended a minimum bandwidth for every school in Australia of at least 128 kbps in 2000, 256 kbps in 2001 and 2Mbps by 2004. Some would argue that these recommendations are conservative.

**Internal infrastructure**

"Put Florence Nightingale in a modern hospital she'd be struck dumb. Put an 1890s teacher into many modern schools and she'd pick up the chalk and keep teaching."\(^\text{14}\)

"The late 1990s may well be remembered as the era in which many students had better information access in their bedrooms than in their classrooms."\(^\text{15}\)

\(^{12}\) *Bandwidth Requirements for the Australian Education and Training Sector*, Olaf Moon, for the Commonwealth Department of Education, Training and Youth Affairs, August 1999

\(^{13}\) *Ibid*

\(^{14}\) Teacher interviewed in the preparation of the Lifelong Learning Report

\(^{15}\) Teacher interviewed in the preparation of the Lifelong Learning Report
If a school aims to provide routine access to the ICT infrastructure needed to enhance teaching and learning, then its objectives should include:

- providing ready access to computers and other equipment for all students (most States have a target of 1 computer for every 5 students, although there are some variations of targets between primary and secondary schools)
- providing every teacher with computer access of adequate functionality to meet work requirements - at school and at home, where much preparation is done
- providing students and teachers with classroom access to peripheral devices such as scanners, digital cameras, video cameras and printers
- linking all computers in the school to a quality local area network and the Internet, so that students and teachers can easily access, share and distribute information
- developing appropriate network management tools and technical support.

Technical support is a big bugbear for many schools. Schools complain that they have been given funds to buy equipment, but that they don't have the money or the expertise to maintain it. Equipment is fine as long as it works - but when it doesn't, teachers have a right to have help in fixing the problem. The roles of teacher and technician are complementary and teachers should not be expected to carry both roles - particularly if it is an expectation rather than a specified duty. Education authorities are increasingly turning to this issue as a problem for which a solution - or solutions - must be found.

The location of computers within schools is also a matter for contention. While the computer laboratory may still have its place, it should not be at the expense of providing clusters of computers within classroom, so that usage can become a routine part of classroom practice. Where the focus was on developing specific IT skills (word-processing, spreadsheets and so forth), a lab may have worked well, but if the purpose is to support learning across all year levels and all areas of the curriculum, the location of computers needs to be rethought. Curriculum needs, not past practice or security concerns, should drive decisions.

Content

Digital technologies, including the Internet, offer unprecedented opportunities for teachers and students to access, adapt and create curriculum resources. The creation of 'curriculum content' is likely to be less and less a 'text book model' and more and more a 'pick and mix' approach by professionals, drawing on information and ideas available through the world wide web, building collaborative learning activities through new telecommunications tools and sharing good practice through electronic networking. There is a need to bring together the skills of people such as curriculum designers, teacher practitioners, content experts, software writers and information managers to develop new models of 'content' for an online world.

EdNA Online ([http://www.edna.edu.au](http://www.edna.edu.au)) already offers access to information and services to facilitate teacher use of online curriculum resources. With links to over 9000 evaluated websites, EdNA Online offers a quality selection from the chaos of the world-wide web. As a search engine, EdNA Online offers access to nearly 300,000 sites, indexed from the evaluated sites. Perhaps even more importantly,

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16 Lifelong Learning report, p34
EdNA Online offers support to teachers through email alerts about new sites, about sites related to particular themes or topics or particular years of schooling (such as Early Childhood). Email discussion groups and noticeboards offer communication tools for teachers.

State and Territory websites, such as Tasmania's Discover (http://www.discover.tased.edu.au) and Victoria's Leading Practice Ideas Bank (http://www.sofweb.vic.edu.au/lpol/index.htm) have taken further the opportunity for teachers to share what is available and indicate how they have used resources with their students to support learning outcomes.

Projects using telecommunications, involving students working with other schools within Australia and overseas, are an increasingly popular form of interactive content. Currently, in a project funded by the Commonwealth, the national professional associations for each of the key learning areas, with the Australian Council for Computers in Education and the Australian Curriculum Studies Association, are developing an exciting set of models for collaborative curriculum projects, using online technologies.

As well as providing access to quality sites, providing models of curriculum delivery using online technologies, such as collaborative student projects, and providing opportunities for teachers to share good practice, there is a need to develop a range of online curriculum products with an Australian curriculum focus - including sequenced materials to support courses or to deliver units of instruction online.

A proposal currently before education CEOs sets out a strategy to stimulate the Australian online content market through targeted public interventions. The proposal is based on the principle that education systems cannot afford to do this alone and argues that national collaboration to develop major online curriculum content is needed if the investment in infrastructure is to be realised.

Any such development must be underpinned by a quality assurance framework that includes information management standards, agreed principles and mechanisms for managing intellectual property rights, instructional design frameworks and agreed pedagogical approaches that take account of curriculum differences as well as commonalities across States and Territories.

**Summary**

The Strategic Analysis paper by Lifelong Learning Associates, and the subsequent development of the School Education Action Plan for the Information Economy, have reiterated the importance of the 'tripod' - people, infrastructure and content - in addressing the issues of improving teaching and learning through the use of information and communications technologies.

The papers have reiterated the need for strategic planning and emphasised the transformative power of the new tools available to educators. All those committed to the ideals of Education Network Australia believe that these tools offer an opportunity to rethink and reshape school education and believe that these tools will help equip will young people to learn for life and take their place in a knowledge society.
Postscript

When this paper was proposed, it was in response to the topic of the Conference and how the concept of 'Framing the Future' related to the work of EdNA.

In espousing and promoting the Internet as a powerful tool for educational purposes, the EdNA collaborative framework is itself evolving. The power of the networks - as distinct from bureaucratic and hierarchical structures - is changing relationships between stakeholders in the education enterprise.

Frameworks are attempts at coherence and broad control. They are intended to allow for diversity, but within an established structure. Curriculum frameworks, the EdNA collaborative framework, the Strategic Framework for the Information Economy, the School Education Action Plan for the Information Economy - these are all attempts to create logical structures within which agreed outcomes - particularly by governments and education authorities - can be achieved. Australia is very much given to frameworks - they fit naturally with a federated system where stakeholders are prepared to agree on the scaffolding, as long as they have plenty of leeway in deciding what goes on within the frame.

Networks on the other hand tend to operate across frameworks and have the potential to upset the frame. Networks can be supportive; they can also be subversive of the status quo. Online networks offers opportunities for educators, academics, administrators and students to meet in an environment without established protocols and power structures. They offer new ways of working which challenge traditional notions of ownership and control.

In an increasingly global world, connected by communication media, the message may well be 'networking the future' rather than 'framing it'. A conference in the next century - perhaps even the next ACSA Conference - might be more interested in talking about networks than frameworks!

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