



This issue of Australian Educational Computing seeks to provide an overview of technology education in Australia. To this end, my colleague, Dr. Sue Trinidad contacted computer groups, education departments, catholic education offices and the Australian Education Union for comment and input. Within these pages are the replies received by the time of publication.

In some cases the predictions for the future must be reviewed and read in the light of recent political changes. With changes of government, agendas change and so do priorities for spending money on technology education.

The issue themes for 1999 will be;
Vol. 14, No. 1 - Teacher IT Competencies
Vol. 14, No. 2 - Teaching Computer Studies

Jeremy Pagram

Edith Cowan University j.pagram@cowan.edu.au

EDITORIAL BOARD

Dr Wing AuUniversity of South Australia, SA	Dr Ron OliverEdith Cowan University, WA.
Dr Betty CollisUniversity of Twente, The Netherlands	Jeremy Pagram.....Edith Cowan University, WA.
Toni DownesUniversity of Western Sydney, NSW	Dr. Geoff Ring.....Edith Cowan University, WA
Dr Tony FetherstonEdith Cowan University, WA.	Dr Michael RyanQueensland University of Technology, QLD
Dr John King.....James Cook University	Dr Sue Trinidad.....Curtin University, WA
Dr Anne McDougall.....Monash University, VIC	Glenice Watson.....Griffith University, QLD
David McKinnon.....Charles Sturt University, NSW	Martyn Wild.....Edith Cowan University, WA.
Dr Paul NewhouseEdith Cowan University, WA.	Dr Nicola YellandQueensland University of Technology, QLD

Australian Educational Computing is the refereed journal of the Australian Council for Computers in Education (ACCE) and is published twice a year. Members of affiliated state computer education groups receive the journal. Other residents of Australia who wish to receive Australian Educational Computing should join the appropriate state computer education group as listed below. The overseas subscription rate is A\$50 per annum. Cheques should be made payable to Australian Educational Computing. All subscriptions, and all editorial material including press releases, books, software and other products for review should be sent to:

The Editor, Australian Educational Computing,
PO Box 993, South Perth, Western Australia 6151.
E-mail: J.Pagram@cowan.edu.au

ACCE Affiliated Groups

ACS PO Box 534 Queen Victoria Building Sydney NSW 1230	CE SIGT 2 Davey St Hobart TAS 7000
CEGACT PO Box 1516 Tuggeranong ACT 2901	CEGV Room 42 State Wide Resources Centre 217-219 Church St Richmond VIC 3121
OSITE OUT Kelvin Grove Locked Bag 2 Red Hill Qld 4305	ECAWA PO Box 297 Claremont WA 6010
NSWCEG PO Box 1110 Harris Park NSW 2150	CEANT PO Box 41805 Casuarina NT 0810
CEGSA PO Box 116 Kingswood SA 5062	

Advice to Contributors

The editorial panel welcomes contributions in the form of original articles, letters, reports and reviews. Authors should ensure that their manuscript conforms loosely to the American Psychological Association (APA) bibliographic convention.

All manuscripts should be clearly printed on one side of numbered pages in a publishable style (eg. diagrams placed appropriately). Apart from the title page no author identification should appear on the manuscript. Figures, tables and graphics should be provided in camera-ready form. Photographs should be black and white rather than coloured. **Authors should limit articles to a maximum of 4000 words and include an abstract of 100-150 words.** Electronic copy in the form of a plain (unformatted) text file (9cm MS-DOS or Macintosh format, or via e-mail to the editor), should be submitted with the paper copy. Authors should include a brief autobiographical statement.

Papers contributed for the Theme Papers or Contributed Papers sections will be anonymously refereed by at least two members of the Editorial Board. All submitted material will pass through an editorial phase to maintain journal standards and balanced coverage. All articles accepted may be published in both print and electronic forms.

All material is copyright unless otherwise stated in writing and may not be reproduced in any form without the permission of the editor.

Options expressed by contributors do not necessarily represent the views of the editorial panel or the Australian Council for Computers in Education. The Australian Council for Computers in Education does not endorse products or services advertised in this journal.

Deadlines

31st March, 1999 for Vol 14, No. 1
30th August, 1999 for Vol 14, No. 2

Editorial Team

Jeremy Pagram, Sue Trinidad, Paul Newhouse.

Design

Totem Graphics

Cover Design

Edward Pagram

AUSTRALIAN Educational Computing

JOURNAL OF THE AUSTRALIAN COUNCIL FOR COMPUTERS IN EDUCATION

Volume 13, No. 2

November 1998

CONTENTS

President's Column	2
1998 ACCE Educator of the Year	3
National Overview	
Table of state Education Department technology initiatives	4
Teachers, schools and the new technologies: An Australian Education Union discussion paper	6
State of the Nation Reports	
Tasmania	13
Victoria	14
Western Australia	15
Catholic Education	16
CEG FOCUS - Queensland	18
CONTRIBUTED PAPERS (Refereed)	
The role and function of the computing coordinator in Western Australian Government Senior High Schools	20
The student voice: perceptions of autonomy and collaboration in learning with technology	28
ACCE Teacher Information Technology Competencies Project	
ACEC 98 Conference summary and discussion	34
Reviews	
Smarter not harder: multimedia made easier	35
Kids can do: computers in the K-6 classroom v1.0	35
Multimedia reading resources	36
Index 1998	38

Contributions for the non-refereed section of this journal are welcomed from teachers and other practitioners. Contributions for this section of the journal be clearly marked, "Not for Refereeing" and should be a maximum of 1000 words.

ISSN 0816-90-20

Michelle Williams

Queensland
University of Technology
m.williams@qut.edu.au

Welcome to the second issue of 1998 where the work of computer education groups across the country is celebrated, continuing a thread from issue one where recording the history and purposes of the Computer Education Groups (CEGs) and ACCE continued in print. Like most teacher associations, CEGs play three important roles. Firstly they provide a network for the expertise within teacher communities. Such a support network nurtures newcomers and enables leaders to break new ground and shape the association. Secondly, CEGs provide a structure for educators to gain support regardless of employer and employer system. Thirdly, CEGs act as a political lobby. The reports in this journal highlight how CEGs are working within these broad agendas.

In July, the 1998 Australian Computers in Education Conference was hosted by CEGSA for ACCE. The conference achieved a couple of important milestones. I would like to share my reflections of those two significant issues. It was clear that the conference had a national conference atmosphere, different to that experienced in state conferences. It contained reports of significant research in computer education, some of which will redefine what we are defining as authentic computer education activity in this country. Teachers expressed to me that the practical ramifications of the research were significant and they were delighted to have had opportunity to find out first about such work at an Australian Computers in Education Conference. It is essential that ACCE provides a structure for new and experienced researchers to report and discuss Australian research with us. The conference balanced the celebration of Australian ideas with national and international speakers sharing visions and new ideas. Furthermore, leading Australian teachers had opportunity to share their classroom work and Industry groups were able to contribute to the conference themes and provide all of us with new

ways of considering the impact of industry progress on our classrooms, schools and universities. The national conference is an important opportunity to bring the most significant Australian computer education people together to further the agendas which affect classrooms. Congratulations to CEGSA for achieving this significant combination.

The conference also enabled ACCE to take an active role in debating issues and setting political agendas. The ACCE Board hosted a session at the conference defining the issues about teacher competencies in computer education. Labelled differently in various states, the systemic agenda seems to be about defining learning technology competencies or capabilities and about setting in place procedures to ensure (or help) teachers in schools take responsibility for demonstrating competencies in classrooms.

The conference enabled ACCE to uncover these issues. It was clear that there is increasing pressure on reluctant teachers to achieve competence with learning technology, with some states alluding to mandatory conditions of employment. It was also evident that the three states with published definitions, had adopted a broad understanding of learning technology competence focusing on teachers curriculum understanding, classroom management, resource management and ability to contribute to school planning and decision making rather than technical skills. Finally ACCE had a loud and clear message to act proactively on behalf of teachers.

Conference participants asked ACCE to proactively lobby systems to define competence, especially in those states where definitions have not been published and to perhaps help define standards for learning technology competence. Delegates were also keen for ACCE to lobby for improved opportunities for teachers to gain competence and to debate teacher ownership of computers,

access to quality professional development as opposed to training programs and opportunities to be recognised for contributions to learning technology initiatives. Agendas about management of computing facilities, recognition for the work of computer coordinators and opportunity for teachers to build networks of expertise arose from discussions about enabling teachers to have greater 'say' in systemic initiatives. The role of CEGs and ACCE is clearly to create opportunity for informed debate and to encourage systems to recognise the value of practitioners' opinions.

ACCE has thus undertaken a project to define standards for learning technology competence. It will develop a number of statements about the consequences of such standards and the issues involved in helping our teacher workforce achieve such competence. The research is done. The debates are soon to be launched on oz-teachers and within state's online communities. Please join in and help ACCE shape such a range of positions statements with you.

A sad element of the conference was the lack of NSW teacher participation. CEGNSW decided to host their conference

at the same time as the national event. The Board of ACCE hope that in future, CEGs will join in the collaborative spirit of ACCE and become part of this important event enabling all Australian teachers the opportunity to celebrate statewide expertise and participate in the national agendas.

Important work has begun in supporting the redevelopment of the New Zealand Computer Education Society. ACCE have been providing a support network for society board members and interested educators. In the project Bev Gower, current president has visited the ACCE Board. I had the opportunity to attend their national conference, present ideas for a society model and attend some meetings to help unite their CEG structure within a stronger national umbrella. I will be attending a national meeting again in November where I expect the New Zealand team will finalise their structure. ACCE has offered a reciprocal affiliate agreement which will enable Australian teachers to participate in New Zealand events and access New Zealand publications. More than this we have discussed combined conference programs, opportunities for Australian teachers to undertake

professional development tours of New Zealand and opportunities for joint online projects. The New Zealand team are very collaborative and offer us so much.

An agenda for the ACCE Board in the later half of 1998 is to offer support to Northern Territory teachers to reform their CEG. I hope that Northern Territory teachers will contact me or any ACCE Board members and offer their support and advice. I hope we can celebrate the Northern computer education initiatives in an AEC in 1999.

Further, in the latter half of 1998 the Board will be finalising ACCE membership categories, moving from a one tiered MACCE membership structure to a three tiered structure. I expect that you will hear so much about that in the 1999 journals.

In closing, I want to say thank you for your support of your CEG's activities in 98 and for supporting the work of the ACCE board. I wish you and your families a safe and happy festive season and holiday.

Regards,

Michelle Williams.

ACCE Educator of the Year 1998

Each year the ACCE takes nominations from state and territory groups for the award of ACCE Educator of the Year. This is one way of acknowledging the work of teachers who make outstanding contributions to the quality of educational computing activities.

The ACCE Educator of the Year for 1998 is Mike Leishman from Newman College in Western Australia. Mike, a Computer Studies teacher, has pioneered a variety of excellent computer education initiatives with students in schools, and has been extensively involved in teacher professional development activities with ECAWA. Michelle Williams, President of the ACCE, presented the award at the conference dinner at ACEC98, and Anne McDougall, Australian Computer Society representative on the ACCE Board, presented Mike with the 1998 Educator of the Year trophy provided by the ACS. We offer warm congratulations to Mike.



State	The target ratio of computers to students and an indication of when this target is likely to be achieved.	A brief summary of the approach used for IT professional development for teachers.	Any specific IT focused resources provided to teachers.
Tasmania	Provision from central initiative of new computers on a basis of 1 computer per 5 students. This provision is in addition to the existing computers inschools.	<ul style="list-style-type: none"> • Senior secondary colleges and other schools have been funded to be the initial course providers. An Educational Computing Professional Development (ECPD) unit has been established to coordinate PD statewide. • A series of PD modules has been constructed which address both functional and educational aspects of using IT in schools. These are organised into focus areas: computer literacy with a personal and professional focus; teaching and learning with IT with a student and curriculum focus; school level management and planning with a system and support focus. • A set of 4 courses has been identified as pre-requisite modules. • A Graduate Certificate in Education (Education Computing) under the ANTA framework is currently under development. • A benchmark has been set consisting of the 4 prerequisite courses plus the first 2 modules of the Graduate Certificate (which address pedagogical aspects). • This professional development is available to all DETCCD teachers at no cost to them. • District-based (approx 1 per 30 schools) Resource Teachers are in the process of being appointed to provide support in PD in using IT in education. This is in addition to the ECPD team. 	<ul style="list-style-type: none"> • A fully-supported laptop computer with software for each full-time teacher. • A School Administrative Computer System (SACS) which will allow more efficient use of teacher time in performing necessary administrative tasks. This includes a Student Achievement Module for recording and reporting student learning outcomes. • All classrooms and staff areas in all schools cabled with LANs, all with access to software and the Internet. • Extensive PD opportunities available free of charge to all teachers.
Victoria	By 2000 a ratio of 1:5	<ul style="list-style-type: none"> • The Statement on Learning Technologies in Victorian Schools 1998-2001 provides a framework for activities and efforts in the IT area and sets targets for achievements from students, teachers, principals and school communities. • A priority is the professional development of teachers to enable them to confidently and capably use IT. The Government has committed \$56M over four years for this purpose. • Schools have received a Learning Technologies Teacher Capabilities resource package, and a range of programs and resources are available. • Allocation of notebook computers requires a commitment by teachers of at least 40 hours to professional development in the use of learning technologies. 	<p>The Department has embarked on a wide range of initiatives to meet its targets for integrating IT in schools. Some of the initiatives provided to teachers are:</p> <ul style="list-style-type: none"> • VicOne Statewide Wide Area Network - Utilising VicOne, Education has established a statewide education network, linking 1900 educational sites, supporting services which include: <ul style="list-style-type: none"> - enhanced Internet access incorporating the Education Selected Cache which has become a valuable resource for teachers, - video-conferencing to enhance inter-school communications, and the delivery of distance education, - electronic mail for communication between all schools and Department offices and 40,000 staff, including the EduLibrary facility for electronic document distribution, and - the Digital Resource Centre (1999) which will provide online educational material to schools. • Improved Teacher Access to Technology - A subsidy initiative announced in the last budget will result in \$36m expenditure over 2 years to improve in-school access for teachers to technology. • Notebook for Teachers Program - This program will provide notebook computers to up to 36,700 principals and teachers over a period of five years.

Compiled by

Dr Sue Trinidad

Faculty of Education
Curtin University of Technology

Based on original concept by

Kevin Leighton

Project Coordinator
Information Management Branch
Department of Education
Tasmania

State	The target ratio of computers to students and an indication of when this target is likely to be achieved.	A brief summary of the approach used for IT professional development for teachers.	Any specific IT focused resources provided to teachers.
New South Wales	By June 1998 a ratio of 1:14 computers to students on a state wide basis. This is based upon a base allocation with schools using additional funds to provide equipment beyond this level. The government announced in June 1998 that an additional 22,000 computer entitlements would be provided to government schools.	<ul style="list-style-type: none"> • A program of training and support for teachers has been developed. The aim of the program is to enable teachers to integrate technology into their current teaching and learning practices. • There are two main aspects to this program: a thirty hour technology course for teachers K-12 known as Technology in Learning and Teaching (TILT) one-and-half days of training for one Internet Contact Person in each school. • TILT is a flexible program designed to develop the technology skills of teachers and promote the application of technology in teaching and learning. It emphasises: good classroom practice; building on and developing teachers' current skills and expertise; learning with and through technology; using technology that is appropriate, applicable and available; the integration of technology across the curriculum K-12. 	Resources provided to teachers includes TILT. Curriculum documents.
Queensland	Systemic targets for 2001 <ul style="list-style-type: none"> • a ratio of 1:7.5 • improved student learning achievements through the use of learning technology • computers in every classroom for use across all eight key learning areas and all year levels (P-12) and by students with special needs • a school network that gives every classroom access to the Internet • Quality curriculum software and courseware systems available to all students and teachers. 	<ul style="list-style-type: none"> • Education Queensland will have a WAN connecting all 1300 schools, district offices and central office by December 1998. This WAN provides access to a managed Internet service and Departmental Intranet and email facilities. Schools are connected by an ISDN line or satellite. • The major systemic goal is to develop and maintain the information technology (IT) competencies of staff and the application of these competencies to effective learning and teaching in all key learning areas, P-12. • Minimum systemic learning technology competencies for teachers have been established with a percentage of the workforce to meet the targets each year up to 2001, when it is expected that 100% of staff will have the competencies. A school-based model is being applied where funds are provided directly to each school and the school community decides the approach for professional development to be provided. • The learning technology competencies for teachers have four dimensions: <ul style="list-style-type: none"> • IT skills • curriculum applications, including classroom planning and management • school planning • Student-centred learning • The accreditation process for achievement of the competencies will ensure that teachers meet all four dimensions. 	Apart from the grant-based professional development funds, the Connecting Teachers to the Future Project is a submission-based project which provides professional development to over 200 teachers each year. Each teacher who participates in the Connecting Teachers Project receives a laptop computer and Internet account for their own professional use while they are an employee of Education Queensland. A multi-media professional development CD-ROM entitled "Computers in Learning" has been produced and provided to all schools. Professional development funds in excess of \$500 per teacher are provided to each school as it comes on line over the three year period to help teachers meet learning technology competencies at level 1.
South Australia	By 2001 a ratio of 1:5	<ul style="list-style-type: none"> • Schools are provided funds (according to a formula) with local providers delivering the training. Certain outcomes are required to be achieved with audits done to measure progress. The training focuses on Microsoft Office software, CD ROMs and use of the Internet. 	No specific resources provided to teachers at this stage. Some curriculum resources are available.
Western Australia	By 2002 a ratio of 1:5 in Secondary and a ratio 1:10 in Primary. This is based upon full government funding for the acquisition of computers to meet these ratios.	<ul style="list-style-type: none"> • Each school has had a trainer trained to provide PD in their school on the use of the Internet. • Schools have funding to fund professional development to support the implementation of school priorities. Where technology is a priority, schools can identify and fund their choice of professional development opportunities. • The new Learning Technologies project provides funding to schools which may be used to provide professional development. • In their planning for integrating learning technologies into the curriculum, and accessing the government funding, schools are required to demonstrate how they will be providing professional development opportunities for their staff. • The Department is exploring establishing a directory of quality assured providers. • Annual audits of teacher competencies will commence in 1999. 	No specific resources provided centrally to teachers. Schools can direct school funding to strategies to improve teacher competencies. In the future will be considering ways of encouraging teacher ownership.

Teachers, Schools & the New Technologies: A Discussion Paper

John Graham

Research Officer, Australian
Education Union (VIC)

Roy Martin

Research Officer, Australian
Education Union (Federal Office)

Comments on the paper should be directed to John Graham at the Vic Branch (Fax - (03) 9417 6198) or Roy Martin at the Federal Office (E-mail roym@edunions.labor.net.au; Fax - (03) 9254 1805).

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?

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.

"... 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."

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 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 outsourced 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 full implications of cyber literacy for the student, the classroom and the school will remain unrealised until teachers are given the incentive ... to develop and extend their own expertise."

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

“The new technologies present teachers with opportunities to explore a range of new learning possibilities. Technology can both enhance existing elements within the curriculum ... and the Internet to develop discursive essay writing skills and expand the curriculum into new areas...”

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.

Discussion

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.

State of the Nation: Tasmania

Janine Bowes

Tasite

Background

Government

Directions for Education

The Government "Directions for Education" statement announced in April 1997 promised a laptop for every teacher, new computers in a ratio of 1:5 full time students K-12, all schools fully networked, routed permanent Internet connection to every machine, a professional development program and a service agreement for ongoing performance and maintenance of the new learning technologies facilities.

Non-Government

Under "Directions for Education" there was originally no direct funding assigned to non government schools. At the time of writing all Directions initiatives are to be made available for purchase by non government schools (economy of scale) and in July 1998 it was announced that \$1.9 million would be allocated to non government schools for Information Technology.

NOTE: This article was prepared before the recent political changes in Tasmania. Some of the initiatives described are in doubt.

Teacher perceptions:

Some schools have ceased to spend the funds they usually would assign to technology in expectation of the imminent roll out of Directions computers. This causes frustrations at times as whole cohorts complete another school year under resourced in this area. There is an air of optimism accompanied by a degree of fear and the natural consequences of enforced/imposed change on a major scale.

Common Positive views

- Level of equipment is very substantial particularly for smaller schools
- Laptops for teachers seen as recognition of professionalism
- The role and importance of education as an agent for social change is recognised through this funding
- Support is seen as valuable especially by Principals and schools in rural/remote areas
- Focus on education rather than technology (especially important for Primary Schools)
- Free professional development welcomed by most teachers
- Reduced load on school resource budget as most of IT is centrally funded
- Economies of scale from software bulk purchase seen as beneficial for school management
- Assessment and reporting software is receiving favourable comment from teachers

Common Negative views

- Degree of scepticism that the promise will be delivered
- Fear of the unknown by many teachers
- Perception of loss of autonomy and freedom to innovate
- Bulk purchasing of software may stifle creativity
- Changed role of IT coordinators
- People believe that this gain will be at the expense of resources elsewhere in education and in schools eg no music teacher, no building repairs
- Schools may become targets of theft and vandalism
- Increased workload and impact of change on teachers
- Fear of centralised reporting as being a control mechanism

- Costs to schools for furniture, power points, lighting, shading, heating, ventilation, occupational health and safety, building modifications seen as onerous

General Comments

The change process is too fast for some but the equipment roll out is too slow. Some teachers undertake professional development and training and are then unable to practise what they have learned. This is frustrating for the teachers concerned and demonstrative of some omissions in the professional development planning.

The linking of teaching tools with learning outcomes has the potential to identify successful practices without imposing additional burdens. It is encouraging that multiple professional development models are emerging and are being implemented systemically. There is scope for professional associations to fill niche gaps and contribute to the professional development offerings in the State.

A revolution in terms of educational pedagogy in every learning area has occurred. This means that every learning area has enormous needs in making best use of technology in their curriculum. Making the vision a reality requires the marshalling of all resources including professional associations.

The Directions for Education implementation team has made use of multiple strategies for consultation and communication of progress. In particular they have adopted a proactive role in communicating with grass roots teachers via the online community hosted by TASITE and it has been more than encouraging to see their willingness to listen and adapt where possible.

With so much of the journey of planning and infrastructure of Directions for Education now completed yet so little actually implemented, it is ironic its future now depends on the outcome of the State election which will be known by the time this is published. That outcome will determine whether the brave and optimistic vision that has attracted attention worldwide is continued, diluted below the critical mass level or abandoned.



State of the Nation: Victoria

Nina Netherway

CEGV

VicOne Wide Area Network

One of the main foci for schools in Victoria is learning technologies. Government schools are being networked to the VicOne Wide Area Network which will link all Victorian Government Schools, TAFE's and Government agencies giving access to the internet and email addresses for all staff and students. VicOne includes a Digital Resource Centre and a huge cache of websites to enable speedier and safer access for schools.

The Notebook Computer for Teachers program will provide teachers with leased notebook computers over a period of five years. The cost for teachers will be \$450 over a three year period. This program, which is linked to a commitment to professional development, begins in October 1998 when approximately 25% of teachers will receive a notebook.

Professional Development support is coming from the release of the CD-ROM based Selfpaced Learning Materials and the Teacher Capabilities Documents with their related PD support materials. Navigator schools have been established in four primary schools and three secondary schools around the state. These schools offer examples of excellence in the use of learning technologies in the classroom through professional development programs. Leading Practice classrooms have also been established to offer examples of good practice to visiting teachers. SOFWeb, the DOE's website offers educators a wonderful collection of information and web services.

Primary

CEGV has the Project Management role for the implementation of the CAPC Course (Computers Across the Primary Curriculum). This 20 hour course which encourages teachers to use computers across their curriculum, is conducted throughout the state by trained teacher-leaders. A Project Officer from the CEGV does the administration and organisation for this project. LWTI (Learning With the Internet) : a 12 hour course on usage of the internet in the classroom, is also conducted by trained teacher-leaders throughout the state. The CEGV maintains the administration for this course also. LWTI covers both primary and secondary teachers and is a major component in the Computers Across the Secondary Curriculum (CASC) course, which is presently being implemented in post-primary schools.

Secondary

The major thrust in secondary schools is the CASC (Computers Across the Secondary Curriculum) project. This is a 6 hour curriculum focused course in either of the following Key Learning Areas: English/LOTE, Maths/Science, and SOSE.

A teacher is awarded the CASC certificate when they have completed one Key Learning Area module plus the Learning With The Internet program.

These State wide projects are open to teachers from both government and non-government schools. Private schools also show great diversity in their use of Learning Technologies - ranging from the use of a satellite link between campuses, radio networks, laptop programs, and extensive multimedia programs to the smaller schools with limited resources.

Learning Technology conferences have been organised by the CEGV, the Department of Education and some private schools. These conferences have attracted a range of participants from all sectors and make a great contribution to the spread of knowledge regarding learning technologies. CEGV, as well as planning a State Conference for 1999, has already commenced planning for the ACEC2000 conference.

Issues

Issues confronting schools include:

1. Hardware and networking financing issues
2. Network issues, do we really need a network? What sort of network? What should we do with a network when we have one
3. Professional development - assisting teachers to be able to use the technology in the classroom and to fully utilise the networks which are being installed into schools
4. Maintaining the hardware and networks - technical support
5. Access to resources
6. Leadership and direction within the school for the implementation of learning technologies
7. Integration of learning technologies into the curriculum especially for secondary schools
8. Where do you go for expert, independent advice on infrastructure/ hardware etc.

CEGV Directions

The CEGV is working on some new directions: CEGV enterprises; membership cards; expertise database; Professional development; publishing the magazine COM3 on line

State of the Nation: Western Australia

Mark Weber

ECAWA

It is interesting to reflect on where Information Technology (IT) in Western Australia is in relation to where it was ten, or indeed twenty years ago. In the mid 80's, Western Australians prided themselves on being educational leaders in the field of Computers in Schools. The feeling here is that this lead has slipped, first to South Australia and the folk over at Angle Park, then Victoria and Queensland, and now maybe to Tasmania.

In an effort to position our students in a comparable position to others, our state government promised \$100 000 000 over the next four years. The commitment was for primary schools to have a ratio of 10 students per computer and high school students to have a ratio of 5 students per computer.

With the injection of this government money, there has been an emphasis to have coherent, well thought out IT plans. Schools are required not only to plan for the physical hardware for a school site, but include a commitment to where it will be used in the achievement of educational objectives and how technology will be applied across the curriculum. Also, there is a requirement for a component of teacher training in the plan.

To this end, the Education Department of Western Australia (EDWA) has provided real leadership with a variety of initiatives. Such projects as Technology 2000, Train the Trainer, Tech Focus 2000 Project and others, have provided direction and support for government teachers in this state. They have insisted that such initiatives have web sites, and as a result, made this information available for remote schools and those in the private arena.

These initiatives have also involved the School of Isolated and Distance Education (SIDE), a facility which provides live-in accommodation and computers for teachers from both the city and the country. Teachers can come in from all around the state, stay on site, and put in intensive time learning with and about the new technologies. These facilities are available for anyone to hire, and ECAWA has availed itself of the accommodation to run its annual goal setting meetings.

EDWA has also made available to all government schools the Technology Planning file based on a Victorian document, reworked for a Western Australian focus.

This of course has meant the usual huge learning curve for those who are "lucky" enough to be IT coordinators. ECAWA, through its Flying Numbats, online listserver Echalk, web site Ecaweb and many conferences and workshops, has been to many parts of the state delivering its message of educational computing. ECAWA have also been proactive in identifying issues and have a think tank, the Computers in Education Special Interest Group, to investigate and report on developments.

The major issues we are looking at as a group at the moment include :

- What is a computer literate teacher?
- Is computer literacy a right or responsibility?
- What is the role of an IT Coordinator in the school?
- Who sets the standards and conditions for IT teachers to work in?

A further question we will face in this state in the near future is that of IT competencies. It is already a condition of employment in some schools, that teachers meet some criteria regarding IT. This will no doubt filter into the general arena, possibly in the next five years. There are a few issues to be thrashed out in this

area, and ECAWA is pleased to be part of the ACCE initiative in contracting Dr. Graham Ferres to prepare a national position on this issue.

However, it must be remembered that there is an aging population in teaching. Some fear declining standards for entry into undergraduate education courses and increasing uncertainty as teachers no longer are given permanent tenure mean more able students in our secondary schools are rejecting education as a career. It may well be that future teachers may not be interested in developing advanced skills in computing or indeed IT.

Another issue that has surfaced in this state is that of Training versus Education. Training sits nicely in the Vocational Education realm, where classes of students all sit at individual machines and the instructor tells them when and how to open a file. Educators give the students tools and skills, and set up an environment for learning to take place. The question is where should a school emphasis lie?

Some administrators have the view that computing and IT will somehow serendipitously and magically permeate the teaching learning process, and that IT will take over or change the teaching style. There is a view that the future of IT and or Computing Coordinators is limited and somehow those who have put the time, commitment and passion into the introduction of these new technologies will go the way of Morse code operators. It will be interesting to see how the outcomes of this theory develops.

In conclusion, IT seems to be a lot healthier in this state going into the year 2000. The Numbats are encountering more teachers, especially in the primary service, forming a critical mass that embrace the technology. Schools have an emphasis on planning their IT and providing teacher training. Many primary schools have at least one class conducting a collaborative project like a travel buddy, and digital cameras are becoming "must have". The EDWA and state government initiatives have provided real and meaningful IT development.

However, there is real concern for the long term future of not only technology education, but whether administrators can staff all areas relating to maths and sciences in the next ten years.

State of the Nation: Catholic Education

Catholic Education Centre: NSW

Target Ratio of Computers to Students

No specific ratio of computers to students have been set. However, the following minimum standards have been set for schools:

- each school to have a collaboratively developed Information Technology plan
- each teacher to be able to use, and assist students to use, email, Internet and multimedia
- regular student access to facilities for email, Internet, multimedia and word processors
- provision in school budgets for Information Technology hardware, software and professional development.

Approach used for IT professional development for teachers

In 1997 one reference teacher from each school was trained, through a three day course, in the TALENT (Teachers and Learners Engaging in New Technologies) materials. This training dealt with:

- TALENT Discovery: Beginning Computer Awareness
- TALENT on-line: The Internet and email
- Information skills
- Software available across Key Learning Areas
- Key Websites for classroom use
- Values in Information Technology
- Copyright Issues
- Building a Website
- Setting up Small Computer Networks.

In 1998, more principals and teachers are being trained in these topics at regional office and school level.

IT focused resources provided to teachers

In addition to the TALENT material described above, a manual Going 'On-Line' - A Leader's Guide to Educational Technology has been produced to assist school leaders in managing the development and implementation of an Information Technology plan.

Catholic Education Centre: SA

Catholic Schools in South Australia have responsibility for making decisions at the school level in relation to information technology. These decisions are made across a broad range of areas including infrastructure, professional development, resource management and curriculum development. A representative group of principals, deputy principals, information technology managers, teacher/librarians, country teachers formed the Education and Technology Working Party. This working party deliberated for 18 months and delivered a strategic plan for Catholic schools in SA in late 1997. The strategic plan identified the following directions :

- Schools should manage information technology through the use of a considered information technology plan developed in consultation with stakeholders. Elements of the plan should include the school vision, educational outcomes, identifies system functionality and establishes a framework for a set of actions, both short and long term.
- With the increasing shift to electronic resources, schools need to plan for student access to the Internet. By the end of 1998, all schools should have an Internet access and should be planning to increase access via the use of computer networks.
- Whilst Catholic Education in South Australia has not adopted a benchmark for the computer to student ratio, schools are expected to improve access to information technology to all students in schools. This means schools should plan to reduce the student to computer ratio at a rate which is manageable and affordable to the school community.
- Resource management is the responsibility of the school. The implementation of a standard staff, student and school software management system has been a major project for schools. The Matcom product, DUX, is now in 85 schools, with the financial package being implemented over the next 2 years.

- The strategy states the importance of supporting staff in their professional development. The importance of professional development was emphasised by suggesting that equal spending on hardware and professional development was required for successful integration of technology in the classroom. Schools adopt a number of strategies to assist staff. For example, a mentor system places an experienced and confident user with a new user so that skill transfer and confidence can be effected in a non-threatening environment. 'Good practice' demonstrations at staff/faculty meetings allow staff to share their success. On-site, after hours workshops, are developed by schools who have the facilities and expertise for staff members to work on a large group basis. These workshops are often skill focussed, although staff training should adopt an approach which is curriculum focussed. The support of the leadership in the school was an important factor in successful implementation of information technology.
- Schools are able to access courses and materials provided by private providers for professional development through a user pay system. Courses range from Microsoft training courses to 'Integrating the Internet' delivered via University of South Australia short courses. Catholic schools make good use of the School of the Future which presents courses for skill acquisition as well as practical teaching ideas for the classroom.

Documentation available to schools include a set of guidelines developed by the Education and Technology Working Party in the area of hardware/software, professional development, Internet access and services and financial options. As well, websites for Catholic Education in SA (<http://www.ceo.adl.catholic.edu.au>) and nationally (<http://www.ncec.catholic.edu.au>) have been developed for publishing, and in the future, distributing materials electronically. Through close association

with EdNA (Education Network Australia), other resources are made available to schools. (eg the excellent planning document 'Learning Technologies : A Planning Guide for Schools ' produced in Victoria has been made available to Catholic schools in SA)

Catholic Education Centre: Victoria

Victorian Catholic Sector

<http://www.ceo.melb.catholic.edu.au>

- No target ratio has been set by the CECV.
- Individual schools may have set computer to student targets and in pilot projects in Melbourne, the ratio of computers to students is between 1:5 and 1:10.

There is a variety of approaches to professional development of teachers.

The emphasis is on using IT in the learning context. So, in developing teacher skills, the emphasis would be on the practical and effective application of IT in the learning environment. IT is viewed as a tool for learning.

The developing view of professional development in this area recognised the need to address a number of factors:

- The teacher's stage of development in the use of technology (entry, adoption, adaption, appropriation, invention)
- Skill development in the use of technology
- Development of curriculum and teaching and learning strategies and approached
- Development of classroom management and organisation skills
- Development of critical evaluation skills.

Building Professional Communities

Report from QSITE
(Queensland Society for
Information Technology
in Education)

Michelle Williams

ACCE President

Past President QSITE

The spirit and energy of teacher professional associations is built by the activities of members. Within this ethos, a significant goal for any contemporary association is to build a sense of belonging, as members learn to actively build their professional profile and learn to participate in the community of practice which is the association. QSITE has gradually worked towards this goal. There is however much to learn from all computer education groups in Australia about constructing an environment for contemporary teachers who are working differently now as they connect to each other in online communities and as information and communications technology alters their workplaces and classrooms. This report describes the key structures and activities of QSITE, as it learns about enabling a participatory and responsive membership.

Chapter structures

QSITE has established a range of geographical chapters, so members in local districts have opportunity to host activities, share expertise and take leadership roles. The chapter structure sprung from a realisation that planning and conducting activities was best done by locals and that it was logistically difficult to plan events for a town 1000K from the QSITE office. Local chapters have now matured from a local organisational structure to an integral part of the QSITE ethos.

There are chapters at Cairns, Townsville, Rockhampton, Western Queensland (Outback chapter), Toowoomba, Gold Coast and Sunshine Coast. Each is different within a common structure. Chapters have a local management team, have financial autonomy and conduct their own kind of events. They have also constructed web sites, run online communities and conducted major projects, winning contracts to host major professional development initiatives on behalf of Education Queensland. QSITE Outback and QSITE Townsville have hosted the Connecting Teachers to the Future program, an initiative which provides teachers with laptop computers, training and professional support while undertaking projects in their schools. Others have hosted a major conference or been involved in elements of the QSITE State conference. Chapter work is now sometimes complemented by teachers

who host events in areas where chapters are not yet formed. There is now no reason for members to complain that there are not local events for them; they are instead encouraged to participate in making some.

An important consequence of chapters is that the management team can confidently plan activity which is inclusive of people outside of the south-east corner of the state. For example, in 1997, QSITE hosted a distributed conference, enabling a shared Keynote, local activity, synchronous communication and an online training environment in multiple sites. Sharing people and expertise across chapters is now a planned activity with many exchanges and collaborative events being hosted around the state.

Sharing professional development models, management strategies and expertise across chapters occurs more easily because of hosting an annual Chapter meeting, highlighting chapters at conferences, conducting specialist publications on chapter activities and because of an online management list which enables chapter and management teams to share news and ideas, as well as seek help and support. Building a communications system between chapters and within the management teams is the most significant contribution to building a cohesive structure and to disable the fragmentation which could result if team members were not so determined to maintain a statewide structure. The annual face-to-face meetings of chapters and management are core business of the association and budgeted for, in the same way that publications and conferences are cornerstones of association output. This local autonomous chapter activity is complementary of a statewide membership system. Members of QSITE belong to the statewide association and do not pay any fees for working with local people in a chapter structure. All chapters contribute to the value of membership by hosting local activity, providing additional services (usually online) and acting as a local support team for leading teachers and teachers needing advice.

Online activities

As soon as a public Internet access was available, QSITE established online communities for teachers to learn about participating in the new professional structures enabled by global networks. QSITE was clear in its belief that

connecting teachers first is important in helping teachers understand the potential of online spaces for hosting learning communities. From such a humble beginning, a sophisticated collection of online communities now supports many groups within the association and plays an important role for teachers.

In retrospect, QSITE can now reflect on some important decisions about its online contributions. Firstly, the email list for Queensland teachers was named QSITE-community. Thus QSITE has an amazingly high profile amongst teachers, principals and systems. It is part of the everyday lives of Queensland teachers in a way that no paper-based device could achieve. QSITE-community was built as a general teachers list before educational systems understood the potential of online environments for connecting teachers. The result was an inclusive list across systematic schools, rather than a Departmental only list. QSITE built an open-membership policy allowing members and non-members to join freely. This community service has been so important and enabled QSITE to demonstrate its leadership thinking and encourage members and non-members to work together. It is a reflection of the goals of the association which extend far beyond building a stable membership base. Further, the list is not archived, enabling free debate and open discussions. This has proved invaluable in letting teachers critique initiatives while participating in a place where people learn about communication online.

Two developments online have contributed to teachers' understanding of the potential for online spaces. Firstly QSITE has hosted events on its online communities. Guest speakers, online debates and online workshops complement the usual metaphors which reside in online communities (helpdesk, a place to seek partners, announcements, vendor sifting, newsletter and soapbox and a place to enable lobby groups). Secondly, QSITE has increased the number of its online specialist communities. Lists exist for local chapter work and special interest groups. Online communities for computer studies teachers, computer coordinators and network managers complement the general community. The QSITE-Lan list for network managers has achieved amazing results in lobbying for computing initiatives, raising the profile of the work of computer coordinators and in persuading

unions and systems to think differently about the lobby potential of online communities of teachers. More than this QSITE-Lan has become an essential toolbox for surviving the job of being a network manager. Most computer coordinators in the state are members and rely heavily on the expertise in this community. Its strength is its membership and the knowledge and experience which resides in peers, a concept very familiar to the ethos of professional associations.

The QSITE Netsite complements the online activity. The web site acts as a place to gather contacts, extend links between pockets of expertise and collect the wisdom of the association. It also acts as a management tool for members and a device for organising events and activities. The web site is not a postcard or brochure of the association for tourists and outsiders. It is an integral tool for the membership and for people who participate in QSITE's activities.

Professional development models

QSITE is exploring alternative professional development structures to the usual training workshop model. Although there is much to learn, there are some important new ideas been tried and tested. A "Tinkering with Technology" model is helping new computer users become more confident in a just-in-time model for gaining knowledge and skills. The model involves a team of people meeting with participants. In a round table session, participants decide what kinds of things they want to learn. Groups of people then wander in and out of work spaces learning skills and find out "how" with the team of workshop leaders. The day is quite informal, based on individual needs and enables people to gain access to expertise and further help. Leaders enjoy the day too and can participate without the large burden of preparing long-term presentations and workshops. It is a simple model for sharing existing expertise while catering for individual needs.

Within conferences, QSITE is extending its models for conducting professional development programs. Each conference pushes the boundaries. Distributed conferences began in 1997. The National Computer Studies Conference took teachers to Industry for a day and enabled industry to work with teachers in a case study model. The 1998 conference deviated from the standard model with

round tables as a model to share expertise and to enable teachers to share classroom experiences in a collaborative fashion learning from the audience as well as sharing the speakers experiences. The 1998 conference also dedicated a day to management issues, recognising formally, the importance of computer coordinators in the membership base.

QSITE has begun extending its expertise to other professional associations working in 1998 with the Natcom project and the National Joint Council of Teacher Professional Associations, DEETYA funded projects to help professional associations learn about building online activity. This has helped shape the thinking of the association and helped us document online models and our web development. This will be important continuing work in 98-99.

QSITE is expanding its activities constantly learning from peers in other CEGs. QSITE has borrowed the 'Flying Numbat' model from ECWA and QSITE ONLINE is available to schools to ask for help. It is hoped that closer links to CEGs in the next few years will extend QSITE's understanding of how to build professional support communities for members and take leadership roles in national and state initiatives.

Publications

Apart from online publications and CD Rom collections of resources, QSITE hosts two paper-based publications, a 12-page monthly newsletter and a quarterly journal. Although this is normal activity for a CEG, the relationship between online activity and paper-based publications is interesting. One tells the story of the other, sharing the connected communities stories with those not yet able to connect. It has been deliberate planning to merge the publications and to consider how online communities make use of paper-based and online information. There is much to develop in this area and we look forward to learning from other CEGs as they embrace the issues of online publications, duplicating publications online and using each version of publication to develop the other.

In short, QSITE is growing. It is growing in membership and growing in its energy and output. However it is important to grow in sophistication too and to work with our peer CEGs as we learn more about the role of professional communities in the changing educational landscape.

The Role & Function of the Computing Coordinator in Western Australian Government Senior High Schools

Diana C. Brown

Technology Focus Coordinator
Clarkson Community High School

Paul Newhouse, PhD

School of Education
Edith Cowan University, Western Australia

In 1991 Kershaw and Weber portrayed the role of Computing Coordinators at Australian high schools as demanding a diversity of knowledge and skills in computer technology together with excellent management qualities. A census survey study based on Kershaw and Weber's study was conducted with Western Australian government senior high school computing coordinators in 1996. This study found that most coordinators considered their roles too onerous with the majority not awarded time to specifically perform their coordinating duties. This study also determined that most coordinators were using a proportion of their teaching time and a considerable amount of their class preparation time, managing computers. Considering the possible impact this could have on student learning, it was not surprising that most coordinators felt that their coordinating role seriously impinged on their role as a teacher.

Introduction

The roles undertaken by Computing Coordinators have been rapidly expanding as Australian schools incorporate new technology and keep pace with related changes. In a limited survey performed by Hancock in 1985 (cited in Smith, 1987), it was found that of the Australian schools that had computers, they had an average of eight computers per school. By 1991, 16% of Australian high schools surveyed by Kershaw and Weber (1991) had in excess of 60 computers each. Without doubt, this number will have increased considerably since then. Despite early recommendations set down by the National Advisory Committee on Computers in Schools to "integrate computers in appropriate ways across the whole curriculum" (Anderson & Camiller, 1986, p. 122), it would appear that the development of students' knowledge and

skills in computer technology has remained almost exclusively the responsibility of Computing Departments. Consequently, providing for the care, maintenance, development of staff, budget preparation and a host of other associated tasks is left to the coordinators of these departments.

Studies performed by Kershaw and Weber (1991), Barbour (1986) and Bruder (1990) established that Computing Coordinators considered themselves placed under extreme pressure to ensure that they provide for the smooth running of computer technology within their schools, with no clear job specification in place. In addition to normal teaching duties, they consider it their responsibility, expected or self perceived, to maintain and evaluate hardware and software, assist colleagues and perform various other associated administrative duties (Kershaw & Weber, 1991). Kershaw and Weber found that coordinators felt obliged to stay abreast of new technology with regard to professional development and handle an ever-increasing workload as technology expanded within their schools.

In Western Australia, many Computing Coordinators also play the role of Head of Department (HOD) or Teacher in Charge (TIC) of a larger area of the curriculum. For example, the HOD of Technology and Enterprise is often in charge of Design and Technology, Home Economics, and Computing. Both HODs and TICs are required to take on a leadership role within a particular Faculty or Faculties, manage administrative and curriculum duties, provide for the needs of their team and generally perform all the necessary tasks to enable a department to run efficiently. A Computing Coordinator who has departmental responsibilities would be required to perform these duties in addition to their coordinating role.

Considering the impact implementing and caring for new and expanding computer technologies could have on teachers who cater for this equipment in schools, it would be expected that much research at the school, education system or government level would have been undertaken to determine how computing coordinators were coping.

However, to date, only two studies have been carried out in Australia that specifically relate to the roles, work conditions and perceptions of Computing Coordinators in Australian high schools. The first was a pilot study by Weber and Kershaw (1990), followed by their major study (Kershaw & Weber, 1991) a survey of Computing Coordinators to determine their role and work in Australian high schools.

With the endorsement of the Australian Council for Computers in Education, Kershaw and Weber (1991) conducted their survey research to determine the essential and desirable criteria for job selection as a Computing Coordinator in Australian government and non-government high schools. Kershaw and Weber's (1991) study used a random sample of 460 high schools, 20% of all Australian high schools. Of these, only schools with a person acting in the role of Computing Coordinator were asked to take part. Only 129 (28% of sample) completed questionnaires were submitted by Computing Coordinators. Therefore, it is possible that the reliability and generalisability of their results may be challenged as only Computing Coordinators who considered their roles too onerous or those schools that, in name only, had a person acting in the role of Computing Coordinator, may have replied.

Whilst a full job description for the position of a Computing Coordinator at Australian high schools was not given in Kershaw and Weber's (1991) paper, they determined that "computing coordinators were expected to perform and carry out a multifarious array of tasks in addition to their teaching role", and that a "range of administrative duties and managerial decision making responsibilities formed a major part of the coordinator's role" (p. 106). They found that Computing Coordinators typically required a diversity of knowledge and skills in the broad spectrum of computer technology and a willingness to invest a considerable amount of their own personal time. These demands necessitated the ability to cope under pressure in the performance of the myriad of tasks necessary to enable the smooth running of the ever expanding

implementation of computer technology within their schools. Now, over five years later, while the quantity of computer technology in Western Australian senior high schools is continuing to increase, it is unclear whether the position of Computing Coordinators has improved.

As part of EDWA's Technology 2000 Strategic Plan (1996a), a job description form (EDWA, n.d.) was prepared outlining six duties required of successful applicants for the position of Learning/Information Technology Coordinator at a number of Western Australian schools. When compared with the duties performed by Computing Coordinators in Kershaw and Weber's (1991) Australia wide study, apart from 'assisting other staff', the duties do not match those expected by EDWA (n.d.). These were, in order of priority, hardware maintenance, assisting other staff, software and hardware evaluation and negotiating with suppliers. The lesser duties carried out by coordinators in Kershaw and Weber's (1991) study of providing computer training for school staff and parents, giving administrative support, managing finances, preparing budgets and undertaking curriculum development at the school and state level, did in fact match in part with EDWA's list of duties.

As Kershaw and Weber (1991) succinctly put it, Computing Coordinators' roles are determined by the demands that "stem from the needs of the various people groups and tasks related to the technological needs of the computing environment" (p. 101). These demands can, and do, occur at any time and Computing Coordinators feel obligated to respond, even with enthusiasm, "despite relentless long days and a general lack of support", as 666 coordinators were reported to be doing in the American survey performed by Bruder (1990, p. 24).

There is an urgent need to address whether or not Computing Coordinators are given sufficient time and support to perform their coordinating duties without adversely affecting their other roles. This paper reports on a study designed to investigate these issues by addressing the question, do Computing Coordinators at Western Australian government senior

high schools have adequate support to perform their duties?

The Study

All Computing Coordinators at government senior high schools in the state of Western Australia were asked to take part in a census survey with the aim of identifying their backgrounds, duties, the time afforded to perform these duties, the time considered necessary to perform the duties efficiently without impinging on their other roles, and to determine if there were other factors that affected their ability to carry out their duties. Coordinators from the 85 government senior high schools in the state of Western Australia, with the agreement of their respective Principals, were asked to take part in this survey.

The questionnaire was based on Kershaw and Weber's (1991) Survey of Senior Computing Teachers (p. 109). Their five part questionnaire was revised to take into consideration the different sample groups and aims of the two studies. Eight questions were added to the revised questionnaire. In addition, coordinators were asked to make an extended response on the revised questionnaire. The purpose of the extended response was to give coordinators the opportunity to clarify their situation and to provide possible solutions to any problems they may have been experiencing. The revised questionnaire resulted in thirty questions in six sections: Background and Training, Professional Development, Teaching Time, Coordinator Duties, Coordinators' Perceptions, and Coordinators' Responses.

Due to the changes made to the original questionnaire developed by Kershaw and Weber (1991) a pilot study was conducted with six Computing Coordinators from non-government high schools. Main Results The discussion draws comparisons with Kershaw and Weber's (1991) findings. It should be noted that the aim of their study was to build a "comprehensive picture of the computing coordinator in Australian secondary schools" (p. 102). This present study was designed to specifically address the role of the Computing Coordinator at Western Australian government senior high schools.

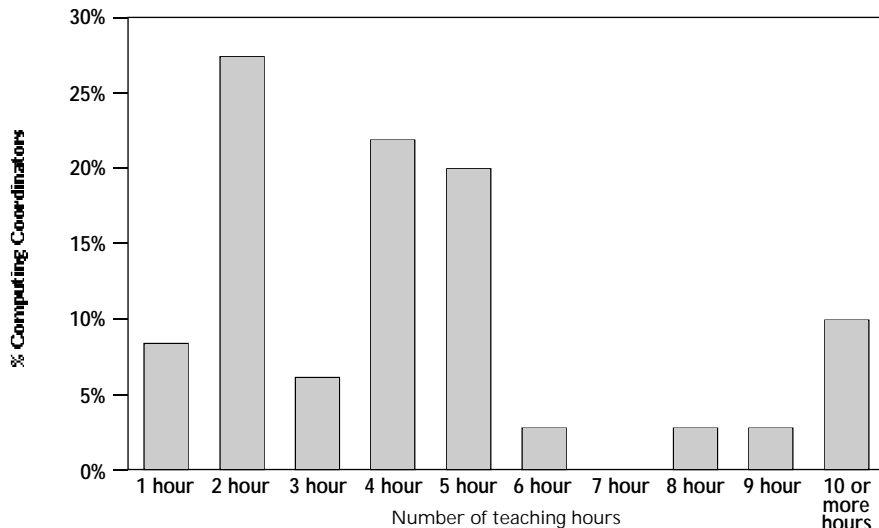


Figure 1. Number of teaching hours per week spent managing computers by the 80% of coordinators found to be using their teaching time to manage computers.

Qualifications and Expertise

A total of 50 Computing Coordinators chose to participate, 59% of the population. Of those who responded, 72% were male. Most (78%) coordinators had formal computing qualifications, the majority holding either a Graduate Diploma in Applied Science or a Bachelor of Education in Computing. The coordinators found to have formal computing qualifications were made up of 61% holding a major and 17% a minor teaching area. The coordinators without computing as their major teaching area had gained their major qualification in a wide range of curriculum areas. Six of the eleven without computing qualifications were enrolled in formal computer related studies, the majority in multi-media. In addition, all respondents had been using computers in excess of three years and almost 20% had been coordinators in excess of ten years with a mean of six years.

Kershaw and Weber (1991) found that only approximately 17% of coordinators had no formal qualifications in computing, and that a high number of coordinators held degrees in either mathematics or science. In both studies it appeared that all coordinators without computing qualifications considered their computing skills to be sufficient to perform their role effectively.

Teaching Time and Role

Coordinators involved in this study were found to teach an average of 19 hours per week with 88% teaching in excess of 16

hours per week in the area of computing. However, 80% of coordinators indicated that they spent a proportion of their teaching time managing computers. For these coordinators, four hours per week was the average number of actual classroom teaching hours they used to manage computers, 37.5% used five or more hours, 15% used eight or more hours and one coordinator spent fifteen hours per week teaching time managing computers (more information in Figure 1).

Directly linked to teaching time is the number of hours allocated to teachers for duties other than teaching (DOTT). Computing Coordinators indicated that they were allocated an average of five hours per week for DOTT, which is normal DOTT

for a full-time secondary teacher. An average of three hours per week of coordinators' DOTT was spent managing computer systems, with 58% using three or more hours and 17% using all of their DOTT.

As would be expected, the main role of a Computing Coordinator was found to be teaching. Figure 2 compares the teaching load of coordinators in this current study with those from Kershaw and Weber's (1991) study. There were considerable differences between the time spent on teaching duties with only 10% of their respondents teaching in excess of 80% of a full teaching load, compared with 22% in this study who had relatively full teaching loads. A striking feature appeared to be that 65% of coordinators in this study taught between 61-80% of a full teaching load (c.f. their result was approximately 17%). With the rapidly increasing quantity of computer technology in secondary schools, it is of concern that the vast majority of coordinators were found to have no time allowance for these duties.

Coordination of Computing Duties

Coordinators had a range of duties as shown in Table 1 which summarises what they ranked as the five most time consuming tasks. The questionnaire listed the first eleven tasks and allowed respondents to add others. Of the first eleven items listed, 90% of coordinators who responded performed all the tasks using varying degrees of time.

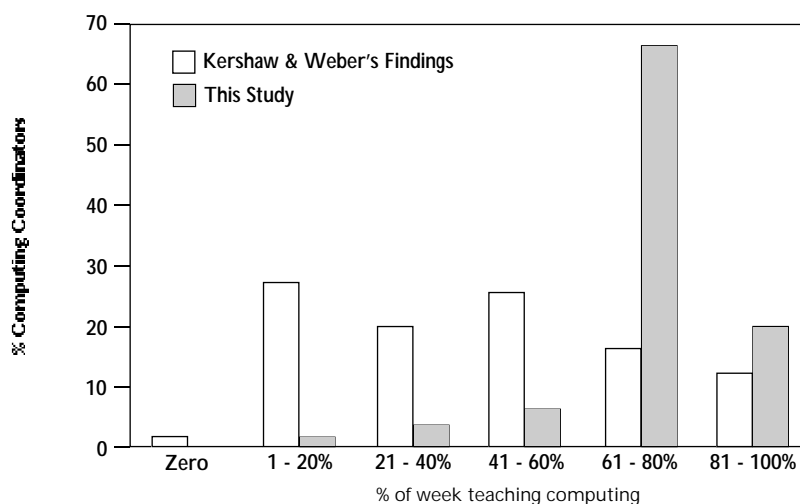


Figure 2. Comparisons between this study and Kershaw and Weber's 1991 study of the time coordinators spend teaching.

Table 1
Computing Coordinators' Ranked Responses to their Five Most Time Consuming Tasks, Ranked by Number

Tasks	Ranked responses					% ranking in top five
	1	2	3	4	5	
Maintain Software	16	15	4	3	6	92
Hardware Maintenance	14	14	5	5	2	83
Install Software	3	3	10	8	5	60
Assist other Staff	4	7	8	5	4	58
Department Duties	8	3	2	4	3	42
Assist Administration	1	1	2	5	6	31
Inservice Staff	0	2	6	2	5	31
Negotiate with Suppliers	0	1	4	6	2	27
Evaluate Software	1	0	4	4	3	25
Reports/Budgets	0	1	1	4	5	23
Evaluate Hardware	0	1	1	0	4	13

NOTE. 1 ranked most time consuming

There were five duties which Computing Coordinators ranked to be the most time consuming in the performance of their coordination of computing role (Table 1): maintaining software (92%); hardware maintenance (83%); installing software (60%); assisting other staff (58%); and departmental duties (42%).

Software maintenance

Software maintenance was the most time consuming duty reported by coordinators but oddly, it was not mentioned in Kershaw and Weber's (1991) investigation. Software installation was also not mentioned in their study, yet it was the third most time consuming duty in this study. Perhaps these anomalies were due to increased software availability and the larger number of computer systems found to be in the schools involved in this study.

Maintaining software was ranked by 92% as one of their top five most time consuming tasks as opposed to software installation which was ranked in the top five by 60% of respondents (see Table 1). Software maintenance refers to tasks such as the restoration of corrupt software, virus scanning and removal, recovery of lost files and the setting up of drivers for new peripherals devices. It was likely that some

of the time coordinators spent on software maintenance was related to the low level of networking evident and the range of operating systems used in many schools. Only 16% of schools had all of their computer systems networked. A further 20% of the schools surveyed had stand-alone systems and the remaining 64% had a mixture of networked and stand-alone systems. Software maintenance is considerably reduced with networked systems. Further, 58% of coordinators indicated that they worked with three or more operating systems. The more operating system environments that coordinators work in, the greater their knowledge and skills base needs to be to handle the idiosyncrasies of individual systems software.

Due to the ever-changing nature of software, it is understandable that software maintenance absorbed so much time. Before maintenance is undertaken the study of manuals, on-line help, etc., may be required to determine how to complete the task. Having completed similar tasks in the past does not ensure that the same procedure can be used again to achieve the same end. Although software has become more user friendly and many commands are transferable from

one piece of software to another, the host of problems that can, and do occur, obviously take up much of a Computing Coordinator's time. There is also the possibility that coordinators lacked the skills necessary to efficiently complete what may have appeared to be simple software maintenance tasks but often involve very complicated software configurations.

A further possible cause of the high ranking of software maintenance was given by many coordinators in their open ended responses. It was their opinion that system faults were often caused by having unskilled teaching staff inadvertently allowing students to sabotage the system with viruses or blatant vandalism. It is likely that these problems will become more prevalent as cross-curricula initiatives are furthered and non-computing trained teachers gradually become more confident in using computer technology in the curriculum.

Hardware maintenance

Hardware maintenance was ranked as the upper-most duty performed by coordinators in Kershaw and Weber's (1991) Australian study and fourth in Bruder's (1990) American study. This was found to be the second most time consuming task performed by coordinators in the present study. The time consuming nature of hardware maintenance is hardly surprising according to Coburn, Kelman, Roberts, Snyder, Watt and Weiner (1985), who consider that computing equipment is "not built for constant use by hundreds of different people with varied understanding of how they work" (p. 244). Consequently, at the school level, malfunctioning equipment is often a daily occurrence. All of the coordinators involved in this study considered that a percentage of the computer hardware in their schools was outdated in relation to continual malfunctioning. Whilst further study would be necessary to verify the age of computer equipment in Australian high schools, from personal experience at six government senior high schools in Western Australia during the nineties, a good proportion of computer equipment was found to be from that era.

From this present study the average number of computers per school was 72. As most computing laboratories would be expected to house 30 or less computers, it would seem reasonable to surmise that for most of the schools in this study, their computers would be placed in three or more locations. Both the number and location of computing equipment would have an influence on the time consuming nature of hardware maintenance.

At the time of this study, computer hardware maintenance assistance was available to schools through contractors to the Education Department (Business Maintenance Association (BMA)). The equipment was either repaired by contractors on site or removed, repaired and returned at a later date. Both options required checking out the hardware problem, writing a report and job order, making a telephone call to arrange repairs, waiting for the action, discussing the problem with the contractor and finally reporting on the action taken. Based on the time consuming nature of these activities and the fact that computing equipment would be out of action for some time when following these procedures, it was not surprising that 80% of coordinators perceived that getting computer equipment repaired was extremely difficult. It would seem likely that rather than put up with the increased paper work, the delays and subsequent loss of student learning time, where possible coordinators attended to the repairs themselves. It was found that 90% of coordinators were performing the technical maintenance of computer equipment, due in part to the fact that 84% of the schools studied did not have access to a computer technician or assistant.

Other Duties

Other areas that took up much of a coordinator's time were the installation of software (60%) and assisting other staff (58%). According to coordinators, their assistance was required as staff members lacked skills in computing technologies due to insufficient training and ongoing professional development. This will be discussed further when considering the

support afforded coordinators in the performance of their role.

Departmental duties were the fifth most time consuming duty performed by coordinators. Unlike the other duties performed by coordinators (see Table 1), the responsibility of a department is a 'role' rather than a specific 'duty' with its own set of tasks. For example, budgeting for a department would be quite separate from budgeting for computer technology which was ranked as the tenth most time consuming duty performed by coordinators. Further consideration of coordinators' departmental responsibilities will be dealt with when discussing the issue of support.

Extent of responsibilities and time

Sixty-four percent of coordinators were awarded time to perform their duties with an overall average of four hours per week. The remainder received no time. Coordinators estimated that an average of eight hours per week would be needed to efficiently perform their coordinating duties, although 34% indicated that in excess of ten hours per week would be required.

Thirty-six (72%) of the coordinators were found to have the added responsibility of departmental duties. Of coordinators with departmental duties, thirteen (36%) had no time allocated to perform their departmental or computer coordinating duties, the remaining 23 (64%) were allocated an average of 4 hours per week. Those coordinators with departmental and the coordination of computing duties who had no time allocation for the performance of these duties, taught an average of 20 hours per week. Of the fourteen without departmental responsibilities, nine were allocated between one and five hours to perform their computer coordination duties, with an average of three and a half hours, the remaining five received none. The larger proportion (58%) of coordinators who had departmental responsibilities liaised with three or more staff in this capacity.

About half (46%) of coordinators received payment for their duties and were evenly distributed between those with departmental duties and those without.

Coordinators in schools that had a large number of computers tended to be given some time to attend to their coordinating tasks. On average, five hours per week was allocated to the 20% of coordinators who were responsible for greater than 100 computers. An increase to an average of six hours, was awarded to the 10% of coordinators who had departmental duties in addition to a minimum of 100 computers to care for. Both groups estimated that they required an average of ten hours per week to perform their computer coordination roles, as clearly the time given was inadequate. Kershaw and Weber (1991) indicated that there was a need to determine whether the roles performed by coordinators were "perceived demands" or the result of "changing expectations of the school employing authority as its technological equipment grows and curriculums are influenced" (p. 106). Based on the findings of this study, it would seem clear that coordinators were continuing to perform an increasing number of duties as a reaction to a need that was not being met by other means.

Level of Support

Coordinators reported that minimal support was afforded them in the performance of their coordinating duties. Very few schools had access to a computer technician. A computer technician would be expected to perform many of the tasks currently performed by coordinators.

Technical Support

Coordinators were responsible for an average of 72 computers, ranging from a minimum of 20 to a maximum of 170, with 20% having in excess of 100 computers to maintain. Clearly, coordinators had a large amount of hardware to maintain with little support with 84% of them not having access to a computer technician or assistant. Of the remaining 16% (8 schools), 50% had access on call, 38% for one day per week and the remaining 13% for two days per week. However, 58% of the schools surveyed were leasing at least some computer equipment, with a further 32% considering this option. Of the four (50%) schools that had access to a computer technician on call, three were found to be leasing computer hardware.

Professional Development Support

Only 6% of coordinators indicated that the level of school professional development support in computing was adequate, with none finding it more than adequate. Almost one third (30%) considered that no support was available in any form (e.g. time off or payment of course fees) for professional development in computing, a further 64% felt the level of professional development support was inadequate or barely adequate. The majority spent less than 20 hours per year on professional development in computing. It was also disconcerting to find that 94% of coordinators found professional development support in computing inadequate. It would appear that little has changed since Kershaw and Weber's (1991) study where only 7% of schools from the government schooling system considered the level of professional development support to be adequate.

Possibly due to the lack of support in the form of time and funds for professional development, only 16% of coordinators were involved in curriculum development or syllabus committees compared with the 80% recorded in Kershaw and Weber's (1991) study. Also, very few of the coordinators in this study were members of recognised technology groups or associations, such as the Educational Computing Association of Western Australian (ECAWA). These committees and groups take on the form of professional development in that coordinators can gain considerable knowledge and skills in computing by their attendance. Due to the rapid evolution of computer technology, professional development requires much more than formal training or professional networks. Various incidental and planned learning experiences, such as contact with fellow colleagues, reading of current texts and journals and self training of software, are

necessary to keep skills up to date. Whilst coordinators spent an average of seven hours per week of their own time on this form of informal training, a degree of support from the schooling system should have been afforded them to carry out this training. Three quarters of the coordinators received no support for their coordinating tasks in the form of time and, in addition, half of all coordinators did not receive a financial incentive for either their departmental or coordination of computing role.

"... an average of eight hours per week would be needed to efficiently perform their coordinating duties, although 34% indicated that in excess of ten hours per week would be required."

Coordinators' Perceptions about their Role

Coordinators were asked to respond to a series of statements about their perceived role. The study was not able to establish the precise number of hours coordinators spent performing their coordinating duties. However, it was determined that many coordinators were utilising a proportion of their teaching and teaching preparation time and, of course, any time that was specifically awarded to them to carry out their coordinating roles. Other time, for example before or after school, may or may not have been used but this information was not collected. Well over 70% of coordinators disagreed with the statement that they were given ample time to perform their coordination of computing duties or, in fact, all of their roles. Further, 62% agreed that a school's expectations of coordinators was unrealistic.

Only 16% of the respondents in this study considered that school principals understood the duties required of coordinators and yet 40% agreed that they had a high profile at their school. This high profile may be a by-product of their willingness to take on more than is actually required of them in their coordinating roles, as 78% of coordinators perceived they were doing.

Coordinators were almost unanimous in their agreement that they enjoyed using computers. Perhaps that is why they continue to perform all the duties necessary for the smooth running of technology in their schools. Almost three quarters of the coordinators in this study felt that there were more rewarding job opportunities in computing outside of schools, and 44% had recently considered applying for them. It was the perception of most coordinators that they were hard-pressed to meet the demands of their coordinating role. In their endeavour to perform the host of coordinating tasks expected of them, both teaching time and DOTT were being consumed. As

Callen (1991) wrote in reflection of schools failing to keep pace with technology in industry and teachers subsequent disillusionment with their current situations, "Schools seem lost in an authoritarian and conservative world and bright teachers seem eager to leave the system and join a more diverse one" (p. 26).

Although the majority of coordinators in this study indicated they enjoyed using computers they did appear to have a negative perception of their roles as coordinators of technology in schools. Their negative perceptions were particularly clarified in their open responses where many coordinators referred to their lack of time, funds, professional development, support and assistance and the continual increase in pressures they found themselves confronting. However, many coordinators, after providing their open response, seemed compelled to add a note that either referred to their love of

teaching or using computers. Perhaps this accounts for their dedication and continued acceptance of their positions.

Coordinators' Open Responses

Coordinators were requested to write a brief statement to discuss any major problems they were experiencing in their current roles and offer some solutions to these problems. Ten coordinators provided extended responses, in place of the brief statement requested. By far the major issue referred to by twenty-three coordinators was that relating to time, especially from coordinators with departmental roles, the responsibility of over 100 workstations and collaboration with many staff members. The main difficulty that coordinators referred to was trying to balance their teaching obligations with that of their coordinating role. Another major issue expressed by coordinators and closely connected to time allocations was the expectations placed on them by their peers. Eleven (22%) coordinators specifically mentioned the pressures associated with being required to assist staff with a range of daily computer related problems. Many felt that they were at the beck and call of all school staff, often in excess of

80, who assumed that coordinators should assist them with any information technology queries. Further, a number of coordinators considered that they were under pressure to troubleshoot these problems and fix them immediately, regardless of whether they were teaching, on teaching preparation time or at lunch.

Another concern mentioned by eight coordinators was the number of computer system failures believed to be caused by untrained staff. They felt that unskilled staff utilising computer technology often led to incorrect use of equipment and student tampering, resulting in computer downtime. These coordinators referred to their frustration with staff who had little or no computing skills, did nothing to rectify this situation and continually called on them for

assistance. As computers are slowly integrated into many curriculum areas, it is imperative that teachers involved gain basic computing skills.

The following quotes selected from coordinators' responses provide a broad picture of their feelings:

Wasting half my teaching time (I have a full teaching load) on solving technical problems is a joke.

..... all Computing Coordinators should work to rule for a few months. The resulting chaos would force attention to the issue.

To be honest, I have had it completely - I am only appreciated for my technical ability - and only monkey work for peanuts!

There is continual disruption to teaching due to equipment failures.

" There appeared to be no equity of time consideration even among those coordinators who were found to have departmental duties. "

And finally, one coordinator added after writing lengthy remarks relating to the current situation coordinators found themselves in, "I do not want the above to be seen as a grievance but rather a statement of fact, as I enjoy computing as a subject".

Many of the coordinators in this study took the time to put forward some suggestions on how best to rectify their current concerns. These solutions were placed in a coding frame to determine like responses. The five most common solutions all involve increased funding. They were:

- Solution 1 - Realistic time allocation for coordinating role
- Solution 2 - Lease or purchase of current computer hardware
- Solution 3 - Industry standard and up-to-date educational software

- Solution 4 - Acquisition of a part or full-time technician as necessary
- Solution 5 - Adequate professional development for all staff members

Recommendations and Conclusions

The results of this research indicate the need for clearly defined expectations of the roles placed on Computing Coordinators, together with a provision for necessary support. There must also be some recognition that time requirements for coordinators to perform their roles vary depending on the extent of their duties, and should be calculated accordingly. This study found that coordinators used considerable teaching time and DOTT managing computers. Whilst a further study would be needed to determine what affect Computing Coordinators using their teaching time and DOTT would have on student learning, the seriousness of this scenario is more than evidenced by the 88% of coordinators who considered that their coordination role was detrimental to their role as a teacher.

A recent editorial in PC User, an Australian computer magazine, referred to a "significant mindshift at government level" over the past year "about the need to equip our schools for the coming information revolution, let alone the new millennium" (Dancer, 1996, p. 48). Currently, millions of dollars are being ploughed into technology initiatives within Australian schools (Bogle, 1997) which provides the technology but very little has changed over a decade with regard to providing for its integration and care. Bogle refers to critics who feel that "Too much emphasis is placed on hardware ... and not enough on people - the teaching and technology support staff need to make it work". If Computing Coordinators are to take a leading role in the planning phase of technology integration, as this study appears to demonstrate they already are, some of the current burdens that are placed on them need to be removed. To 'make it work', plans need to be put in

place for the ongoing care of technology equipment in schools. Further, if technology integration within our schools is to be taken seriously, adequate training and professional development of all staff is necessary.

This study found that a major disadvantage for the majority of coordinators is their lack of access to a computer technician. Urgent action must be taken to provide all schools with adequate access to qualified computer technicians to alleviate some of the pressures currently placed on coordinators in their coordination of computing role. The initiative by EDWA to provide technical support for computer technology, commencing 1998 and finally in all schools by the year 2001, may reduce some of the tasks performed by coordinators (1996a). However, EDWA will need to ensure that their initiatives provide adequate assistance for the specific needs of individual schools and that this support is capable of handling the broad and complex tasks, if they hope to alleviate some of the pressures currently placed on coordinators.

A further area for consideration would be to determine the specific role and status of a Computing Coordinator. This study displayed evidence that the role depended on the demands of individual schools. There appeared to be no equity of time consideration even among those coordinators who were found to have departmental duties. This study has provided a clear indication of the roles performed by coordinators so that staffing at the school level can determine realistic time allocations for coordinators to perform their duties. The results could also assist in the determination of the duties and essential and desirable criteria for job selection as a coordinator. Considering the array of tasks performed by coordinators and their obvious time consuming nature, it would seem clear that the duties of coordinators should be separated from those involving departmental duties and each position recognised in its own right in relating to status, time and rewards.

This study found that minimal support in the form of time, funds, professional development and assistance was afforded to coordinators in the performance

of their coordination of computing duties. As much of this support is decided at the school level, the Principal would need to be aware of the duties required of a coordinator. It was the perception of 80% of the coordinators in this study that Principals did not understand the role of a coordinator of computing. All staff need sufficient professional development to keep their skills current. The present situation requires that individual's bear much of the responsibility and cost of their own training. All too often, technology training has been left up to individuals "who are prepared to spend their own time learning programs and figuring out ways to integrate them into their teaching" (Bogle, 1997). Provision for professional development in computer technologies for all staff should be a priority.

Kershaw and Weber's (1991) study highlighted the lack of support afforded Computing Coordinators at Australian high schools. This study has shown that the pressures placed on coordinators at Western Australian government senior high schools have grown rather than diminished. Clarke wrote in reference to a coordinator's role, "At no time in the past decade has there ever been any recognition of this role or the time that it demands, yet in that time the number of computers to be administered has increased ..." (1994, p. 270). The employing bodies need to consider that Computing Coordinators are teachers in the first instance and that their coordinating role is a separate part-time extension of this. None of the duties required of them as coordinators should affect their teaching time and other commitments. This can only be achieved if adequate time and assistance is awarded to coordinators, based on the specific requirements of individual schools. For example, required support is influenced by the number, type, location, set-up and condition of equipment, school staffing numbers and school priorities as they relate to how technology is to be utilised within the school. If these measures are not taken as a matter of urgency, it is the finding of this study that the pressures currently felt by coordinators will escalate as technology expands within Australian schools.

REFERENCES

- Anderson, A., & Camiller, D. (1986). Using and choosing a microcomputer. North Ryde: CCH Australia.
- Barbour, A. (1986). Computer coordinator survey. *Electronic Learning*, 5 (2), 35-38.
- Bogle, D. (1997, June 7-8). Keyboard Jungle. *The Weekend Australian*, p. Features/5.
- Bruder, I. (1990). The third computer coordinator survey. *Electronic Learning*, 9 (4), 24-29.
- Callen, P. (1991). Kids, classrooms and computers in the IT age. *Australian Educational Computing*, 6 (2), 26-29.
- Clarke, B. (1994). Planning for appropriate information technology environments for schools. In M. Wild & D. Kirkpatrick (Eds.), *Computer education: New perspectives* (pp. 261-278). Perth, W.A.: MASTEC, Edith Cowan University.
- Coburn, P., Kelman, P., Roberts, N., Snyder, T. F. F., Watt, D. H., & Weiner, C. (1985). (2nd Ed.). *Practical guide to computers in education*. USA: Addison-Wesley Publishing Company.
- Dancer, H. (1996, November). Editorial: When the penny drops. *PC User*, 8, 48.
- Education Department of Western Australia. (1996a). *Technology 2000 Strategic Plan*. Western Australia: EDWA.
- Education Department of Western Australia. (1996b). *Technology 2000. Technology in schools project: Internet in the curriculum*. Western Australia: EDWA.
- Kershaw, L., & Weber, M. (1991, September). The Computing Coordinator in Australian secondary schools. *Ninth Australian Computers in Education - ACEC'91 Proceedings Navigating the Nineties*, 101-110.
- Smith, S. (1987). Has tomorrow's technology revolutionised classroom teaching? In J. Hancock (Ed.), *Tomorrow's technology today*. (pp. 139-146). Magill: CEGSA.
- Weber, M., & Kershaw, L. (1990). The role of computing teachers in Australian schools. *Australian Education Computing*, 5, (1), 26-30. 0

The Student Voice: Perceptions of autonomy and collaboration in learning with technology.

C. McLoughlin

Edith Cowan University

Increasingly, telecommunications and information technology are being used in distance education to provide education to students in rural and remote schools. This paper reports on the insights and responses of a group of students who accessed the gifted and talented program via telematics during 1996-1997, using audiographic conferencing. For these learners, it was their first experience of learning at distance. Students reported a strong sense of autonomy and self-direction which was a result of having an 'invisible teacher'. In addition, a great deal of feedback was obtained on students' own learning styles, the impact of technology on communication and the growth of cooperative learning across geographically separated classrooms. The implications of these findings are analysed in terms of how distance learning settings affect communication styles and how technology serves collaborative learning. It is recommended that recognising and eliciting the student voice as part of the planning process is important for educational contexts where technology is used to support learning.

Introduction

The potential of communications technologies to deliver interactive and efficient instruction to remote sites is well documented in the literature (eg., Jonassen & Reeves, 1996; Mason, 1994). Nevertheless, several studies also signal the limitations of audiographic conferencing technology and of the pedagogies that it may lead to. Among these are controlling and didactic aspects of teaching strategies (Thompson, 1996) and limited use of the technology to support cognitive interaction between students (Oliver & McLoughlin, 1997). Other studies have shown that computer-supported learning environments combined with the application of

appropriate pedagogies can ensure quality learning with affective and cognitive outcomes (Repman, 1993). Recent empirical studies show that a great deal of emphasis is placed on current uses of technology to support student autonomy and to create an empowering environment (Alonso & Norman, 1996; Saye, 1997).

The view explored in this paper is that in order to evaluate the success or otherwise of a learning environment, it is important to find out how students perceive the technology, whether they are comfortable with it and whether they regard it as improving or changing the learning experience. Those engaged in educational evaluation might well ask: What difference does computer technology make to the quality of everyday classrooms? Research eliciting student views is sparse, though the question has been asked of teachers (Wild, 1996). The purpose of the research reported here was to explore student perspectives on audiographic conferencing, to allow students to say what worked for them, and to encourage them to share their views of how technology affected their learning. Student attitudes may be good indicators of how technology is perceived, and by sharing their experiences and insights, students enable educators to evaluate technology implementation and its putative transformative effects.

Technology and the potential for student autonomy and empowerment

The debate about how best to integrate computers into the curriculum-based culture of schooling and to foster student autonomy is a recurring theme in the literature. A number of theorists have commented that computers are used in a way that is 'decoupled from the mainstream of classroom life' (Crook, 1994, p. 29). This means that computers are often seen as by teachers as devices for saving time, increasing the efficiency of teaching and learning and instruments for maintaining order and structure (Fraser et al, 1991; Underwood, 1990). One of the major themes that has emerged from recent investigations of technology supported classrooms is the potential of

technology to support student-centred learning (Light, 1993; Mercer, 1996). Technology can also be conceived of as providing apprenticeship models of learning, and of enabling students to become increasingly more self-regulated (Jarvela, 1996).

In discussing aspects of effective environments for learning, a number of researchers have commented on the need to create the conditions necessary for independent learning. For example, much of the recent literature has referred to the need for 'learner control' in the design and planning of multimedia for learning (Oliver & Reeves, 1996; Kinzie, 1990). Authorship and generativity are further dimensions of learning environments which relate to the amount of choice, control and self-direction given to students (Hannafin & Sullivan, 1995). The degree to which learners can design, create and explore learning materials is an important element in fostering higher levels of thinking. Therefore, environments where learners can share responsibility, show initiative and make decisions are conducive to independent learning (Grabowski, 1996). Jonassen & Reeves (1996, p. 695) talk about the impact of student involvement in computer assisted learning '...empowering learners to design and produce their own learning experiences is a powerful learning experience'. The dimensions of learner control, generativity, authorship and communicative interaction are all widely accepted features of learning environments that are supportive of learning. Examples of design principles that enable students to develop independent thinking are those that:

- have instructional formats that allow learners to have choices within a structured learning experience (eg., Anderson & Garrison, 1995)
- offer activities that support both collaboration and communicative independence (Teasley, 1995);
- provide activities that enable students to represent their own meanings (Greeno, 1997).

In face-to-face classrooms where a teacher is present there has been a great deal of research into the use of computers

to support group work and collaborative dialogue (Jonassen, Davidson, Collins & Campbell, 1995; Anderson, Tolmie & McAteer, 1993). In contrast, distance learning settings which support synchronous communication have received much less research attention, and the computer is often regarded simply as a hardware to enable geographically separated students to interact and share texts and resources (Wagner, 1994). By presenting student perspectives on learning via telecommunications we can establish whether technological link-ups and interaction between distant sites create forms of student autonomy that change the teaching-learning equation.

What do students think? Issues of control and empowerment

Studies in technology supported classrooms suggest that student perceptions of the instructor and of the instruction are closely tied to positive or negative evaluations of distance learning settings. Recent studies have investigated several different dimensions of learning mediated by technology. One study, by Jayasinghe, Morrison & Ross (1997) investigated reactions to teachers' immediacy behaviours and found that teachers who established eye contact were more likely to be regarded as warm, persuasive and credible by students. Similarly, Walker & Hackman (1992) found that learner satisfaction in a telelearning environment was higher when students perceived the learning as interactive. The important implication of these studies is that academic achievement and satisfaction with a course are likely to be greater if students have positive perceptions of the instructor. However, these studies are limited as they do not investigate student perceptions of their own behaviour, their own learning or of the whether the culture of the classrooms changes when technology mediates learning.

If we know little about how students think about their own learning, we cannot presume that structural manipulations and technological innovation are sufficient to create independent learning environments for

learners. Often, the success or otherwise of technology is interpreted through attrition rates, achievement scores or measures of academic performance. More direct investigations of student opinions seem to be missing from the literature. Despite the paucity of investigations of student views, constructivist theory highlights the central role of student engagement in learning (Harper & Hedberg, 1997). In other studies, the salient factor to emerge in evaluating the learning environment is the association between pupils' sense of personal control over their learning and their level of academic achievement (Hannafin, 1995). In addition, research into effective means of fostering personal control has emphasised learners' capacities for 'self-instruction' (Peterson & Swing, 1992; Wang & Peverley, 1987). For self-instruction to be effective, learners need to feel comfortable and confident with the learning environment and subject matter, and be able to integrate this with planning learning strategies and self-monitoring skills. Such findings signal the importance of investigating students' perceptions of control, comfort and confidence with technology.

Another research focus has been to address the question of how teachers can influence levels of learner activity through classroom strategies which create opportunities for students to take control of their own learning (Kinzie, 1990; Scardamalia & Bereiter, 1993; McLoughlin, & Oliver, 1995). The need to make learning environments more learner centred is expressed by one writer as follows:

The issue on education is control. Who is in control? Now it is curriculum designers, lecturers and workbook publishers. In many cases it ought to be students.. The real role of the teacher, computer or human is to keep the environment interesting enough to prompt questions. (Schank & Jona, 1991, p. 32).

Educational technologists need to investigate learner perceptions of their environment and ask students whether they regard technology as empowering or disempowering, so that planning for improved learning can proceed on the basis of feedback and first hand

experience. Existing studies on this aspect of learning with technology have not proved consistent or wide ranging. For instance, in technology saturated environments where IT is used extensively and promoted, supported and financed as in the ACOT program, there are widespread high levels of satisfaction (Fisher, Dwyer & Yocam, 1996). In other, more general populations there is less evidence that technology is used to change teaching practice or empower students.

Audiographics classrooms

Across Australia, a considerable number of schools use audiographic technology to teach classes in rural and isolated areas. According to the Victorian Ministry of Education and Training Report (Conboy, 1991), the term telematics is described as: electronically based equipment and the processes and strategies used to enable interactive teaching and learning between two or more geographically remote locations. In Western Australia the term 'telematics' is used to describe the particular use of audiographic technology to teach students at a distance.

The study reported here comprised five linked remote classrooms which received instruction in five different subject areas, Maths, Science, Italian, English and Social Studies, from teachers who used audiographic conferencing to teach at a distance. The research was conducted with fifteen students participating in the Academic Talent Program delivered via audiographic conferencing. Five schools participated in the program, which was delivered from a school in the Perth metropolitan area by specialist subject teachers. Two of the sites had four students, one had two students the other had five students. All students were aged 13 years and all were studying in the first year of secondary school and participating in the Academic Talent Program offered by the Education Department of Western Australia.

Data collection and analysis procedures

As the curriculum objective of the Academic Talent Program was to develop higher order thinking skills and autonomous learning, it was considered

important to ask students how technology affected their learning, and whether it fostered forms of autonomous activity. The research questions therefore focused on individual and group experiences of learning via audiographic conferencing. The following open-ended questions were asked of students at each site:

1. How is learning via audiographic conferencing different from learning in the face-to-face classroom?
2. How does the technology affect talk and communication in your classroom?
3. What problems (if any) did you experience with the technology?
4. Does learning via audiographic conferencing change you as a learner? (ie your learning style and way of communicating).

At the end of each term in the one year program, students were interviewed and asked whether they found the technology constraining or liberating and whether it changed their learning patterns. In addition to student interviews, classrooms were observed and videotaped so that their views could be compared with the actual teaching and learning events that were recorded. Each group of students was asked to respond to the questions and the responses are reported

in Tables 1, 2 and 3. Open ended questions were used in order to enable students to elaborate on issues considered important.

Summary and interpretation of main findings

Technological change

Table 1 presents a summary of responses to the question: How is learning via audiographic technology different from learning in a face-to-face-classroom? Students were shown to be adaptable to pedagogical change and to be very positive about it. They were also quite resilient to problems that occurred and took the view that they had to learn the skills required when technological difficulties occurred. This expressed tolerance with the technology was attributed to their perception that knowing about technology was a skill in itself, one that was highly relevant to their learning in other subject areas. Clearly, the distance education setting presented challenges to these students, but they were well prepared to meet them. Students were comfortable with the technology and open to the changes it brought in terms of group interaction, communication patterns and learner control.

Table 1: Audioconferencing VS face to face instruction

Location	Responses	Salient feature of response
Site 1 n = 4	more exciting; more independent; teaches us about technology; more freedom; we can talk to each other when we want	independence freedom to communicate
Site 2 n= 4	more independence; teacher has less control; can say what we like; we can draw things on the computer screen; we have to be really prepared	less teacher control
Site 3 n = 2	it helps us know a lot about computers; we have more freedom; we have to organise ourselves better	need for organisational skills
Site 4 n = 5	I think we are special; we have to troubleshoot; lots more work to do; the teacher expects us to be ready;	trouble shooting skills; readiness for class

Interaction and communication

Students perceived the technology to have a liberating effect on their learning and interaction. Table 2 summarises responses to research question 2: How does the technology affect talk and interaction in your classroom? As the teacher was 'invisible', students were less constrained in questioning each other and seeking clarification. They also believed that they could interact with peers in other remote classrooms through the two-way audio channel. In accounting for this perception of increased freedom and autonomy, much can be attributed to the teachers' implementation of strategies to enhance use of technology as a communicative exploratory tool. Overall, students felt a strong sense of autonomy in the electronic classroom, a willingness to prepare for class and organise themselves. Students quickly mastered the etiquette of communicating across distance and the technology seemed to have exercised a strong motivating influence in the classrooms observed. Only one student was concerned that she felt that the technology was a little impersonal, and that it was difficult make a spontaneous remark or response.

Perceived problems with technology

Despite technical problems, students surveyed seemed to be very positive about the technology and were comfortable using it. In response to research question 3, What problems (if any) did you experience with the technology?, many saw the technology as a bonus: learning in a new way through use of audiographic conferencing, and in addition becoming more competent with technology was regarded favourably. Student reactions included: I think it's exciting that the school is doing this. After all, that's how people learn nowadays. Other students referred to the experience of learning at a distance as doing telematics, a comment which signalled that they considered the technology as important, perhaps as important as the subject matter being studied.

Another interesting finding that emerged was that students at each site were tolerant of the frequent technological breakdowns that occurred, for example when the modem line failed, or the audio quality was poor. They also seemed sympathetic to teachers who were not always in control of these aspects of the classroom. Often, the breakdowns were interpreted by students as showing that

the teacher was not always an expert. One student commented, I guess the teacher is like us: he's learning too.

Learning through collaboration

In response to question 4, Does learning via audiographic conferencing change you as a learner?(ie., your learning style and way of communicating), several students mentioned that the style of learning in the electronic classroom helped them engage in independent inquiry and become more self-reliant. Table 3 provides a summary of responses made by students. Many reported that because the teacher was not present, they formed stronger relationships within their groups and learnt how to cooperate on problem solving and other tasks. As one student commented: It's not telematics itself, its the way we do it - a remark which implied that the technology was not a main factor in this change of orientation to learning. Instead, the pattern of interaction had changed to one where there was less reliance on teacher direction and more cooperative discussion within the group. Students had a clear sense of empowerment through technology, evidence for which can be seen in their similar comments on the empowering features of the technology

Table 2: Summary of responses to questions about interaction in the distance classroom

Comment	Interpretation	n (number of responses)
The interaction is freer than it is in a face-to-face classroom	freedom/autonomy	2
There is more collaboration and friendship among classmates.	collaboration	3
It is possible to get to know the kids from other remote schools.	rapport	2
The teacher does not always try to lead the discussion, We have plenty of freedom.	student centred	1
It sometimes gets a bit difficult cos you have to wait to speak, and you can't interrupt. You have to work out a way of signalling to the teacher that you have something to say. Then it's OK	new communication protocols	3
Sometimes you wonder if anyone hears you .. now we have a way of checking that we are heard and we also give feedback to others. That's a new way of talking. You have to make sure that you understand and that others understand what you are saying.	effective listening skills	3

Table 3:
Perceived differences in the quality of learning in the electronic classroom

Nature of view	Comment
Empowerment	<ul style="list-style-type: none"> We have more freedom in class /the teacher is less controlling. We have to be more independent cos we don't have the teacher with us. The teacher can't solve problem for us- he's not here exactly, so we have learnt to figure it out or ourselves. I realised that I learn better this way. I mean, you have to figure it out for yourself in the long run.
Collaboration	<ul style="list-style-type: none"> We have to talk more to each other than to the teacher. I know there is help there when we need it. But we try to help each other. One great thing is that we can bounce ideas off each other. We share ideas and get more ideas. I think we have become really good mates and we do help each other a lot, like we even read each other's essays- wow! Like when I don't understand something, I rely first on my classmates instead of asking the teacher.
Dialogue and conversation	<ul style="list-style-type: none"> Really what is different is that we talk a lot and share ideas. Discussion is a big part of the way we learn, and it's new to us. We are all probably better listeners now. You have got to be able to explain your views and make connections.
Higher order thinking	<ul style="list-style-type: none"> There is a sharing of ideas and we are becoming more questioning of each other. The teacher expects us to criticise ideas and to develop our own work. Learning this way makes more demands - you have to be more independent minded- at the same time, you have to collaborate. We try to balance ideas off each other, try to give each other feedback and to be better learners.

Students were also aware of the different learning styles needed in the electronic classroom and of the increased responsibility for their own learning, as the teacher was not there to monitor and supervise them. Most students acknowledged that this increased freedom helped them to share ideas, support each other and develop better study habits. All students recognised the increased autonomy and saw it as providing greater scope for them to achieve group outcomes and engage in discussion.

The comments in Table 3 can be interpreted as a change of direction for learners, an awareness of the communicative and collaborative experience of learning at a distance. Students clearly valued the change in the experience of learning, but most saw the technology as only a small element in this equation. Most of the empowerment was seen to come from their own camaraderie, from their relationships within the group and from their determination to succeed despite the technological problems that occurred. There were few expressions of communicative apprehension, and this finding indicated that protocols had been established by the teachers to enable participation and communication between groups. Students were comfortable with the shift from more traditional methods of instruction, where the teachers directs and manages, and perceived this as empowering.

Conclusion

Previous studies have shown that cultural perceptions of technology and learning persist in the classroom and that students often arrive in class with well developed, often resilient notions of what teaching and learning are and that their views are often reflective of a traditional paradigm of instruction (Sheingold et al, 1990; McHenry & Bozik, 1995). In contrast to these studies, the students in the present study were found to be strongly constructionist in their orientation. They saw learning as organised around sharing and refinement of ideas, collaboration and construction of ideas through group discussion.

In this case study, students reported a strong sense of a classroom community which extended beyond each isolated classroom and incorporated the distributed network of classrooms involved in the Academic Talent Program for rural and remote schools in Western Australia. This could have been reflective of teachers' effective use of the technology to shift responsibility from the teacher to the students. An investigation of teacher pedagogy and belief systems could identify whether there was congruence between the perception of autonomy by students and teachers' beliefs about developing autonomy and independence in telematics classrooms. It may also be an indication that the teachers in the study modelled effective independent learning for students and used technology to support collaboration. Both of these issues could be pursued in a further study.

The findings contribute to existing evaluations of audiographic conferencing environments and suggest that empowering learning can be achieved by the instructional intention to move beyond the technical link, to develop systems to support students to act independently, to listen, to communicate, and to share ideas. In this sense, the case study presented here can be seen in the context of the larger debate on how technology changes student roles in a distributed classroom. But most important, it shows that by eliciting student concerns and opinions of technology, insights can be gained into the dynamics of learning and interaction in classrooms supported by technology. Listening to the student voice is therefore an important pursuit for teachers and educational technologists.

REFERENCES

- Alonso, D. L., & Norman, K. L. (1996). Forms of control and interaction as determinants of lecture effectiveness in the electronic classroom. *Computers and Education*, 27(3/4), 205-214.
- Anderson, T. D., & Garrison, D. R. (1995). Transactional issues in distance education: The impact of design in audioconferencing. *The American Journal of Distance Education*, 9(2), 27-45.
- Conboy, I. (1991). *The telematics manual*. Victoria: Ministry of Education.
- Crook, C. (1994). *Computers and the collaborative experience of learning*. London: Routledge.
- Fisher, C., Dwyer, D. C., & Yocam, K. (Ed.). (1996). *Education and technology: Reflections on computing in classrooms*. San Francisco: Jossey Bass.
- Fraser, R., Burkhardt, H., Coupland, J., Phillips, R., Pimm, D., & Ridgeway, J. (1991). Learning activities and classroom roles with and without the micro-computer. In *Computers and Learning* (pp. 205-228). Wokingham, UK.: The Open University.
- Grabowski, B. (1996). Generative learning: Past, present and future. In D. H. Jonassen (Eds.), *Handbook of research for educational communications and telecommunications* (pp. 897-919). New York: Simon & Schuster.
- Greeno, J. P., & Hall, R. P. (1997). Practicing representation: Learning with and about presentational forms. *Phi Delta Kappan*, 78(5), 361-367.
- Hannafin, R. D., & Sullivan, H. J. (1995). Learner control in full and lean CAI programs. *Education, Technology, Research and Development*, 43(1), 1042-1629.
- Harper, B., & Hedberg, J. (1997). Creating motivating interactive learning environments: A constructivist view. In R. Kevill, R. Oliver, & R. Phillips (Ed.), *What works and Why? ASCILITE '97*, (pp. 11-32). Perth, WA: Curtin University of Technology.
- Javela, S. (1995). The cognitive apprenticeship model in a technologically rich learning environment: interpreting the learning interaction. *Learning and Instruction*, 5, 237-259.
- Jayasinghe, M. G., Morrison, G., & Ross, S. M. (1997). The effect of distance learning classroom design on student perceptions. *Educational Technology Research and Development*, 45(4), 5-19.
- Jonassen, D., Davidson, M., Collins, M., Campbell, J., & Haag, B. B. (1995). Constructivism and computer-mediated communication in distance education. *The American Journal of Distance Education*, 9(2), 7-26.
- Jonassen, D., & Reeves, T. (1996). Learning with technology: using computers as cognitive tools. In D. H. Jonassen (Eds.), *Handbook of research on educational communications and telecommunications* (pp. 693-719). New York: Scholastic Press.
- Kinzie, M. B. (1990). Requirements and benefits of effective interaction instruction: Learner control, self-regulation and continuing motivation. *Educational Technology Research and Development*, 38(1), 5-21.
- Light, P. (1993). Collaborative learning with computers. In P. Scrimshaw (Eds.), *Language, Classrooms and Computers* (pp. 40-56). London: Routledge.
- McHenry, L., & Bozik, M. (1995). Communicating at a distance: A study of interaction in a distance education classroom. *Communication Education*, 44(4), 362-371.
- McLoughlin, C., & Oliver, R. (1995). Who is in control? In J. M. Pearce & A. Ellis (Eds.), *Learning with Technology*, (pp. 395-404). Melbourne: University of Melbourne.
- McLoughlin, C., Oliver, R., & Wood, D. (1997). Teaching and learning in telematics environments: Fostering higher level thinking outcomes. *Australian Educational Computing*, 12(1), 9-15.
- Mason, R. (1994). *Using communications media in open and flexible learning*. London: Kogan Page.
- Mercer, N. (1996). The quality of talk in children's collaborative activity in the classroom. *Learning and Instruction*, 6(4), 345-377.
- Oliver, R., & McLoughlin, C. (1997). Interactions in audiographics teaching and learning environments. *The American Journal of Distance Education*, 11(1), 34-55.
- Oliver, R., & Reeves, T. (1996). Dimensions of effective interactive learning with telematics for distance education. *Educational Technology Research and Development*, 44(4), 45-57.
- Peterson, P., & Swing, P. (1992). Beyond time on task: Students' reports of their thought processes during classroom instruction. *Elementary School Journal*, 82(2), 481-491.
- Repman, J. (1993). Collaborative, computer-based learning; cognitive and affective outcomes. *Journal of Educational Computing Research*, 9(2), 149-163.
- Saye, J. (1997). Technology and educational empowerment. *Educational Technology Research and Development*, 45(2), 5-24.
- Scardamalia, M., & Bereiter, C. (1991). Higher levels of agency for children in knowledge building: A challenge for the design of new knowledge media. *The Journal of the Learning Sciences*, 1(1), 37-68.
- Schank, R. C., & Jona, M. Y. (1991). Empowering the student: New perspectives on the design of teaching systems. *The Journal of the Learning sciences*, 1(1), 7-35.
- Sheingold, K., Hawkins, J., & Char, C. (1991). 'I'm the thinkest, you're the typist': The interaction of technology and the social life of classrooms. In O. B.-B. & E. Scanlon (Eds.), *Computers and learning* (pp. 174-185). London: Croom Helm.
- Tasley, S. D. (1995). The role of talk in children's peer collaborations. *Developmental Psychology*, 31(2), 207-220.
- Thompson, D. (1996). Audioteleconferencing: Myths and realities. *Open Learning*, 17(2), 20-27.
- Underwood, J. D. M., & Underwood, G. (1990). *Computers and learning*. Oxford: Blackwell.
- Wagner, E. D. (1994). In support of a functional definition of interaction. *The American Journal of Distance Education*, 8(2), 6-29.
- Walker, K., & Hackman, M. (1992). Multiple predictors of perceived learning and satisfaction: The importance of information transfer and non-verbal immediacy in the televised course. *Distance Education*, 13(1), 81-92.
- Wang, M., & Peverley, S. (1987). The self-instructive process in classroom learning contexts. *Contemporary Educational Psychology*, 11, 370-404.
- Wild, M. (1996). Technology refusal: Rationalising the failure of student and beginning teachers to use technology. *British Journal of Educational Technology*, 27(2), 134-143.

ACEC 98 Conference

Summary:

Project sponsored by
the Australian
Computer Society

*A full report will be published in
the next issue of AEC.*

COMPILED BY

Dr Graham Ferres

Monash University

Teacher as an individual and a member of community

Michelle Williams, (QUT and President ACCE) argued that we need to consider the role of teachers and their use of information and communication technologies on three levels - as an individual and on a personal level; as a member and client in local groups and national enterprises; and as a citizen in a global economy.

Changing nature of education

As part of societal changes, education and the teaching and learning process in classrooms is also changing. Teachers' possible uses of information technologies, when working with colleagues and with students and parents, can be re-analysed in the context of

individual, national and global impacts. Examples include rethinking schools as workplace and learning communities, the growing use of the gathering of 'real' data collected either locally or globally, and the processing of information for analysis and publishing via staff and student presentations. Teachers' skills and understandings of how they might work with other teachers and students to use information technologies in 'learning projects' are crucial.

ACCE Project

Arising from discussions earlier this year of the changing role of teachers and their place in schools and society, the ACCE Board initiated a 'Teacher Information Technology Competencies' project. Graham Ferres presented an overview of the Australian and overseas movement towards developing sets of teacher competencies in the field of information technology (e.g. Finn & Mayer, Queensland, Tasmania, Victoria, USA). It was noted that the American systems have tended to focus upon student benchmarks for 'computer literacy'. ACCE resolved to continue to strongly support teachers in their development of understandings about how to use information technologies with students and as part of their professional work life.

Capabilities, competencies and standards

In July, ACCE conducted a national conference in Adelaide, during which the Council conducted a seminar focusing on the trend towards state systems outlining desired or required competencies by teachers, particularly in the use of information technologies.

Bruce Rigby spoke how Victoria published, in March 1998, a 'Teacher Capabilities Kit'. This included a collection of statements of desired teacher capabilities, and a skill matrix across three possible stages of self-assessment by a teacher of their use of learning technologies with students. He stated that there was no mandatory system, but a 'strong' encouragement to schools to link curriculum renewal with technology implementation. The notion of capabilities included, but did not involve, only technical information technology competencies.

Ken Price from Tasmania outlined how their Department developed a broad set of teacher competencies starting with the accreditation technique from

vocational education and framework of functional analysis - what do you do as part of your role? The draft teacher competencies and intended outcomes were collated into modules, leading from operational skills with the technologies through to a foci on teaching and learning with the use of the technologies. It was not expected that the teacher competencies would be mandatory. (It is now understood that the Tasmanian project team has moved to emphasise more the teaching and learning competencies and intended outcomes with the use of information technologies, by stating that the module for technical IT competencies would be assumed and a pre-requisite to the teacher competencies portfolio.)

Carol Hughes described how Queensland developed a set of 'Minimum Standards for Teachers - in Information Technologies', as part of a 2001 Project. The project analysed current 'best practice in the use of information technologies' across classrooms and concluded that effective classroom practices included: strong IT skills, the ability to apply their use in the classroom, a say in curriculum planning, and an emphasis upon student-centred learning. They then trialed a set of teacher IT standards, which could be assessed by schools. The Department negotiated these arrangements with the Queensland Teachers' Union through an enterprise agreement, as the teacher IT standards will be mandated.

The way forward

At the National conference, participants and the ACCE Council discussed the part that teachers and state organisations might play in these developments. It was argued that we should ensure that a central focus continues to be on pedagogical issues, with the integration of IT across the curriculum and within all KLA's, otherwise the focus will concentrate on IT competencies. And so the focus should be on effective classroom practice - and how to help teachers work towards changing their current practices, including greater use of technologies. Teachers should be encouraged to use information and communication technologies routinely as part of their work life through greater access to the technologies. PD which links, and does not separate, the development of curriculum change and new practice with the development of information technology skills, is crucial.



Smarter not Harder:

Multimedia made easy

Promote and enhance learning by using technology to create multimedia presentations in the classroom.

By Edplus

Price: \$99

Fax/phone (03) 9681 9832

This video is one in the series of videos designed to assist teachers to use technology in their classrooms. It runs for 22 minutes duration and can be used for staff inservices. The video has been developed by two Victorian teachers, June Stratford and Jane Morrison. Following the theme that teachers need to work "smarter not harder" the video shows 5 year old, 8 year old and 11 year old children producing multimedia projects using KidsPix Studio and HyperStudio in their classroom. The purpose of the video is to show how within a school you can optimise your investment in computer equipment; challenge staff with exciting, new teaching strategies, encourage team building and foster co-operative professional development. As Stratford and Morrison state in the handbook accompanying the video "using technology gives a whole new perspective to teaching. It promotes thinking, problem solving and co-operative learning. You will see how to use multimedia with students to enhance and facilitate learning in a wide range of subject areas. Only minimum equipment

and technological skills are required to accomplish significant learning outcomes. The 5 year olds created a class book using KidsPix Studio on the topic of butterflies in an integrated program covering the areas of English, Arts, Maths, Science and Technology. The 8 year olds created group projects of six slides each using KidsPix Studio on the topic of Australian flora and fauna. This was an integrated program covering the areas of SOSE, English and Technology. The group of 11 year olds were involved in an integrated topic on the history of communications using the multimedia program Hyperstudio. This unit of work covered the areas of SOSE integrated with English and Technology and used other technologies such as the digital camera, video camera and the Internet with groups of students producing projects. This is an excellent video to show staff and parents what can be done when a class is set up correctly for technology and the teacher and children have a purpose to use the computer in an integrated theme of work.

Kids Can Do

Computers in the K6 Classroom v1

By Department of Science and Mathematics Education
The University of Melbourne

Price: \$40

Phone (03) 9344 8443

Fax: (03) 9344 8739

VIDEO AND CD REVIEW BY

Dr Sue Trinidad

Faculty of Education

Curtin University of Technology

Perth Western Australia

This CD-Rom contains an exciting set of resources for training teachers and practising teachers. While intended as a set of resources for student teachers enrolled in a specific subject within the Bachelor of Education (Primary) course at the University of Melbourne's Department of Science and Mathematics Education, the resources are useful for any teacher wanting to update or expand their skills in technology. The CD-ROM uses a web-based interface but if you are on-line many of the links will take you to the sites from the CD-ROM. Many references, resources and samples are included. Topics covered include:- Main Menu

1. Overview
2. Hardware
3. Computer Ethics
4. Information Literacy
5. Management Tools
6. Communication Tools
7. Education & Software
8. Learning Styles
9. Software Categories
10. Software Evaluation
11. Classroom Models
12. Logo
13. HyperCard
14. The Internet

15. Special Needs
16. Administration
17. Kidmap
18. Content Free Software
19. Trends in Software
20. Reflections



You will also see some video of what 'Kids Can Do' with computer technology when it has been introduced across the curriculum in meaningful ways. These are in the form of three virtual classrooms showing exemplars of technology situations that can be viewed through Quicktime VR technology. Anderson's Creek Primary School has computers in the class and the students are involved in web-site projects; Blackburn Lake Primary School has just moved from a one computer classroom to a two computer classroom and models a unit of work being completed on oceans; and Elwood Primary School shows a lab of computers in which the computing teacher concentrates on computer skills reinforced through multimedia authoring.

This CD-ROM is great value and a useful resource for educators wanting to update their skills and knowledge in the area of K-6 computing.

Multimedia Reading Resources

REVIEW BY

Bianca Hurley

Edith Cowan University

By Mimosa Technology

Price: \$97.00
(Class packages & site licenses
also available)
Phone (08) 9819 0511
Fax: (0?) 9819 0524

The "Inside Stories" series from Mimosa Technology aims to develop reading skills in Primary and Pre-Primary school children. Language games and activities are integrated into a series of CD-ROMs, using selected familiar stories as themes. Co-author David Hornsby is best known for his "Write On - A Conference Approach to Writing", and "Read On - A Conference Approach to Reading". Co-author Brenda Parkes has worked closely with the Rigby Publishing Company, producing educational children's books.

"Inside Stories" would be most suitable for children at the 'Experimental', 'Early', and 'Transitional' reading phases ("First Steps", 1994). Some of the activities would also be suitable for children at the (less advanced) 'Role Playing' and (more advanced) 'Independent' reading phases.

The four stories are "The Three Little Pigs", "The Three Billy Goats Gruff", "Goldilocks and the Three Bears", and "The Gingerbread Man". Although the product is of American origin (evidenced by the accent of the audio components), the wording of the tales is fairly close to 'traditional' language. Such aspects of cultural neutrality maximise opportunities for participation as children are familiar with the language and story.

Each fairy tale is well presented in its own robust, ring-bound, plastic file. Within each file is a CD-ROM, map of the CD-ROM's navigational structure, skills overview sheet, teacher's guide, and blackline masters. The CD-ROM is easy to load, containing software for both Macintosh and Windows-based (95, 3.1, and 3.11) computers. Hard-copy instructions are also provided at the back of the file, should installation prove troublesome!

A colourful map with screen captures of the CD-ROM greets the user when the file is opened. This map acts as a guide to the learner or parent, detailing the activities and concepts presented within the CD-ROM. While the map is useful and of good quality, it would be advantageous if it was used in the same way within the CD-ROM to show the child the activities that have been completed.

Skills and language strategies are set out in a clear overview chart and check box format accompanying each CD-ROM file. The charts are broken up into "Reading", "Vocabulary and Language", and "Letter/Sound Patterns; Word Structure". Teachers are always on the lookout for products that make evaluation and preparation less time consuming, so it would be beneficial if the charts were obviously applicable to Australian schools. Some correlation to National English Outcomes or 'First Steps' stages would be ideal.

The Teacher's Guide describes the educational rationale for the activities presented. Blackline master sheets, assessment sheets and follow up activities are also well explained. Additionally, a useful index assists the teacher to utilise different forms of writing and reading.

A most useful feature of the product is the inclusion of blackline masters. They are clearly printed, meaningful, and relevant. Each master sheet is labelled with the name of the related CD-ROM activity, allowing easy cross-referencing for teachers. An additional resource for busy teachers is a student record sheet which allows children to take more responsibility for their learning by checking off times/dates they worked on the computer, activity performed, and the date that the computer print-out was completed. A class record sheet is also provided to summarise students' results for the teacher's easy reference.

The CD-ROMs contains all the basic material for activities. Appealing cartoon characters and puppets are featured throughout to help sustain children's attention. A positive feature is the "First Time" function, which, when selected, leads to the relevant story being presented in a book-like format. The story is read to the children as they follow the text and changing illustrations. Allowance is made for children who are familiar with the stories, by providing a "Played Before" option which bypasses the reading of the story and navigates directly to the main menu. Although the product could be used by children working individually, it is

advisable to have them working in pairs so that opportunities for collaborative learning are maximised.

A "Read the story" option provides further reinforcement of language skills. Selecting the "sound button" causes the paragraph to be read by the narrator, with the words lighting up as they are read. Individual words can also be selected to hear them read out. Illustrations match the text, thereby optimising reading for meaning.

Options to Exit/Quit, Help, (Forward or Back when appropriate) are implemented in a consistent way so that navigation options always appear in a familiar way. Use of a 'sound off' option would also have been beneficial, for although the sound is well integrated, the inevitable endless repetition could prove distracting in a classroom environment. A more engaging product could be achieved through the provision of more interactions - additional hot spots would be advantageous in this regard. One major improvement in this area would be the use of cursors which change to indicate the presence of hot spots, providing a point of interest in the changing cursor and indicating which hot spots are active at any one time.

The ability to print out activities is an excellent feature. It provides both teacher and child with a record and a basis

for further consolidation. When the print function is selected, it would be beneficial if a dialogue box was to indicate that printing is taking place (who's experienced several copies of one child's work in the printer!). A further useful feature would be an individual record of each child's progress accessible by the teacher on demand. This automatic monitoring device would also allow the teacher to easily see which activities required further consolidation.

Children are able to navigate through the programs making choices about the order in which they perform activities. The educational level can not be chosen within a CD-ROM; it is expected that children select another CD-ROM at a higher stage if they need a more challenging level.

The use of a local accent would help to cater for children from a non-American background. For example, the letter 's' is at times unclear, and pronunciation of words such as 'advertisements' as 'advertise-ments' is difficult to understand. The ability to customise accent, language, sounds and colours would assist in meeting individual needs. Additionally, more supporting prompts for hearing impaired children would be a welcome feature. Traditional gender role modelling is in evidence throughout the program. This could have

been remedied by making minor changes that would not interfere with the story lines.

Each CD-ROM has different sets of activities and skills, providing variety, with certain important skills being repeated. Feedback is consistent and positive, although the use of clues for incorrect answers would lower any frustration levels and provide more opportunities for success. For example, in 'The Three Little Pigs' a wall is progressively built as children construct words in the 'Which Word?' activity. Appropriately used colours, graphics and text also help to emphasise important information. Most pages are consistent, clear, uncluttered, and set out logically, resulting in a reasonably intuitive interface.

Overall, a well produced set of products that are based on many relevant language and reading principles. It has many positive features, and room for improvement in the next release. It is recommended as a supplementary resource for a whole language program. Just remember to turn the volume down before you start!

REFERENCES

First Steps Reading Developmental Continuum (1994), Longman Australia Pty Ltd. Melbourne, Australia.

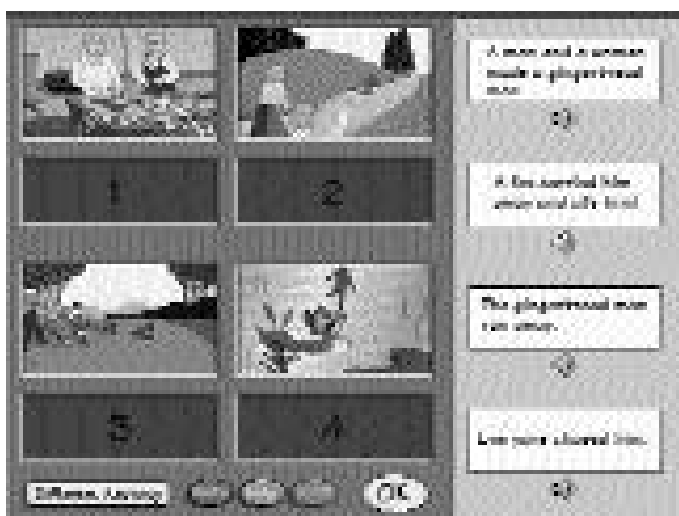


Figure 1 - One of 'The Gingerbread Man's' activities is to sequence pictures, then match with sentences. The story is then read back. Children are able to print the final pictorial result and write their own story.



Figure 2 - Main Menu for 'The Three Billy Goats Gruff' from where children select activities. The other three stories have different activities to select from.