Information and Communications Technologies and Teacher Education in Australia

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ABSTRACT The professional development of beginning and experienced teachers has been widely recognised as a key component in the integration of information and communications technologies (ICT) into teaching and learning activities in Australian schools. Many initiatives have been taken, particularly since the mid-1990s, to assist beginning and experienced teachers to use ICT to increase learning opportunities, enhance learning activities, and improve learning outcomes for students. Some of the approaches taken to familiarise teachers *about* ICT are outlined here, using case studies of 'good practice' to illustrate key features. Other approaches focusing on learning *with*, rather than *about* new technology, are also noted.

Information and Communications Technologies, Teacher Professional Development and Initial Teacher Education in Australia

Australian government reports have recognised that advances in information and communications technologies (ICT) need to become a part of the knowledge and skills imparted to young people in an increasingly complex world. The National Goals for Schooling, adopted by all state, territory and commonwealth ministers of education in August 1999, state that students leaving school should 'be confident, creative and productive users of new technologies, particularly information and communication technologies, and understand the impact of those technologies on society' (Ministerial Council on Education, Employment, Training & Youth Affairs, 1999, p. 2).

The national goals also recognise the importance of improved 'student outcomes' from schooling, the provision of 'high-quality schooling' in achieving agreed goals and the need, if schooling is to be considered 'socially just', of providing 'equitable access' to education, including students located in remote geographical locations.

Government reports have also emphasised that improving access, quality and outcomes is highly dependent on quality teaching. A federal government report titled *Teachers for the 21st Century – making the difference* recognised that 'education of the highest quality requires

teachers of the highest quality' (Department of Education, Science and Training, 2000, p. 1), and identified information technology as one of the 'key priority areas' for funding professional development activities for teachers. Another report, *Learning in an Online World,* prepared for state, territory and federal education ministers, also accorded the educational uses of ICT a high priority in professional development for experienced teachers (Ministerial Council on Education, Employment, Training & Youth Affairs, 2000).

Along with the emphasis given to professional development for experienced teachers in national reports, attention has also been directed to the needs of beginning teachers in initial (pre-service) teacher education courses. For instance, a report by the Australian Council of Deans in Education in 1998 recommended that:

> Graduates should have an understanding of and ability to use appropriate technologies, particularly information technology to facilitate learning; for record keeping and other administrative tasks; and for professional interaction. They should also have a thorough knowledge of how the new learning, information and communication technologies can be used in their particular curriculum levels and areas, including as a means of enhancing interactions between people and as a means of engaging and interrogating sources of information, argument and ideas. They should be able to evaluate software, and develop strategies for managing classrooms that use new technologies. They should be familiar with current information storage and retrieval systems and technologies, and have the capacity to develop competency in new systems and technologies as they emerge. (pp. 13-14)

Reports prepared for state, territory and federal governments by the Ministerial Council on Education, Employment, Training & Youth Affairs, and by professional associations like the Australian Council of Deans in Education, have been influential in determining policy directions. The Federal Government has also provided significant funding for initial and continuing teacher education. In Australia, state and territory governments have primary responsibility for education and schooling and, amongst other things, the provision of ICT infrastructure and support. State and territory governments, as major employers of teachers, determine the criteria for employment of beginning teachers, the terms and conditions of service and, to a large extent, access and funding to continuing professional development (Department of Education, Science and Training, 2000, p. 8). In this article, a brief outline is initially presented of these 'minimum requirements' and 'professional standards' for ICT developed by state governments and education departments. (For an outline and discussion of policy and practice in educational computing in the 1980s and early 1990s see Downes et al [1995]). Later, examples of programmes are presented that attempt to assist beginning and experienced teachers develop the personal and pedagogical

skills needed to successfully use ICT to support classroom learning activities. The article concludes by suggesting that increasing attention in the future is likely to be placed on learning *with* ICT, rather than *about* ICT, in teacher education courses.

Factors Influencing ICT Competencies for Teachers

The terms 'information and communications technology' (ICT) and 'learning technologies' (LT) are both widely used in Australia when referring to the use of new technology in teaching/learning activities. The Department of Education, Western Australia (2000) uses the term 'learning technologies' to refer to 'information and communications technologies that are used as tools to achieve improved teaching and learning outcomes'. In Victoria, learning technologies are referred to as 'the various forms of information technology which are used to enhance student learning. They represent the incorporation of information technology (including both computer and communications technology) into teaching and learning' (Education Victoria, 1998a, p. 14). In this article, the terms 'information and communications technology' (ICT) and 'learning technologies' (LT) are considered to be synonymous.

Guidelines

All education departments have published comprehensive guidelines about the personal skills and classroom practices ('competencies') in ICT expected of beginning and experienced teachers (compare with Marshall, 2000). For instance, in Queensland 'minimum standards' for teachers in LT include personal skills in using computers; curriculum applications; school planning and management in LT; and student-centred learning (Education Queensland, 1997). 'Professional standards' are expressed in the following statements:

[Teachers are expected to]

– determine students' learning needs in relation to the use of available information and communications technologies;

– select learning strategies and resources based on the use of information and communication technologies to cater for students' learning needs and styles;

– create learning experiences in which students actively use information and communication technologies to organise, research, interpret, analyse, communicate and represent knowledge;

– evaluate the effectiveness of teaching and learning approaches based on the use of information and communication technologies;

– use information and communication technology tools to access and manage information on student learning. (Education Queensland, 2002, p. 1)

In Western Australia, the *Competency Framework for Teachers* includes reference to the selection and use of learning technologies to enhance student learning. It is anticipated that a teacher in Phase 1 of the competency framework:

– applies personal knowledge to relevant learning areas in evaluating instructional resources and learning technologies ...;

– uses a range of instructional resources and learning technologies within and across learning experiences;

– encourages students to select and use appropriate instructional resources and learning technologies to enhance thinking and to further conceptual understanding (Martin, 2001, p. 17);

and that a teacher in Phase 2 of the competency framework:

– implements learning experiences to promote the development of student skills in the use of educational technology to access, present and manage information;

– links use of technology with attainment of planned learning outcomes;

– provides opportunities for students to use technology for a variety of purposes: for example, to support inquiry, advance communication, extend access to resources, [and] encourage expression of ideas;

– ensures students have equitable access to educational technology;

– adjusts use of technology to cater for diversity in learning styles and needs. (Martin, 2001, p. 26)

From Guidelines to Criteria

These expectations, and those prepared by education authorities in other states such as New South Wales, Tasmania and Victoria (Department of Education, Tasmania, n.d.; Ministerial Advisory Council on the Quality of Teaching, 1997; Standards Council of the Teaching Profession, 1998), focus on two main aspects – personal skills (e.g. computer operating systems, peripherals and software applications) and classroom strategies related to the integration of ICT into learning activities. These expectations have been influential in beginning and continuing teacher education; since they have

been developed by employing authorities, they contain the criteria against which the suitability of courses in initial teacher education and professional development for experienced teachers are judged. This is clearly indicated in the published guidelines. The Western Australian *Competency Framework for Teachers* states that 'professional development providers and tertiary institutions may use the Framework to ensure that their services continue to be relevant to the needs of Western Australian government schools' (Martin, 2001, Introduction).

In the case of Victoria, the Standards Council of the Teaching Profession (SCTP) has, until recently, evaluated pre-service teacher education courses 'for recommendation for employment of their graduates as teachers in Victorian schools'.[1] By 'develop[ing] and maintain[ing] cooperative relationships with universities and their faculties which are involved in teacher education', by 'undertaking course evaluations' and by accepting invitations to 'participate in university course committee discussions', the SCTP has attempted to provide 'input to assist university teacher educators in evaluating and developing courses which will be consistent with the principles contained in the Guidelines' (SCTP, 1998, p. 7).

Hence, in publishing 'guidelines' about what beginning and experienced teachers are expected to be able to do, and in seeking to influence and in many cases approve initial teacher education courses, state education departments have had a considerable influence on tertiary courses, as some of the case studies presented later in this article reveal. These guidelines have also been influential in the design and implementation of professional development programmes for teachers.

From Criteria to Professional Development

State education departments have also prepared substantial resource materials to help teachers assess personal professional needs and to develop the capabilities and skills needed to integrate ICT into classroom learning experiences. For instance, the Department of Education in Victoria has produced a number of booklets (Education Victoria, 1998a, 1998b, 1998c, 1998d, 1998e, n.d.) designed to:

 – define a set of desired teacher capabilities (including attitudes, understandings and skills) in the effective application of learning technologies in all aspects of teaching and learning;

 – indicate a range of professional development strategies, resources and support to assist teachers to develop the desired capabilities;

> – assist teachers and schools to identify their learning technologies
> professional development needs and, as a result, inform school
> professional development planning. (Education Victoria, 1998a, p. 6)

Other state education departments have published similar professional development resources. As a result, professional development has been 'system driven' (Ling & Mackenzie, 2001, p. 93) in terms of content covered. However, 'Curriculum Days' or 'School Development Days' (usually 1 or 2 days per term) have provided opportunities for teachers to address policies and programmes that are specific to their own school.

Other organisations have been significant providers of professional development for teachers. Many universities and state ICT professional associations offer professional development modules that can be taken as stand-alone programmes or, if an assessment requirement is completed, used as credit towards a university award (graduate certificate) course (Ling & Mackenzie, 2001; Taylor & Clemans, 2000). An interesting example of the ways in which professional development frameworks developed by a state education department and university award courses can be used to provide professional development activities for teachers is the case study from Tasmania, described later in this article.

Another form of professional development for teachers is participation in ICT-related state and national conferences.[2] Large numbers of teachers attend these conferences, and many present papers or posters about the ways in which ICT has been used in their school settings. Many of the presentations by teachers are 'cutting-edge' demonstrations of the ways in which ICT can be used to support learning activities. The sharing of information, and the networking amongst teachers that develops as a result of participation in conferences of this kind, present important opportunities for teachers to shape their own professional development.

This section has outlined some of the factors that have influenced thinking about pre-service and in-service teacher education and ICT in Australia. The following sections provide some actual examples of approaches that have been implemented to assist beginning and experienced teachers to use ICT to enhance classroom learning activities.

ICT and Initial Teacher Education

The 'model for ICT professional development' developed at the University of Tasmania illustrates (Figure 1) one way in which ICT has been integrated into an initial teacher education course.

Modules in this teacher education course are organised in three strands. One strand is known as the 'personal and professional' strand and consists of six compulsory modules in the 1st year of study that are the same as the modules in the in-service course for experienced teachers. The topics covered include introduction to computing in education; word

processing and publishing; Internet and email; and multimedia and web publishing (Tasmanian Department of Education, n.d.). Modules in the 'teaching and learning' strand (compulsory modules in the 4th and final year of the initial course) deal with the integration of ICT into teaching and learning, and cover similar content to both the in-service course and a graduate certificate course. Modules in the 'management and organisational' strand (optional at 3rd-year level) are similar to those in graduate certificate modules which will be discussed later in this article in the section entitled 'ICT and Professional Development for Experienced Teachers'.

	Personal and Professional Strand	Teaching and Learning Strand	Management and Organisational Strand	
CORE MODULES	Operating Skills	Software Evaluation	Pedagogy	
Publishing	Tasmanian Department of Education Units 1–4:	Tasmanian Department of Education Unit 5 and prospective Unit 6: also Graduate Cert ificate modules 1 & 2		Tasmanian Department of Education Graduate Certificate Modules 3–5
Communicating			Planning	
Researching	Covered in 1st year of B.Ed and B.Teach by all students	Covered in last year of B.Ed and B.Teach by all students		Covered in optional B.Ed 3rd-year unit
Problem Solving			Infrastructure	
Independent Learning				

Figure 1. A model of professional development for teachers using information technologies in education (Fluck, 2002).

The provision made for ICT in this course is typical of many initial teacher education courses in Australia that have been highly influenced by advice from the state department of education, along with individual efforts to match course content with local 'standards'. Pre-service teachers are expected to graduate from college with the same competencies that working teachers have gained through in-service courses (Fluck, 2002). Professional development needs are thus met at two levels, namely basic competency in

initial teacher education and in-service courses, and a more advanced level in a graduate certificate course.

A second example of how knowledge, skills and competencies in ICT have been integrated into teacher education courses can be seen in the Faculty of Education at Curtin University of Technology in Western Australia, where all students in the 4-year Early Childhood and Primary (ages 6-11 years) initial teacher education courses must complete the course 'Technology in Education' (30 contact hours). In this subject, students:

– participate in a needs analysis to determine ICT competencies;

– develop an awareness of personal professional needs;

– prepare a 5-10 week teaching programme which integrates learning technologies;

– develop on-line skills and course materials;

– analyse social, cultural and equity issues and trends in ICT;

– take a leadership role in ICT projects. (Department of Education, Training and Youth Affairs, 1999; Curtin University of Technology, n.d.; Trinidad, 2000)

Here, students also share work with classroom teachers 'further helping teachers integrate technology into their work environment' (Trinidad, 2000, p. 4). Students can also complete elective subjects in ICT during the 4 years of this initial teacher education course.

Another example of the content covered in a compulsory subject in ICT can be seen in the postgraduate Diploma in Education (Primary) at Monash University. This 20-week subject titled 'Learning Technologies Across the Curriculum' has been based on competencies outlined in the State Education Department 'learning technologies teacher capabilities statement' (Education Victoria, 1998c). Its goal is to 'increase student awareness of the rationale for the use of ICT in primary classrooms ... introduce students to the logistical problems associated with the use of ICT in the classroom ... further develop students' personal computer literacy and awareness ... and develop positive attitudes to the use of ICT in the classroom' (Romeo, 2000, p. 8). The assessment of the attainment of these goals is based on a 'folio of practical activities containing examples of word processing, desktop publishing, *Microworlds* programming, email, Internet, databases, web site development, multimedia authoring as well as lesson planning, development and implementation' (Romeo, 2000, p. 8).

Similar compulsory subjects exist in other courses (Albion, 2000; Watson & Prestridge, 2001). Initially subjects of this kind were introduced because of low skill levels among students entering teacher education courses. More recently, they have been retained to deal with the 'enormous

divergence between the ICT competency base of entry students' (Watson & Prestridge, 2001, p. 1) and 'varying skill levels ... preconceived ideas about the use of ICT in the classroom, and ... diverse attitudes towards computers' (Romeo, 2000, p. 8). However, questions have been raised regarding the continuation of separate subjects in initial teacher education courses. While this can be a useful way to develop personal skills, separate subjects do not always facilitate integration of ICT into other course components. As Downes et al (2001, p. 33) note:

> ... separate subjects tend to provide a means to identify skills acquisition and support settings where accreditation of skills is necessary. On the other hand, separate subjects tend not to provide the opportunities for teacher education students' modelling across a range of subject matter ... and rarely lead to integration within professional experiences in schools or other educational settings.

In some universities, these subjects are often taught by staff whose primary expertise is in computing rather than in education and the use of ICT in education. As a result, the content covered in the courses is not always seen as being relevant and useful to initial teacher education students (Albion, 2000, 2001). Albion (2000, p. 3) summarises the problems in the following way:

> An increasing proportion of new university students is arriving with essential computing skills acquired in secondary education or prior employment. For them a core computing subject with a focus on introductory skills acquisition is probably unnecessary. For those who arrive without computing skills, the learning curve in the core subject is sometimes too steep ... For both groups ... difficulties ... in making explicit connections to education may diminish the value of the subject as a preparation for future professional application of ICT.

In other cases there appear to be problems caused by a compromise between competing influences of course design and implementation. What often results is a mixture of what is considered important and what is possible to achieve with available resources. These competing influences, along with difficulties involved in presenting a compulsory 1st-year Bachelor of Education (Primary) programme for students at Griffith University, have been candidly described by Watson & Prestridge (2001, pp. 19-20):

> *Learning with Information Technology*, like most subjects at tertiary level, is founded on the '3 Ps' – pedagogy, politics and practicality. Although it would be desirable to consider only pedagogy when we design subjects it is inevitable that politics and practicality will contribute to the shape of subjects. The politics that shaped *Learning with Information Technology* were both external and internal. Included in the external politics was the demand from employers that our graduates could demonstrate ICT in learning competencies that were

concomitant with the aims of Schooling 2001 (Education Queensland, 1997). It is also necessary that from time to time the University be able to demonstrate that their teacher education program encompasses the political demand for ICT-literate teachers to meet the needs of the 'information society' ... While pedagogically it is preferable to integrate ICT throughout the pre-service programme, politically it is much more expedient to be able to point to a dedicated subject. It is also a reality that a dedicated subject ensures all students attain some basic competencies for ICT in learning whereas a purely integrative policy is much more haphazard and is dependent on the ICT interests of constantly changing, and increasingly sessionalised, academic population. Internal politics included the demand from other subject areas that the subject provides students with the ICT skills necessary for them to use ICT in other subject areas. Practicalities included demands on computing facilities, technical support and software availability. A further practicality is the issue of staffing such a subject where there is heavy reliance on sessional staff and the only full-time member is the convenor.

Similar pressures on course design and implementation exist in many Australian universities. In some cases, 'politics' and/or 'practicalities' may mean that subjects of this kind are no longer offered. On the other hand, it could be argued that subjects like these need to be made available to all students as greater use is made of ICT in course design, implementation and assessment in other faculties. It could also be anticipated that greater demand would be experienced for these subjects if they were available on-line. Therefore, there is considerable scope for teacher education faculties to extend existing compulsory subjects to a much wider student population.

There are two other components of initial teacher education courses (identified in the lower left quadrant of Figure 2 by Kirschner & Selinger in this issue) which help to familiarise beginning teachers with new technology – the curriculum studies ('methods') subjects about teaching in 'key learning areas' (KLAs), and the use of ICT during teaching practice in schools. However, little is known about the nature and extent of what student teachers do in these components of courses. Only one account of integrating ICT into curriculum studies subjects in a postgraduate (primary) initial teacher education course, and the 'challenges' involved in doing so, was located (Romeo, 2000). In relation to teaching practice, the importance of suitable placements in schools where student teachers can use ICT and build confidence about managing ICT in learning activities has been recognised, but up-to-date information about the nature and extent of what happens during teaching practice is not available (Albion, 1996; Downes, 1993; Wild, 1995). School-based action research projects are another way in which ICT can be investigated by beginning teachers (Richards & Phillips-Ryan, 2000), but the extent to which projects of this kind have been included in initial teacher education courses is not known.

These ways of familiarising beginning teachers with ICT focus on learning *about* new technology; that is, ICT is the focus (topic) of study, a situation Heppell (1993, p. 230) identified as the 'topicality stage' in the process of introducing new technology. On the other hand, rationales for introducing ICT in primary and secondary schools stress the importance of learning *with* ICT. Hence, another way to prepare beginning teachers to utilise ICT in their own classroom teaching is to actually use ICT to support learning experiences in the initial teacher education course.

One of the applications of ICT which has been explored in some teacher education courses has been electronic networking ('computer-mediated communication', 'computer conferencing', on-line 'knowledge-building communities' or 'telementoring') of participants (trainee teachers, mentors and university supervisors), particularly during periods of supervised experience in schools (practicum) or special placements (internships) at the end of initial training or during the induction phase of teaching (Ferry et al, 2000; Leiminer & Mayer, 2001; Matters, 2001; Mayer, 2000, 2002; Nanlohy & Munns, 2000; Pearson, 1997, 1999).

Electronic networking has the potential to be an important innovation in initial teacher education. On-line discussions provide a forum for trainee teachers, classroom teachers and university tutors to access and clarify professional knowledge about teaching. The text-based nature of communication provides a permanent record of discussions, that can be reviewed and analysed in the future. And the asynchronous nature of communication facilitates reflective practice, enabling participants to consider the ideas of others, and research and clarify their own ideas before contributing to discussions.

In cases where networks have been established, trainee teachers have been generally positive about the benefits to be gained from this form of communication. The author's experience with electronic networking in a Bachelor of Education (Primary) course with 4th-year trainee teachers (n=26), their mentors and university tutors revealed that trainee teachers were very positive about using the network to 'receive information' about practicum requirements, for 'social contacts' with others, to 'discuss educational issues', to deal with 'personal and professional problems' and to 'develop a sense of community' amongst programme participants (Pearson, 1997, 1999). Mayer (2000, 2002) has reported similar outcomes when electronic networking was available during a 10-week internship with students (n=87) enrolled in a graduate secondary initial teacher education course teaching ages 12-17 years. Interns reported that an electronic network enabled them to 'keep in touch', obtain 'strategies and ideas for their lessons', advice about 'behaviour management issues' and 'hear about others' experiences'.

However, in these two examples the potential of electronic networking was not fully realised. Access to computers in schools, and 'lack of time' to read and respond to messages, were common problems reported by trainee

teachers. In the study by Pearson (1997, 1999), trainee teachers reported that the expectation among teachers was that they should get involved in 'real teaching' rather than spend too much time on the network. Trainee teachers also felt unprepared to put forward their ideas in the 'public' way required in discussion forums, and feared criticism from others about their own ideas and suggestions. For many trainee teachers, the vulnerability of written communication was a very real deterrent to network participation. Mayer (2000, p. 19) also reported that 'pre-existing beliefs about supervision in the practicum' (see also, Leiminer & Mayer, 2001), and 'concern about the perceived permanent and legitimate nature of ideas when they are written down' (unease with 'exposing' oneself in this way) were major problems reported by trainee teachers. These findings indicate that greater emphasis on the collaborative nature of learning to teach, and more time on the preparation of trainee teachers to interact with others on an electronic network (Pearson & Selinger, 1999), will be necessary before the potential of electronic networking can be fully realised.

ICT and Professional Development for Experienced Teachers

Substantive professional development programmes for experienced teachers have taken three main forms – award courses offered by universities, programmes initiated by employing authorities (but usually conducted by other providers) and 'lighthouse' schools providing on-site visits. Examples of these programmes are briefly outlined in this section.

Award Courses

At the University of Tasmania, a Graduate Certificate in Education – Computing for Teaching and Learning has been designed to develop 'the competencies required to use computer-based technologies to support teaching and learning'. This course consists of nine modules:

Module 1 Teaching and Learning
Module 2 Implementing Good Practice
Module 3 Professional Activities
Module 4 Learning Environments
Module 5 Management and Access
Module 6 Leadership Practices
Module 7 Research and Development
Module 8 Evaluation and Review
Module 9 Collaboration and Communication

To gain the award, teachers must complete seven modules including the compulsory modules 1 and 2 (Tasmanian Department of Education, n.d.). An

interesting feature of this course is recognition with the Australian Recognition Framework (ARF), 'a national system of standards for the recognition of training organisations and the skills and qualifications gained by people through accredited training' (Australian Recognition Framework, n.d.). Hence, this award, developed as an in-service course in one state, will also be recognised in other states where ARF accreditation is supported.

Courses Initiated by Employing Authorities

Technology in Learning and Teaching (TILT) is an introductory (30-hour) course for primary and secondary teachers in New South Wales. The course, delivered through workshops, case studies, CD-ROMs, videos and in-school activities has, since its introduction in 1995, provided training and support for large numbers of teachers. More recently, a number of additional programmes (known as TILT Plus) have provided advanced and specialised professional development activities related to teaching and learning, administration and leadership, and system and network management (New South Wales Department of Education and Training, 1999, 2002).

Computing Across the Primary Curriculum (CAPC) is another example of a substantial (18-hour) professional development course.[3] CAPC, an initiative of the Victorian Department of Education, has been conducted over several years by an ICT teacher professional association. The course focused on the development of basic competencies, and the use of software in English, mathematics, studies of society and environment and technology KLAs. A major component of the course was an action research project which required 'an analysis of the most effective use of technologies and trialling of teaching strategies to support student learning and the achievement of learning outcomes' (Department of Education, Victoria, n.d.).

In professional development programmes conducted for school systems in Queensland by the Research in Information Technology Centre at the Queensland University of Technology, teachers have been encouraged to (a) 'identify problems [associated with new technologies] and seek multiple solutions, hence developing independence and responsibility for their own technical competence'; (b) 'identify and critique contemporary educational practice and uses of ICT within their schools' (Research into Information Technology in Education, 1999). A feature of these programmes has been the formation of on-line 'communities of practice' that provide participants with expert support and advice, electronic documents and other resources, and access to telecommunications curriculum projects.

The three programmes briefly reviewed here have been initiated and funded by state education departments (while taught and managed by other providers). This has ensured that professional development in ICT has been maintained amongst competing demands for teachers' time and funding. Courses have been conducted over an extended period of time, provided various forms of support (school visits, on-line networking) and included

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school-based tasks (teaching projects, action research) which linked 'theory' and 'practice'. These are features of professional development programmes more likely to result in changes in teachers' practice in classrooms (Ling & Mackenzie, 2001). However, in the absence of any published evaluations of classroom practices, the impact of ICT professional development programmes of this kind cannot be determined.

'Lighthouse' Schools

The 'Navigator Schools' Project' was launched by the Department of Education, Employment and Training in Victoria in October 1995. The aims of the project were to:

> – create a network of exemplar schools, with accessible models of new learning environments where there is access to technology in every classroom;
> – share with others what is learned in creating those environments;
> – provide evidence of additional teaching and learning outcomes in a technology-rich environment;
> – provide a premium professional development resource for teachers and principals across the state. (Department of Education, Employment and Training, Victoria, n.d.)

Three primary and three secondary schools were identified as Navigator Schools.[4] A project officer was appointed in each school to provide training and support for teachers, as well as 'challenging teachers' concepts of teaching and learning, and facilitating the adoption of student-centred approaches in all classrooms' (Department of Education, Employment and Training, Victoria, n.d.). A feature of Navigator Schools has been teacher practica, 3- to 5-day professional development programmes for classroom teachers from other schools (Department of Education, Victoria, 1998). In 1999, over 10,000 teachers participated in these programmes. The Navigator Schools Project is ongoing, retaining the original schools in what is now known as the Navigator Schools Consortium (n.d.).

The 'Technology School of the Future' (TSOF) in South Australia offers a range of professional development courses for teachers. One of these involves teachers working with TSOF staff to plan units of work incorporating ICT. Teachers can then attend with their own students and investigate appropriate teaching methodologies in laboratory teaching situations. The TSOF also collects examples of best classroom practice and models for school development, and supports schools wishing to participate in national and international on-line projects (Department of Education, Training and Employment, South Australia, 1999).

Visits to exemplar schools like TSOF and those involved in the Navigator Schools Project have been popular with teachers. It can be anticipated that these visits have increased teachers' awareness of the

potential of ICT and the strategies that can be used to incorporate ICT in classroom learning activities. However, the impact of exemplar schools is not known as the experiences of teachers visiting these schools, and actual changes in classroom practice that may have resulted from these visits, have not been documented.

Another form of professional development for teachers is participation in discussions on electronic networks. Here, issues and concerns about teaching including ICT can be shared with others. However, while discussion forums are available on most state education department web sites, Education Network Australia (n.d.) and occasionally for other purposes (Yelland & Bigum, 1995), there have been no published evaluations about this application of ICT.

Concluding Comments

This article has reviewed recent initiatives to learning *about* and *with* ICT in Australia. These initiatives reveal the diversity of approaches that have been adopted to prepare and support beginning and experienced teachers introduce and manage ICT in classroom learning activities. Examples of 'good practice' have been highlighted. However, while a range of approaches have been implemented, there have been few published evaluations of specific approaches. The impact of initiatives on classroom practices remains largely undocumented.
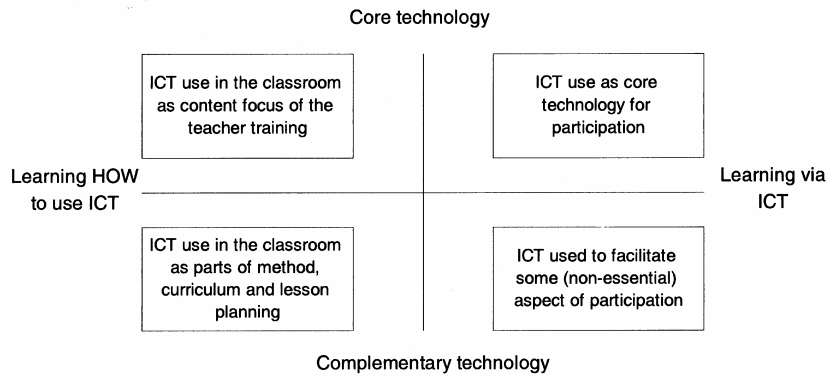

Figure 2. Synthesis of axes. (Kirschner & Selinger, 2003, p. 11**.)**

Until now, a great deal of professional development has focused on learning *about* ICT (identified in the upper left quadrant of Figure 2). This will continue to be important in continuing professional development. For instance, a recent proposal (Department of Education, Science & Training, 2002) to develop an ICT competency framework for teachers indicates that new initiatives could be taken to enhance teacher professional standards in the application of ICT in teaching and learning activities in schools.

However, in future, increasing emphasis is also likely to be placed on learning *with* ICT (the upper right quadrant in Figure 2). Recent research suggests an 'infusion approach' in initial teacher education is more likely to lead beginning teachers to adopt ICT to support student learning activities in schools (Downes et al, 1995, p. 34). New technology also features prominently in the 'strategic plans', 'mission statements' and 'teaching and learning plans' of most universities and faculties of education. ICT can be anticipated to play a much greater role in course delivery and assessment, access to resources, communication with others, and activities undertaken in schools. With greater experience of learning *with* new technology, beginning teachers should be better placed to integrate ICT into their own teaching and bring about pedagogical changes in schools that have been anticipated for so long.

Notes

[1] The Standards Council of the Teaching Profession has now been replaced by the Victorian Institute of Teaching (VIT), an independent statutory body reporting to Parliament through the Minister of Education. The VIT is expected to be operational by 1 February 2003.

[2] Information about national conferences (held every 2 years) can be found at http://www.ictev.vic.edu.au/acec2000/ and http://www.tasite.tas.edu.au/acec2002/

[3] This course is no longer offered. It was conducted by the state professional association named Computing in Education Group of Victoria (CEGV). The CEGV has recently been renamed as ICT in Education Victoria (ICTV). For details about ICTV see: http://www.ictev.vic.edu.au

[4] The Navigator Schools are: Bendigo Senior Secondary College (http://www.bssc.edu.au); Glen Waverley Secondary College (http://www.gwsc.vic.edu.au); Northcote High School (http://www.nhs.vic.edu.au); Apollo Parkways Primary School (http://webapolloparkps.vic.edu.au); Bayswater Primary School (http://www.bayswaterps.vic.edu.au); and Essendon North Primary School (http://www.enps.vic.edu.au).

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References

Albion, P.R. (1996) Student-teachers' Use of Computers During Teaching Practice in Primary Classrooms, *Asia-Pacific Journal of Teacher Education,* 24, pp. 63-73.

Albion, P.R. (2000) Setting Course for the New Millennium: planning for ICT in a new bachelor degree program, in D.A. Willis, J.D. Price & J. Willis (Eds) *Technology and Teacher Education Annual, 2000*, pp. 756-761. Charlottesville: Association for the Advancement of Computing in Education.

Albion, P.R. (2001) Some Factors in the Development of Self-efficacy Beliefs for Computer Use Among Teacher Education Students, *Journal of Technology and Teacher Education,* 9, pp. 321-347.

Australian Council of Deans of Education (1998) *Preparing a Profession. Report of the National Standards and Guidelines for Initial Teacher Education Project* (Adey Report). Canberra: Australian Council of Deans of Education.

Australian Recognition Framework (n.d.) http://www.bvet.nsw.gov.au/recoaccr/bv01re3.htm

Curtin University of Technology (n.d.) *Ed303 Technology in Education* [on-line]. Available at: http://www.edna.edu.au/sibling/tefa/html/body_case3.html

Department of Education, Employment and Training, Victoria (n.d.) *Navigator Schools' Project:* http://www.sofweb.vic.edu.au/navschls/about.htm

Department of Education, Science and Training (2000) *Teachers for the 21st Century – Making the Difference* [on-line]. Available at: http://www.detya.gov.au/schools/Publications/2000/t21.htm

Department of Education, Science & Training (2002) *Raising the Standards. A Proposal for the Development of an ICT Competency Framework for Teachers* [on-line]. Available at: http://www.dest.gov.au/schools/Publications/2002/Raising the standards/

Department of Education, Tasmania (n.d.) *Educational Computing Professional Learning. Educational Computing Units* [on-line]. Available at: www.discover.tased.edu.au/ec/irt/Units/units.htm

Department of Education, Training and Youth Affairs (1999) *Integration of Information and Communications Technologies through Teacher Professional Development and Pre-service Training. Report to the 13th APEC Education Forum* [on-line]. Available at: http://www.edna.edu.au/sibling/tefa/html

Department of Education, Training & Employment, South Australia (1999) *Technology School of the Future* [on-line]. Available at: http://www.edna.edu.au/sibling/tefa/html/body_case11.html

Department of Education, Victoria (1998) *Rethinking Learning & Teaching. The Navigator Schools' Experience.* Melbourne: Department of Education. Also available on-line at: http://www.sofweb.vic.edu.au/navschls/report.htm

Department of Education, Victoria (n.d.) *Computing Across the Primary Curriculum* [on-line]. Available at: http://www.edna.edu.au/sibling/tefa/html/

Department of Education, Western Australia (2000) *Learning Technologies* [on-line]. Available at: http://www.eddept.wa.edu.au/T2000/Itdef.htm

Downes, T. (1993) Student-teachers' Experiences in Using Computers During Teaching Practice, *Journal of Computer Assisted Learning*, 9, pp. 17-33.

Downes, T., Perry, B. & Sherwood, C. (1995) IT in Education and Teacher Education in Australia, *Journal of Computer Assisted Learning*, 11, pp. 23-34.

Downes, T., Fluck, A., Gibbons, P., Leonard, R., Matthews, C., Oliver, R., Vickers, M. & Williams, M. (2001) *Making Better Connections. Models of Teacher Professional Development for the Integration of Information and Communication Technology into Classroom Practice*. Canberra: Department of Education, Science & Training. Also available on-line at: http://www.dest.gov.au/Schools/Publications/2002/professional.htm

Education Network Australia (n.d.) http://www.edna.edu.au

Education Queensland (1997) *Minimum Standards for Teachers – Learning Technology* [on-line]. Available at: http://education.qld.gov.au/curriculum/learning/technology/mst_des.html

Education Queensland (2002) *Professional Standards for Teachers: guidelines for professional practice* [on-line]. Available at: http://education.qld.gov.au/learning_ent/ldf/standards/teachers/6.html

Education Victoria (1998a) *Learning Technologies. Teacher Capabilities Guide*. Melbourne: Department of Education.

Education Victoria (1998b) *Learning Technologies. Teacher Survey*. Melbourne: Department of Education.

Education Victoria (1998c) *Learning Technologies. Teacher Capabilities Statement*. Melbourne: Department of Education.

Education Victoria (1998d) *Learning Technologies. Skill Development Matrix*. Melbourne: Department of Education.

Education Victoria (1998e) *Learning Technologies. Professional Development Support Matrix*. Melbourne: Department of Education.

Education Victoria (n.d.) *Learning Technologies. Classroom Leading Practice Network*. Melbourne: Department of Education.

Ferry, B., Kiggins, J., Hoban, G. & Lockyer, L. (2000) Using Computer-mediated Communication to Form a Knowledge-building Community with Beginning Teachers, *Educational Technology & Society*, 3(3), pp. 496-505.

Fluck, A. (2002) Personal correspondence, 28 February.

Heppell, S. (1993) Teacher Education, Learning and the Information Generation: the progression and evolution of educational computing against a background of change, *Journal of Information Technology for Teacher Education*, 2, pp. 229-238.

Kirschner, P. & Selinger, M. (2003) The State of Affairs of Teacher Education with Respect to Information and Communications Technology, *Technology, Pedagogy and Education*, 12, p. 11.

Leiminer, M.J. & Mayer, D. (2001) Preservice Teachers Negotiating Competing Versions of 'The Good Intern' in a Virtual Professional Learning Community. Paper presented at the Australian Association for Research in Education Annual Conference, Fremantle, December. Available on-line at: http://www.aare.edu.au/01pap/lei01454.htm

Ling, L.M. & Mackenzie, N. (2001) The Professional Development of Teachers in Australia, *European Journal of Teacher Education*, 24(2), pp. 87-98.

Marshall, P. (2000) A Review of Educational Competency Standards. Paper presented at the Australian Computers in Education conference, Melbourne, July. Available on-line at: http://www.ictev.vic.edu.au/acec2000/paper_ref/p-marshall/paper11/index.htm

Martin, G. (2001) *Competency Framework for Teachers*. Perth: Education Department of Western Australia. Also available on-line at: http://www.eddept.wa.edu.au/centoff/cpr/Competency%20Framework.pdf

Matters, P. (2001) Beginning Teacher Internships, Telementoring and ICT – newfangled or new ways? Journeys of discovery. Paper presented at the Australian Association for Research in Education Annual Conference, Fremantle, December. Available on-line at: http://www.aare.edu.au/01pap/mat01077.htm

Mayer, D. (2000) Using Information and Communications Technologies in a Teacher Education Internship. Paper presented at the Australian Association for Research in Education Annual Conference, Sydney, December. Available on-line at: http://www.aare.edu.au/00pap/may00311.htm

Mayer, D. (2002) An Electronic Lifeline: information and communication technologies in a teacher education internship, *Asia-Pacific Journal of Teacher Education,* 30, pp. 181-195.

Ministerial Advisory Council on the Quality of Teaching (1997) *Computer Proficiency for Teachers* [on-line]. Available at: http://scs.une.edu.au/Materials/Comps/Comps.html

Ministerial Council on Education, Employment, Training & Youth Affairs (1999) *The Adelaide Declaration on National Goals for Schooling in the Twenty-first Century* [on-line]. Available at: http://www.curriculum.edu.au/mceetya/national goals/natgoals.htm

Ministerial Council on Education, Employment, Training & Youth Affairs (2000) *Learning in an Online World*. Available at: http://www.edna.edu.au/publications/schooled_action_plan/onlineworld.pdf

Nanlohy, P. & Munns, G. (2000) A Virtual Tutorial – engagement and encounter in an on-line learning community. Paper presented at the Australian Association for Research in Education Annual Conference, Sydney, December. Available on-line at: http://www.aare.edu.au/00pap/nan00111.htm

Navigator Schools Consortium (n.d.) http://www.gwsc.vic.edu.au/navcon/org/index.shtml

New South Wales Department of Education and Training (1999) *Technology in Learning and Teaching* [on-line]. Available at: http://www.edna.edu.au/sibling/tefa/html/body_case10.html

New South Wales Department of Education and Training (2002) *Technology in Learning and Teaching* [on-line]. Available at: http://www.tdd.nsw.edu.au/tilt/index.asp

Pearson, J. (1997) *A Case Study of Electronic Networking in an Initial Teacher Education Course*. Ph.D. thesis. Melbourne: Faculty of Education, Deakin University.

Pearson, J. (1999) Electronic Networking in Initial Teacher Education: is a virtual faculty of education possible?, *Computers & Education*, 32, pp. 221-238.

Pearson, J. & Selinger, M. (1999) Linking Different Types of Knowledge in Professional Education and Training: the potential of computer-mediated communication, in M. Selinger & J. Pearson (Eds) *Telematics in Education – trends and issues*, pp. 15-31. Oxford: Elsevier.

Research into Information Technology in Education (1999) http://www.edna.edu.au/sibling/tefa/html/body_case8.html

Richards, C. & Phillips-Ryan, D. (2000) School-based Projects: a model for integrating new literacies and technologies across-the-curriculum in teacher education, in S. Schuch & G. Segal (Eds) *Change & Choice in the New Century*. Sydney: Change and Education Research Group, University of Technology Sydney.

Romeo, G. (2000) Learning Technologies: what are education students learning about the use of technology in the classroom? Paper presented at the Australian Computers in Education conference, Melbourne, July. Available on-lineat: http://www.ictev.vic.edu.au/acec2000/paper_ref/g-romeo/paper2.htm

Standards Council of the Teaching Profession (1998) *Guidelines for the Evaluation of Teacher Education Courses*. Melbourne: Department of Education, Victoria. Also available on-line at: http://www.vit.vic.edu.au/pdfs/Guide99.pdf

Tasmanian Department of Education (n.d.) *Educational Computing Units* [on-line]. Available at: http://www.discover.tased.edu.au/ec/irt/Units/units.htm and *The Graduate Certificate in Education – computing for teaching and learning* [on-line]. Available at: http://www.discover.tased.edu.au/ec/gradcert/index.htm

Taylor, T. & Clemans, A. (2000) Avoiding the Hoops: a study of recognition of prior learning processes in Australian faculties of education, *Asia-Pacific Journal of Teacher Education,* 28, pp. 263-280.

Trinidad, S. (2000) Flexible Outcomes: educating for the 21st century. Paper presented at Teaching and Learning Forum 2000, Perth, February. Available on-line at: http://cleo.murdoch.edu.au/confs/tlf/tlf2000/trinidad.html

Victorian Institute of Teaching (2003) http://www.vit.vic.edu.au/aboutvit.htm

Watson, G. & Prestridge, S. (2001) Changing Patterns of Pre-service Teachers' ICT Competencies and What it Means for Pre-service Teacher Education Programs. Paper presented at the Australian Association for Research in Education Annual Conference, Fremantle, December. Available on-line at: http://www.aare.edu.au/01pap/wat01470.htm

Wild, M. (1995) Pre-service Teacher Education Programmes for Information Technology: an effective education?, *Journal of Information Technology for Teacher Education*, 4, pp. 7-20.

Yelland, N. & Bigum, C. (1995) A Professional Development Model for Primary Teachers Participating in a Computer Technology Program for Schools, *Australian Educational Computing,* 10(2), pp. 24-26.