

# **Teachers Schools and the New Technologies**

Discussion Paper

Draft prepared for  
Federal Conference  
January 1998

**John Graham - Research Officer, AEU (Vic)**  
**Roy Martin - Research Officer , AEU (Federal Office)**

**Australian Education Union**  
**120 Clarendon Street**  
**Southbank VIC 3006**

*Copyright © Australian Education Union*



## Introduction

The purpose of this paper is to facilitate discussion within AEU Branches/Associated Bodies in an important but complex policy area. The expanding use of the new technologies in education has been accompanied by a great deal of hype and techno-speak, which has acted to exclude many teachers from the debate. In addition, the sheer speed of change has meant that the AEU, along with the rest of the education community, has found itself having to address issues which are still evolving.

The term 'new technologies' includes not only computers and software applications, including electronically packaged learning and specific purpose software (eg administrative, recording/reporting etc), but the outcomes from an increasing convergence between telecommunications and personal computers, such as the Internet, electronic networks and new forms of multimedia.

This discussion paper is based on the principle that the essential questions to be asked require expertise in teaching and learning, not in technology. Whatever the educational future, all teachers should be an important part of determining it. It seeks to raise issues and stimulate thought and discussion, as a prelude to policy making by those who understand teaching and learning.

The process used in formulating this paper was to develop a framework and a set of key questions to bring to a six hour workshop at the national ACSA conference held in Sydney in July 1997. The workshop consisted of teachers, academics, bureaucrats, consultants and union officials from around Australia. The workshop deliberations and recommendations have been integrated into the 'Discussion' sections of this paper.

The paper structures the issues into four areas: resources, equity, work organisation and professional issues. Each of the areas incorporates issues relating to schools, teachers and the curriculum.

The principal focus question of the paper is:

**What are the issues which the AEU should be concentrating on in relation to the new technologies and what should be its policy in these areas?**

The paper is presently in an unfinished draft form designed to encourage input from AEU members, officers and Branches/Associated Bodies. There are clearly areas of overlap and issues which need to be more fully discussed and explored. The paper will be further developed during 1998 and lead to policy recommendations. Comments on the paper should be directed to John Graham at the Vic Branch (E-mail - johng@aeuvic.asn.au; Fax - (03) 9417 6198) or Roy Martin at the Federal Office (E-mail roym@edunions.labor.net.au; Fax - (03) 9254 1805).

## Resources

### Questions

What links are there between curriculum requirements and information technology resourcing?

To what extent do information technology resources transform the curriculum eg. through Internet access, assessment and reporting procedures, student laptops?

Are resource levels of technology keeping pace with need? If not, in what ways?

Is it desirable to implement benchmarks for resource provision in schools? If so, what factors would need to be covered?

Are there any special implications for the Library/Resource Centre or any other specific areas in schools due to the continued expansion of the new technologies?

How do resource levels at school interact with those at home?

What resources (hardware, software, training etc) do teachers require to meet their information technology needs?

To what extent should teachers be concerned about governments trying to use information technology to address resource issues such as staffing shortages (cashing in teacher positions to buy computers), class sizes, workload etc?

What links are there between curriculum requirements and information technology resourcing?

To what extent do information technology resources transform the curriculum eg. through Internet access, assessment and reporting procedures, student laptops?

### Discussion

#### 1. Resources and the Curriculum

The introduction of new technologies into schools has been largely on an ad hoc basis, and it has relied to a considerable extent on the goodwill and voluntary efforts of teachers and others. There has been comparatively little formal developmental work carried out by education authorities, and commercial initiatives have, with a few exceptions, not established themselves in basic curriculum.

Consequently, there is little defining research on the interaction between the curriculum and new technologies, and a wide variety of opinion on the importance of new technologies in the curriculum.

There are some who argue that it will make little change to the curriculum and therefore resource needs are minimal. Others suggest it will fundamentally change the way in which knowledge is structured and delivered and thus the role of schools. They suggest that there will be an increased emphasis on the socialising aspects of school, and that the school's values, culture etc. will become the important focus.

Despite this general uncertainty about exactly what the role of the new technologies in curriculum is, there is a general feeling that technology will be an important feature of education in the future and that educators must play an important part in the way that this develops. The curriculum does need to be modified to accept and acknowledge the existence of these technologies and the school has to provide access to the technologies. This means educators developing curricula which utilise the new technologies to teach emerging skills and knowledge and combining this with much of the traditional curriculum that will remain relevant and important.

There are already many examples of where this is happening which can form a basis for best practice models.

This will need to take account of the fact that many students, though not all, will have access to sophisticated technology in the home, and that this also means access to considerable knowledge and resources that previously would be largely delivered through schools. (The recent TIMSS survey suggests 70% of year 8 students have home access). One of the priority needs is to develop competence in critically evaluating the mass of information that becomes available.

## **2. The Funding Issues**

Similarly, the provision of resources has been largely left to individual schools and their communities, with minimal and inadequate provision by governments. As a result, provision has become extremely variable from school to school. Some private schools have established themselves as "laptop" schools and a few government schools have now tried to emulate that. Others, however, argue that this is not the best way to go even if one has the capacity.

Whatever the desirable configuration, there is a need to fully come to grips with the resource needs and to catch up a large backlog. There are signs that some governments are at last beginning to take the issue seriously, but the budgetary implications are severe. School-based fund-raising will always be inadequate, and is an unsatisfactory way of funding needs. Apart from its general inadequacy, it creates problems with the compatibility of resources, and with consistency of approach. This is particularly evident where feeder schools with more technology set up expectations about the receiving school leading to student disappointment and negative reaction if the expectations can not be met.

There is therefore a need for system-wide funding policies to be developed and implemented. As part of this discussion, the AEU has developed a set of resource guarantees around technology. Such guarantees need to make provision for the necessary building and infrastructure costs, and to take account of the ageing of resources. Provision of technological resources is a recurrent funding issue, not a "one-off" situation.

The cost of meeting such needs will lead governments to seek cuts elsewhere to pay for it, and in particular they will suggest the shedding of education workers. This is exacerbated by the fact that politicians see technology as as a way around funding a fully staffed curriculum, enabling specialist teachers to communicate with students in other schools supervised by those not qualified in that subject. Similarly, attempts by governments to use technology as "the solution" to problems should be questioned, such as the use of technology as a behaviour management tool when computer programs are used to teach students with behaviour problems literacy skills.

At this stage, the evidence suggests that the introduction of technology requires additional staff with new skills. There is no evidence that the new technologies can lead to a downsizing of the workforce without the loss of quality, and it is improper to create this dilemma within education.

### **3. Teacher Resources**

The particular needs of teachers must also be met.

Priority must be given to providing time to teachers for a range of matters around new technologies. Paramount amongst these is professional development. Most teachers need time and well developed programs to enable them to become expert with the technology. However, there is also concern that information technology absorbs more and more of the professional development funds, leaving less for other major needs of teachers. It is therefore essential that there be additional specific allocations.

Teachers also need to have the opportunity to absorb the new technologies into their everyday professional life, and become as conversant with it as many of their students. Several commentators have underlined the importance of a policy that ensures teachers are given priority in the provision of equipment. This seems to lead to more computer use of the equipment supplied to students and better curriculum integration.

### **4. The Need for Support**

Provision must also be made for adequate levels of trained, qualified support staff.

This includes professional support in the professional areas involving curriculum consultants or advisors.

There is a major need for technical support in schools. The successful introduction of information technology requires adequate technical support; the more technology the more support.

## **5. Research and Development**

Finally, the current paucity of research should be addressed through government supported research and development in all of the above areas, particularly the need to develop appropriate curriculum changes.

# Equity

## Questions

To what extent has computer (or cyber) literacy become a basic requirement for all young people in terms of achieving success at school, in tertiary education or in gaining and maintaining employment?

Are there serious curriculum consequences for students arising out of the unequal distribution of information technology resources?

What can schools do to address the differential access to information technology students have because of their home resources and parental incomes?

What must schools do to address the gender issues associated with unequal computer time?

In what ways does the funding by schools and Departments of the new technologies impact on the issue of equitable provision of education.?

How is this affecting schools and students, and how are they coping with it?

In what sense is the use of information technology by teachers dependent upon a range of factors such as the school they are at, their KLA, their age, their level of training, their use of a computer at home, Departmental policies, resources etc.

What are the implications for the development of teacher computer literacy?

## Discussion

### 1. Making Technology Available

The advent of the new technologies has coincided with a period when the commitment of governments to resourcing the needs of students and schools has been very much in question. Governments have been slow to provide purchase programs for new technologies. As a result, schools have been under pressure to find money for resourcing from sources other than governments. The purchase of technology in schools has become largely a school responsibility, and walkathons, cake stalls, and other fundraising mechanisms have been very much a part of technology provision. This has led to extreme disparities in the technology available to different students and schools. At one extreme, some of the wealthy private schools have marketed themselves as "laptop" schools, (and some government schools have begun to imitate them), at the other, some schools are able to provide very little access to technology, especially that which is up to date.

Even in those schools which have been reasonably successful in purchasing technology, the continual need for renewal and updating is proving a tremendous strain on finances. Depreciation costs of around 30% per annum on both equipment and skills are indicated in the literature. The financial implications of access to the new technologies are immense. The potential expenditure seems limitless, and even moderate levels imply major increases to what were previously already stretched budgets.

It is doubtful whether it is possible to talk in terms of equitable supply - the capacity and desire for some schools to purchase what is beyond the dreams of others appears almost an inevitability. The balance between equity, inequality and quantity will always favour those most able to afford to buy their own, and the variation between school systems, states, and individuals appears an almost insuperable problem.

This is exacerbated by student access to technology at home.

How, in these circumstances, can the problem be addressed? One suggestion has been to base government funding on a principle of compensation - using it to provide access to those individuals and schools with least access. However, it is argued this will decrease the motivation for schools to provide for themselves, and therefore some favour a core base to all schools.

Studies on gender and computer use, particularly in the school situation, also show that provision at the school level comes with in-built equity problems which must be addressed.

## **2. Equity and the Curriculum**

The inequitable distribution of the technologies poses real equity problems in the delivery of the curriculum. There is concern that some students are missing out on the new basic - cyber literacy. (Some argue that literacy is not really an appropriate term as it implies a static level of competence, whereas technology is always changing.)

There are also increasing problems confronting teachers in the area of assessment as the resources available differ so much between students, with some having access to the Internet and other information sources whilst others do not. There now appears to be some need to take account of this in assessment, but exactly how is a complex question.

Conversely, there is some capacity for technology to be used positively to create greater equity, although this remains an area to be explored and is currently fraught with schemes that may not be desirable in reality. For example, the provision of LOTE access to students who would not otherwise be able to study this subject may give them a more equitable opportunity, but may also encourage governments to provide sub-standard curriculum.

### **3. Equity for Teachers**

The issue of equity for teachers is equally important. The gap between technology richer and poorer schools influences access to career opportunities and disadvantages some teachers. Teachers in schools with poor technology will find themselves in difficulties when they move to another school with good technology resources. They may also find it difficult to move to another school due to requirements regarding technology literacy.

Relevant professional development is more likely to be available in those schools with more technology, whilst those in schools with less may well be most in need of the opportunity. For this reason, there needs to be consideration of a "teacher first" policy in the provision of resources and training which takes place independently of school location.

## Professional Issues

### Questions

What are the implications for teaching as a profession, and for teachers as professionals?

In what ways will the use of information technology change the role of teachers?

Has the use of information technology the potential to either enhance or undermine teaching as a professional occupation?

Should teachers be concerned about the use of information technology to implement new systems of teacher evaluation and accountability?

What are the consequences for the structure and content of the curriculum of making cyber-literacy a basic skill for all students in the school system?

What are the consequences for the role of the teacher as curriculum development becomes increasingly out sourced and packaged?

Does information technology foster the development and use of certain approaches to curriculum eg. outcomes-based education, testing?

In what ways might the new technologies impact over time on the role of schools in society?

### Discussion

#### 1. The Purpose of Technology

The use and integration of technology needs to be carefully thought through and clearly set out in school plans and curriculum documents. Technology should not be used simply for its own sake. Teachers must be convinced that information technology is the most effective and appropriate means of achieving the curriculum goals they have identified. The purpose of introducing technology into the classroom should be to enhance teaching and learning and its use should be structured and evaluated in these terms.

At the same time there is a need to recognise that students need to develop technological skills as an essential learning tool.

There is also a need to develop good pedagogical models both to realise the potential of the new technologies and to integrate them in a purposeful way into an overall learning program. These models need to encompass the varying levels of resources and the different approaches

to technology now existing in schools eg laptop classes, group use computers etc. With increasing levels of technology in schools, the development of a sound pedagogy must be regarded as a priority.

There is already evidence that technology is determining aspects of the curriculum in some schools eg. in the reporting of student achievement. A number of software packages designed to report and record student achievement have a bias towards numerical and other coded forms of reporting and this then influences assessment and reporting policies in schools. Schools need to work out their reporting policies first and then see the extent to which technology can deliver the outcomes they want.

The use of technology to facilitate more progressive assessment, such as portfolio assessment, should also be further investigated.

## **2. IT Across the Curriculum**

Information technology must eventually be integrated across the curriculum. Valid and productive uses of IT have been identified in most, if not all, learning areas. Computer skilling and 'cyber literacy' should not be owned by particular curriculum areas or faculties eg business education and/or maths departments. This is not however, an argument against having a specific subject area aimed at extending the knowledge and understanding of students in information technology.

Initially, the related issue of the location of information technology resources - computing room or spread throughout classrooms - will have an impact on the extent to which IT can be integrated across the curriculum. This in turn will be influenced by the level and type of resources available. The desirable goal must be to have computers physically integrated into all areas of the school where they are needed.

## **3. Student Skills and Understandings**

The skills and understandings needed by students in the information age are of different orders of complexity. They range from the practicalities of using the technology in its present forms through to new means of conveying and retrieving information to the development of high order competencies such as research, communication and problem-solving skills. The combination of these skills and understandings are often referred to as 'cyber literacy'. Areas of particular need which have been identified by teachers include the development of student 'discernment' eg how to decide whether material derived from the Internet is worthwhile and questions of values eg the 'ownership' of work. Students also need to understand the impact of technology on society.

## **4. Cyber Literacy**

The current definition of literacy needs to be expanded to include 'cyber literacy'. Work needs to be carried out to develop a general understanding of what cyber literacy involves. The recognition of cyber literacy as a 'basic skill' alongside the other forms of literacy will have

consequences for curriculum development, resourcing in the classroom and such matters as national benchmarking.

A framework for the development of cyber literacy should be produced to provide guidelines for schools in this area. The framework should be accompanied by an implementation plan which addresses the resourcing and teacher training issues. Any new (or revised) learning area framework documents and syllabi should include a recognition of the needs of cyber literacy . Any course requirements however, must take account of resource disparities between schools, the provision of teacher training etc.

## **5. The Impact on Teachers**

There are rising expectations from governments, departments of education, schools and the community concerning teacher computer literacy. Teachers are now expected to be able to integrate technology into their curriculum programs. This is being reinforced by the expanding use of computer-based recording and reporting (and with new moves to computer-based assessment). There are also moves to require significant levels of cyber literacy in new graduates and the inclusion of IT skills in advertisements for teacher vacancies and in performance reviews. As a consequence, teachers are being faced with the question: 'Is it possible today to be a good teacher without information technology skills?'

Perceptions of teachers in schools are now being influenced by their capacity and willingness to use technology. A teacher will be seen by students and parents as 'up-to-date' if they regularly use technology. The students of teachers who are unable or unwilling to use computers may be perceived as 'missing out', and their learning area seen as less relevant to information technology than other subjects eg. maths, science, business studies.

There are a range of reasons why teachers need to have reasonable levels of cyber literacy. Unless teachers understand and are able to use technology they will find it difficult to critically review its use and limitations. Many of their students are regularly using information technology either at home or in other classes and subjects. Teachers need to be able to deal with a series of new IT problems such as the authentication of Internet-derived work.

Other impacts of the new technologies on teachers include : the use of computer recorded and reported student outcomes to evaluate teacher performance; the increase in 'teacher-free' electronically packaged learning; the introduction of computer-based programs to professionally develop and train teachers; the development of electronic teacher networks.

## **6. Professional Development**

While the importance of information technology has been generally recognised by teachers, they have largely been expected to pick up the computer literacy skills involved by themselves, or informally through their colleagues, and at their own expense. There has been no real acknowledgement that a 'teacher first' policy is the best way to extend the productive use of new technologies to all classrooms. A teacher first policy would have the priority of providing resources (eg. hardware, software, technical support) and training to teachers to make them confident users of the new technologies.

Often students have access to more sophisticated technology for longer periods than their teachers and the student as expert can undermine the self-esteem of teachers. There are also indications that some teachers feel that they have been left behind by the rapidity of the expansion and development of the new technologies. There is a need for a major professional development program which will empower teachers to become confident, critical and creative users of all of the new developments in information technology. The full implications of cyber literacy for the student, the classroom and the school will remain unrealised until teachers are given the incentive (time, resources, recognition, etc) to develop and extend their own expertise.

There is a need for an overall professional development strategy rather than the existing fragmentation. Professional development programs should revolve around best practice dissemination and sharing good models, action research linked to the curriculum and collegial training in work groups. Internal training is preferable to external models, particularly as there is often a mismatch between external professional development and an individual school's software and hardware.

There needs to be substantial additional funding for professional development in the new technologies. This is not only because of the size of the program needed, but to ensure that other important areas of professional development are not starved of funds to pay for the new program.

Teacher education courses should ensure that new graduates have had substantial experience in the use of information technology, its various applications in the classroom and a range of appropriate pedagogical models. They should be confident, critical and creative users of the new technologies.

## **7. Software and Other Resources**

Despite some excellent exceptions, the software available to schools is very limited in terms of its quality and relevance. There is a need for more teacher-developed software (rather than products from software houses). Models for achieving this aim include developing and resourcing teacher networks in partnership with the department and various professional organisations and using groups of student teachers, who are good at programming, to go to schools and collaboratively develop resources.

Teachers need the skills to analyse and select appropriate software. At present this can be complex and time-consuming. Criteria for the evaluation of software need to be developed. There needs to be accessible reference sources identifying useful sites on the Internet and providing reviews of available software. Teacher networks should be used for this purpose. They can disseminate their own information, talk on the Internet, use e-mail and benchmark web sites. Professional development and pre-service education should encompass skills in analysing resources, copyright issues, etc.

# Work Organisation

## Questions

What are the implications for the curriculum of students working increasingly from home?

Will the widespread use of information technology increase student workloads as students increase the amount of work they do at home?

What are the consequences of the widespread use of information technology for:

- (i) catering for individual differences?
- (ii) socialisation and working with others?
- (iii) distance and second chance education?

How can a proper balance between these two curriculum purposes be maintained?

In what ways do (or might in the future) the new technologies affect the way that schools work? (including administration, structure of the day, working from home, organisation of classes, individualisation of learning, of the school day, etc.)

Is there a need for new teaching and non teaching staff configurations? If so, what type of positions should exist? How should they interact with existing staffing?

How will or should the technologies be organised within the school? (eg. Is a laptop for every student a desirable aim?) Are there better ways of organising things, or additional ways?

Might the perception of “school” as essentially a physical site be challenged? What are the implications of this?

What are the major impacts on the work of teachers of the expanding use of information technology in schools. eg. changing pedagogy; recording, assessment and reporting procedures; student expertise and differential access to resources; authentication of student work?

What are the implications of governments requiring teachers to be ‘cyber-literate’ eg. role statements, links to incremental advancement and promotion positions, PD and training, access to resources?

Are there specific roles in schools which will experience major changes due to the expanded use of information technology eg. librarians

## **1. Industrial Claim**

There is increasing pressure from governments and education departments throughout Australia for all teachers to be competent users of the new technologies. In some states mandated curriculum documents indicate that all teachers should be integrating information technology into their classrooms, while new graduates from teacher education courses must have documented competence in this area. Many schools have also introduced computer-based recording and reporting systems. The implication is that a certain level of computer literacy is becoming a requirement rather than an option for teachers in government school systems. This significant change in the work of teachers, leading to reskilling and work intensification, needs to be addressed by negotiated industrial agreements.

The agreements should cover such matters as increased salary to recognise increased skills; training guarantees including fully funded professional development and training programs conducted, where possible, at the school or college level and funded access to work-time training rather than time-consuming after-hours programs; the funding of teacher networks to provide collegial support and teacher-developed resources; the development of relevant curriculum materials; the provision of a suitable computer, with appropriate licensed software and technical support, for every teacher expected by their employer to use information technology as part of their designated duties either at their place of employment or at other work-sites.

More specific areas which need to be addressed include the role and working conditions of information technology managers/computer coordinators and ancillary technical staff in schools and the changing role of school library staff.

## **2. Role of Teachers**

Teachers need to play a key partnership role in the expanding use of new technologies in schools. The use of the technologies in the classroom gains its justification in terms of enhancing the learning process. The key issues therefore, are those of pedagogy and curriculum program design, and the expertise of teachers in these areas must be recognised. If teachers don't assert their leadership role they may find themselves subject to various forms of deskilling eg through packaged learning and the arrival of concepts such as the 'virtual school'.

The new technologies present teachers with opportunities to explore a range of new learning possibilities. Technology can both enhance existing elements within the curriculum eg using word processing and the Internet to develop discursive essay writing skills and expand the curriculum into new areas eg various forms of modelling and design. In each case appropriate pedagogical models need to be developed so that these opportunities can be fully realised. The current consensus describes the teacher's role in the technological classroom as 'co-learning facilitator' rather than the authoritative transmitter of knowledge. The full implications of this revised role are still being worked out but it clearly presents a challenge to the pedagogy of some teachers.

The new technologies present teachers with a series of teaching problems and dilemmas. These include the classroom of 25-30 students all with different backgrounds and levels of computer

literacy, the balance between students working in isolation on their machine and the need to develop cooperative group work which values social interaction, the new forms of work organisation and pedagogy arising from laptop schools and computer networked schools and the implications of working with different levels of classroom computer resources eg ratios of 1:25 as compared to 1:1

### **3. School Reorganisation**

Many commentators are now predicting the end of schools and schooling as we know them. The claim is that the advent of the new technologies and their accelerating development requires fundamental changes to schools and a review of the nature of schooling. While some of this argument is part of the millennial bandwagon, there are a series of existing developments which raise questions about the intentions of governments and the compatibility between expanding uses of the new technologies and traditional approaches to schooling.

One of the main areas of focus is the relationship between the home and school. There are a series of experiments now occurring which electronically link the homes of students, and teachers, to schools. The links are being used for a range of purposes including access to resources, facilitating and monitoring homework assignments, reporting to parents etc. There is little doubt that these experiments will continue and be further expanded as the technology develops and becomes more accessible.

There has also been an expansion in the range and variety of 'educational' services available on the Internet. These include systemic sites developed by government departments and agencies, various institutional sites (both Australian and international) and privately funded sites. The services offered both complement and duplicate those provided by schools and include an expanding number of 'virtual schools'. In the USA the expansion of these services has led to a major growth in the home schooling movement.

The Victorian Minister for Education, in launching the Schools of the Third Millennium project, referred to a school in Ohio where '3000 kids study at home, taught by six teachers on-line'. While he insisted that he didn't support that particular staff-student ratio, at least at present, it did indicate the new interest Australian governments have in the potential of home schooling. As with most current educational 'reforms', this interest is driven largely by potential cost savings; cheaper on-line services may be able to reduce the need for expensive educational infrastructure and pay for the expansion of the new technologies. The many educational, social and economic concerns raised by notions of increased home schooling will need to be clearly identified and highlighted by the AEU.

Other developments which are already having an impact on schools include: the redesign of school buildings, classrooms and furniture to take account of networked technology, computer work stations, the growing use of laptops etc; the redesign of libraries to more clearly reflect their function as 'information services'; moves away from formal class periods, classroom-based learning and age-based student cohorts; the use of external electronic providers for curriculum extension and teacher professional development.

All of these developments are resource-hungry. In line with the movement to school-based management, they are happening first in individual well-resourced schools. Their implementation is contributing to growing inequities between students, schools and teachers within government education systems.