Introduction – examination into the preparation of teaching graduates to use information and communication technology

This submission was authored by four University of Tasmania, 2nd year Bachelor of Teaching students, who specialise in secondary teaching in the field of information technology.

The preservice teachers who compiled this report are Ann Steczkowicz, Sandy von Allmen, James Tyson and Mark Long. The report was compiled after considerable work reviewing the use of information and communication technology (ICT) in their own Bachelor of Teaching course, national initiatives concerning teacher training in ICT, and published findings.

Our submission does not cover every aspect of the Terms of Reference. Rather, it focuses on Reference point 7 (iv) *"examine the preparation of primary and secondary teaching graduates to successfully use information technology"*.

The three areas considered in order to provide recommendations that address this term of reference are:

- A review of the ICT content in the Bachelor of Teaching course at the University of Tasmania by means of a survey.
- An overview of the approach of each state toward teacher training in ICT and ICT integration into curriculum.
- A literature review regarding the current situation of the preparation of preservice teachers for using ICT in Australia and internationally.

We applaud the government for undertaking this review of teacher education with a view to better preparing our teachers for the classroom.

We acknowledge the existing federal and state initiatives already play a major role in preparing teachers; however our findings suggest that further improvements can be made.

We call on the government to acknowledge that national minimum standards need to be developed and implemented in addition to restructuring preservice teacher education programs to integrate ICT into all subject specialisations, and provide ICT accreditation for both preservice and inservice teachers.

1. Full Recommendations

The following is the complete list of recommendations we are making:

1.1 National minimum standards

1.1.1 National standards of ICT competence should be finalised.

1.1.2 These standards should be incorporated into the teaching programs, reducing the requirements for postgraduate testing.

1.2 Restructuring preservice teacher education programs

1.2.1 Develop course entry assessments for preservice teachers to determine entry level ICT skills.

1.2.2 Make available a bridging course in ICT skills before degree commencement.

1.2.3 Include a component in each curriculum and methods class about using ICT for that subject, and introduce subject specific software rather than just relying on stand alone ICT units.

1.2.4 Offer general ICT classes looking at software that can be used to assist with planning, assessment and other non-subject specific teaching software.

1.2.5 Provide specific and authentic examples where the use of technology is advantageous showing different ways to integrate ICT into teaching.

1.2.6 Training should broaden awareness of a wide range of functions, for example: alternative communication (online discussion boards etc.), webquesting, calculations such as exchange rates and graphing, responsible and applicable use of email communication.

1.2.7 Teachers must be trained to use technology and resources that are currently practical to use in school environments.

1.2.8 Train preservice teachers in the use of computer systems not just computer software.

1.2.9 Preservice training must include modules on, or integrated training in:

1.2.9.1 General computing skills

1.2.9.2 Class Planning (inclusion of ICT in the curriculum)

1.2.9.3 School Planning (facilitating a school-wide approach)

1.2.10 Assessment at the end of the teaching program should provide evidence of how ICTs have been incorporated into the preservice teachers' practicums.

1.3 Accreditation

1.3.1 ICT skills developed through preservice teaching programs should meet the national standard, eliminating the need for postgraduate testing.

1.3.2 Provision must also be made for existing teachers to attain certification through performance assessment

1.3.3 Make available optional additional certified qualifications, for example the Australian Pedagogical ICT Licence or AusiPict [http://www.ausipict.com/], that result in an increase in employment opportunities

2. Survey of final year students

2.1 Survey Background

2.1.1 The Bachelor of Teaching (BTeach) course at the University of Tasmania (UTAS), aims to prepare its graduates for their teaching careers equipped with sound knowledge and skills in ICT. As such, the BTeach at UTAS incorporates an ICT module into its course through a compulsory cross-curriculum studies unit. This focusses upon personal operational ICT skills in the first year, and integration into teaching practice in the final year. The final year module is designed to make the potential graduates "*familiar with current classroom practice using 'Information and Communication Technology (ICT)'*".

2.1.2 The aims of the unit are to derive the following outcomes out of the students.

2.1.2.1 *ensure equitable use of information technologies by students in all areas of learning*

2.1.2.2 *recognise and act on the need to continually update their skills and knowledge of emerging technologies*

2.1.2.3 *facilitate and lead the use of information technologies to enhance teaching and learning*

2.1.2.4 *ensure appropriate, secure and responsible use of information technologies*

2.1.2.5 *inform parents and the community on how information technologies are or would be used in the school*

2.1.2.6 *demonstrate the integration of information technology in teaching, learning, and educational management.*

2.1.3 In order to determine if this module in the BTeach course is adequately preparing graduates, a survey was prepared in order to extract answers and opinions from the students themselves. The survey was conducted amongst the 2nd year BTeach students at UTAS. The survey was distributed, completed and collected during the ICT lectures on both campuses.

2.1.4 There were 107 surveys returned. Of these, 68.2% were from Hobart, and 31.8% from the Launceston Campus (Table 1). Table 2 depicts the level the students are training to teach. Those labelled K-12 are all music students.

Campus

	Frequency	Percent
H	73	68.2
L	34	31.8
Total	107	100

Table 1 - Percentage of respondents by campus.

Teaching Level

	Frequency	Percent
K-12	4	3.7
Middle School	18	16.8
Primary	36	33.6
Secondary	49	45.8
Total	107	100.0

Table 2 - Percentage of respondents training to teach at each level.

2.2 Confidence of students in utilising ICT

The results show that a majority of respondents are self-assured in their own ability to use ICT (81%), with only 17% not confident and 9% unsure about their ICT skills (Table 3). Of those that are not confident, some stated that they are "*getting better*". Those that said they are confident generally supported their opinion with remarks such as "*work in IT industry*" however some made statements similar to "*sometimes I feel overwhelmed*" or "*only the basics*".

ICT Confident

	Frequency	Percent
No	17	15.9
Undecided	9	8.4
Yes	81	75.7
Total	107	100.0

Table 3 - Percentage of respondents who are comfortable using ICT themselves.

2.3 Adequacy of ICT training time

In regards to levels of ICT training received throughout the course, 74% of respondents felt they receive enough training, while 33% believe that not enough training is provided, or are undecided (Table 4). However, of those that think ICT training is adequate, some students believe that there is either "*too much*" or that the training is "*useless for me personally*". Students who consider ICT training in the course as inadequate commented that, "*there could be more time allocated as some things we've had to rush through*".

Enough ICT Training

	Frequency	Percent
No	27	25.2
Undecided	6	5.6
Yes	74	69.2
Total	107	100.0

Table 4 - Percentage of respondents who feel that there is enough ICT training as part of the course.

2.4 Student intention of integration of ICT into teaching practice

Despite only 75.7% of respondents (Table 3) feeling confident with using ICT, 88.8% of students thought they will incorporate ICT into their own teaching (Table 5). Those students who did not feel confident, yet considered they would utilise ICT in their teaching offered reasons such as; "*I feel that I have to*", or more commonly; "*Only for web research and typing up assignments*" or other limited uses.

Use ICT in Teaching

	Frequency	Percent
No	3	2.8
Undecided	9	8.4
Yes	95	88.8
Total	107	100.0

Table 5 - Percentage of respondents who will use ICT in there own teaching.

2.5 Analysis of Survey results

2.5.1 For most variables, there was no significant relationship between a student's confidence in their ability to use ICT, when compared against opinions regarding ICT training time or the likelihood of using ICT in their own teaching. Chi-Square testing determined that there were significant relationships between where a student studied the ICT module and the likelihood of using ICT in teaching practice, as well as the level (primary, middle or secondary) that the respondent is training to teach.

2.5.2 A Pearson Chi-Square test showed a correlation of .813 between the campus the respondent studies at and the likelihood of integrating ICT into their teaching practices. Of Launceston respondents, 91.2% believed they will use ICT in their teaching practice, and 87.7% of Hobart respondents consider that they will utilise ICT in their teaching (Table 6).

		Undecided	No	Yes	Total
Campus	H	9.6	2.7	87.7	100.0
	L	5.9	2.9	91.2	100.0
Total		8.4	2.8	88.8	100.0

Table 6 - Respondents by campus who will use ICT in their teaching practice.

2.5.3 A Pearson Chi-Square test showed a correlation of .779 between the respondents teaching level and ICT confidence. This dropped to .617 when looking at the relationship to ICT training levels. The relationship between teaching level and likelihood of using ICT with in the classroom was the strongest with a score of .819.

2.6 Overall survey results

Table 7 depicts the percentage of respondents that answered yes to each of the three questions. Middle school students showed the least confidence in the use of ICT (66.7), yet survey results from students learning to teach this age group returned the largest percentage of respondents who thought they received enough ICT training (77.8). Secondary specialist students had the lowest percentage (83.8%) of respondents who believed they will use ICT as part of their teaching.

		ICT Confident	Enough ICT Training	Use ICT in Teaching
Teaching Level	K-12	75.0	50.0	100.0
	Primary	77.8	69.4	91.7
	Middle School	66.7	77.8	94.4
	Secondary	77.6	67.3	83.7
Total		75.7	69.2	88.8

Table 7 – Percentage of respondents answering yes for each question.

2.7 Additional comments

2.7.1 From the additional comments that respondents added to the surveys it is apparent that many respondents are not happy with the ICT course. Suggestions that students gave for improving the ICT training were "*more work could be done on incorporating ICT into the classroom*" and "*we need to incorporate it into our curriculum classes*".

2.7.2 Respondents also had comments indicating that the course conveys knowledge that they already know such as; "*They have taught the very basics, but not much further!*", and "*It is sufficient for me but I entered the course already having the skills that are assessed by the ICT program*". Conversely, some students felt that progress through the content is too quick for them to grasp and retain it "*There could be more time allocated as some things we've had to rush through*", "*However a lot of lessons are rushed*" and "*Easy to forget stuff though*". One respondent indicated that it could be improved by teaching ICT "*in strands or ability groups - to work better*".

3. Nation-wide initiatives to best prepare Preservice teachers in ICT

3.1 Overview

3.1.1 This summary of state-wide initiatives into ICT teaching reveals that there is a large push for ICT integration into the curriculum. This integration appears to be in the process of being implemented in different forms throughout the country. This is a positive step that will benefit students and teachers alike and should be done in such a fashion as to demystify ICT as a field of education.

3.1.2 However, despite the vast amount of initiatives being aimed at increasing ICT literacy in schools, few of the suggested initiatives appear to be integrated or implemented by tertiary institution programs. Instead, a large focus of each state is placed upon the professional development and education of the current fleet of teachers. We feel that this is an issue that must be rectified in order to better prepare preservice teachers for using ICT in their chosen profession.

3.2 National initiatives in ICT education

The Australian government has committed itself to improving the quality of teaching and instruction of ICT through the joint statement on education and training in the information economy. This statement follows on from the activities commenced during 2000 under the Australian Government Quality Teacher Programme in which more than 39 000 preservice and inservice teachers participated. Further projects to improve ICT teachers and their teaching are planned for next year, flowing on from the *Making Better Connections* report funded by the national government (DEST, 2002a).

3.3 Tasmania

The Tasmanian Department of Education released a policy in 2002 named *ICT in Education (K-12) Strategic Policy 2002-2005.* This policy along with the *Connections* strategy in ICT featured sections to improve the quality of the workforce that were involved in ICT education. Initiatives such as *e-magine* as well as Tasmania's strong involvement with the national *Le@rning* Federation project have pushed teachers statewide to become ICT literate. The new curriculum shift to the Essential Learnings (*ELs*) has also aided Tasmania in developing its educational professionals in information literacy, through its endorsement of a trans-disciplinary framework. The Tasmanian Department of Education realises that the development of a workforce to meet the requirements of the *ELs* in terms of information literacy in the workforce will take time.

3.4 Victoria

In September 2003, The Department of Education and Training in Victoria held an ICT Think Tank, supporting the Blueprint for Education papers developed in August 2003. Most relevantly, the "Teacher Learning" paper recognised the potential for ICT in teaching and learning, recommending that teachers' capabilities in ICT be further developed, and that teacher skills in ICT management be increased. The Think Tank in turn asked key questions regarding the use of ICT in teaching and learning, and offered many recommendations regarding the structure and function of ICT in schools. There are many constructive and encouraging initiatives suggested; the effect of these is probably not going to be evident for another year or so, when the initiatives can be fully implemented and evaluated.

3.5 New South Wales

3.5.1 A public review into ICT in New South Wales recognised the increased usage of ICT in teaching. A series of initiatives aimed to provide learners educational opportunities regardless of location or education system. There was, however, no mention of improving the ICT proficiency of teachers, or their knowledge of integration. It was recognised that the full capabilities of ICT have not yet been harnessed in teaching and learning – it might have been prudent to note that teachers are probably not being trained to a sufficient level, to enable them to integrate ICT in the most advantageous and efficient ways.

3.5.2 The New South Wales Department of Education and Training (DET) ICT Blueprint (2004) has not yet been published. It is therefore hard to determine what measures might or might not have been implemented to this end. Publication of this document would allow for a better assessment of the NSW DET stance on teacher education.

3.6 A.C.T

3.6.1 The ACT Department of Education, Youth and Family Services published in 2004 the "Learning Technologies Plan for ACT Government Schools and Preschools 2004-2006". This document introduced a series of goals directed towards enhancing the abilities of teachers and learners to use ICT. The second goal is to create "teachers who embed the use of learning technologies in their teaching and learning practice". One of the intended actions towards this goal is including a learning technologies module in the beginning teacher induction program. This is in addition to the requirement for preservice teachers as part of their course to develop lessons that integrate the use of ICT.

3.6.2 The attitude and initiative shown by the ACT in teacher training in ICT is encouraging and shows a serious effort towards positive and effective integration of ICT in teaching and learning. The Learning Technologies Plan supports ongoing development of integration in the interest of helping learners achieve learning goals and be "active participants in our learning society".

3.7 Queensland

3.7.1 The Queensland Department of Education specifically addressed the need for teachers who are adept in using learning technology in 1999, publishing the "Minimum Standards for Teachers – Learning Technology". Grants were supplied to enable professional development in order to bring teachers up to these minimum standards. The document includes self-assessment checklists, notes on the assessment process, and several other related appendices.

3.7.2 The specificity of the document is encouraging, however considering the release of the document was six years ago, the skills list may need to be updated to include new and/or more prevalent technologies.

3.7.3 Demonstration of proficiency in ICT can lead to credentials for a Centre of Teaching Excellence. The existence of credit for reaching this level of proficiency is encouraging; it provides incentive for institutions to seriously pursue a greater level of ICT integration.

3.8 Western Australia

The Western Australian government's department of education made significant contributions to their plan for government schools 2004-2007, which promotes an ICT integrated curriculum. The department has also initiated a *Curriculum through ICT* program, which focuses on developing an integrated curriculum. This initiative has fostered many side projects, such as the *ICT Innovators*, which ICT professionals seek to educate students and student teachers alike, and also the *Partners in Learning*, where the WA government has joined this world-wide initiative run by Microsoft.

3.9 South Australia

3.9.1 The Technology School of the Future (TSOF) in South Australia has introduced an initiative called Professional Learning in ICT. There are a range of programs designed to be useful to teachers with many levels of competency. The 2003 Department of Education and Children's Services (DECS) Teacher ICT Skills and Attitudes Survey questioned teachers on

their use of ICT. It revealed promising results for integration of ICT in schools, and in turn the TSOF initiatives were introduced to further improve the standards of ICT use.

3.9.2 There appear to be no initiatives specifically aimed at improving the skills of preservice teachers. The focus seems to largely be on improving the skills of the current fleet of teachers. The bachelor degrees in South Australian Universities (Uni SA, Adelaide Uni, Flinders Uni) in education and teaching contain very little which might enable preservice teachers to effectively integrate ICT. A focus on these skills in preservice teacher education will ensure that the future fleet of teachers will have these skills, and will continue to develop new ones as technology changes.

3.10 Northern Territory

In February 2005, the Northern Territory Government Department of Education and Training division LATIS (Learning and Technology in Schools) published the Educational Capabilities Survey. The survey is a self evaluation guide in many areas of ICT usage, ranking at four different levels the capabilities of the teacher. The initiative is specific and tailored to encourage better and more frequent integration of ICT into teaching. The LATIS website did not offer any information about whether accreditation could be gained upon demonstration of a high level of competency. The survey is likely a tool for self-improvement which, while encouraging, might lack incentive for those who prefer some form of official recognition.

4. Literature review on the current situation in the preparation of preservice teachers for using Information and Communication Technology (ICT)

4.1 It is generally expected that all preservice teacher education programs should prepare teachers to be confident and competent users of information and communication technologies (ICTs) in their classrooms. (Watson & Prestridge, 2001)

4.2 In 2003, the Department of Education, Science and Training (DEST), Committee for the Review of Teaching and Teacher Education launched the final report of a review of teaching and teacher education in Australia. In the review's *Agenda for Action* (2003, p. 35), Action 31 states that 'All teacher education programs prepare prospective teachers for the digital age where ICT is an important tool in information and knowledge management and integral to student learning.'

4.3 In recent years there has been global interest in how ICT training can be integrated into education programs and discovering how preservice teachers develop their personal ICT skills. International conferences, such as those run by the Australian Association for Research in Education (AARE) [http://www.aare.edu.au/] and the Society for Information Technology and Teacher Education (SITE) [http://site.aace.org/] have provided a forum for a great deal of discussion and interest in this area.

4.4 Studies have been conducted on both undergraduate and postgraduate teacher education programs, in countries throughout the world.

4.5 In one study done in the UK, Taylor (2003) investigated the ways in which postgraduate trainee teachers developed their personal ICT skills. She discovered that both the initial level of skill and experience, as well as the learning strategies used by the individuals affected their skills development. The method of learning was also very important, and it was critical that it fit with the individual's learning approach. These learning approaches ranged from simply learning on a need-to-know basis, being allowed to play and learn, through to trainees wanting to know exactly why they were learning the software and how it would fit in with their teaching. It was found that it was useful for some trainees to have a reason and a context to practise their skills, as it increased their motivation to learn and helped with the retention of skills. Self-audits were used by the trainees to help them recognise areas where their knowledge was lacking.

4.6 In Australia, Finger, Lang, Proctor and Watson (2004) reported the findings of their in-depth study of teacher education undergraduates just prior to graduation. They discovered that the majority of students perceived themselves to have a high level of competence and confidence with ICT and those in the primary program rated themselves higher than did participants in the secondary program. However, of concern was the limited range of applications with the participants expressed high levels of confidence. They identified a need to audit the ICT experiences of trainee teachers to ensure that all graduates will have the necessary competencies and confidence to integrate ICT into their teaching.

4.7 Some studies stated that a separate ICT course conducted in a teaching program is not sufficient and that ICT must be integrated in all areas of learning for preservice teachers. Dawson, Johnson and Ring (2004) state that 'many teacher education programs have evolved to include content-specific technology courses, technology-based field experiences and technology requirements in student teaching'.

4.8 Arizona State University West (ASUW) College of Education redeveloped their preservice curriculum following a similar pattern. Their award winning redesign, described by Wetzel, Wilhelm and Williams (2004) has created a program in which the emphasis is not on mastering information technology skills in isolation, but rather a 'blend of pedagogy and student uses of technology to achieve academic goals'. The course is web-based, students are surveyed with an online tool to determine their level of comfort with technology and their access to technology at home, and ePortfolios are used for collection and reflection on artifacts. An online Showcase of the course is at http://coe.west.asu.edu/williams/coe313/ and includes links to all of the interactive syllabi and supporting documentation.

4.9 The evolution to these technology supported courses is aided by the development of standards related to technology integration in teacher preparation programs. The National Educational Technology Standards for Teachers (NETS-T) (International Society for Technology in Education, 2002) has been adopted in the United States and in the United Kingdom and Wales, the Department for Education and Skills (2003) has developed the Professional Standards for Qualified Teacher Status and Requirements for Initial Teacher Training.

4.10 Nationally, the Department of Education, Science and Training (DEST) (2002b) has proposed a framework for teacher ICT competency. However more work needs to be done to standardise the ICT component of preservice teacher education programs to eradicate the competency testing still required in individual states. Finger and Trindad (2002) detail the many initiatives being undertaken by each state to provide support and training to their existing and preservice teachers.

Although Australia is looking to move in the right direction, frustration is still caused by the individual states' requirements for graduating teachers to gain accreditation in ICTs. In Tasmania, for example, for accreditation of ICT use, teachers are required to complete the Embedding Educational Technologies into Professional Practice (EETs) (Department of Education, Tasmania, 2003).

4.11 The Head of the Teaching and Learning Division at the Australian Council for Educational Research, Ingvarson (2003), writes that while there are many individually effective professional development programs operating at school and state levels, the overall pattern of provision is brief, fragmentary and rarely sequential. He suggests a national framework for continuing learning be introduced, incorporating a performance-based professional certification system.

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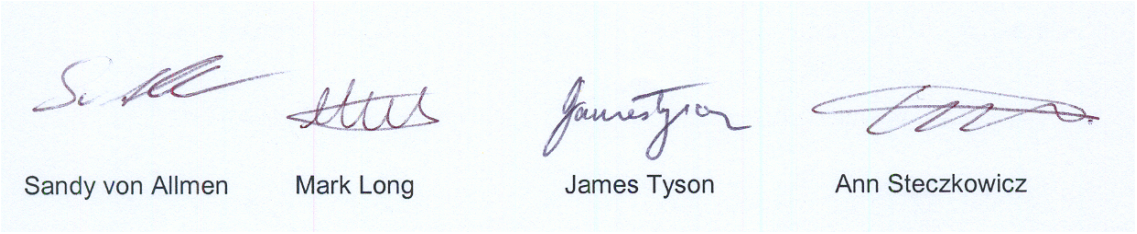

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Appendix

References

Dawson, K., Johnson, N., & Ring, G. (2004). Partnership strategies for systemic integration of technology in teacher education. *Contemporary Issues in Technology and Teacher Education, 3*(4), 482-495. Retrieved 21 March, 2005, from http://www.citejournal.org/vol3/iss4/currentpractice/article2.cfm

Department of Education and Childrens Services, South Australia. (2003). *Professional Learning in ICT.* Retrieved 30 March, 2005, from http://www.tsof.edu.au/projects/plict/

Department for Education and Skills, Teacher Training Agency. (2003). *Qualifying to Teach : Professional Standards for Qualified Teacher Status and Requirements for Initial Teacher Training*. Retrieved 27 March, 2005, from http://www.tta.gov.uk/php/read.php?resourceid=2700

Department of Education and Training, ACT. (No Date). *Information and Communication Technology Competencies for high schools.* Retrieved 30 March, 2005, from http://www.decs.act.gov.au/publicat/ict_competencies.htm

Department of Education and Training, ACT. (2004). *Learning Technologies Plan for ACT Government Schools and Preschools 2004–2006.* Retrieved 30 March, 2005, from http://activated.decs.act.gov.au/admin/ltplan/pdf/LTPlan.pdf

Department of Education and Training, New South Wales. (2002). *13. Information Communication Technologies (ICT).* Retrieved 27 March, 2005, from https://www.det.nsw.edu.au/reviews/futuresproject/issuespapers/ict.htm

Department of Education and Training, Victoria. (2003). *Blueprint for education, Key findings and recommendations. ICT THINK TANK.* Retrieved 23 March, 2005, from http://www.det.vic.gov.au/det/resources/blueprint/docs/keyFindings_ICT_Think_Tankdoc

Department of Education and Training, Victoria. (2003). *Blueprint for education, Key findings and recommendations, Leadership Group on Teacher Learning.* Retrieved 23 March, 2005, from http://www.det.vic.gov.au/det/resources/blueprint/pdfs/findings-Teacher-Learning.pdf

Department of Education, Queensland. (1999). *Minimum Standards for Teachers – Learning Technology.* Retrieved 21 March, 2005, from http://education.qld.gov.au/itt/learning/docs/min-standards.pdf

Department of Education, Science and Training (2002a) *Making Better Connections Models of teacher professional development for the integration of information and communication technology (ICT) into classroom practice.* Retrieved 21 March, 2005 from http://www.dest.gov.au/schools/publications/2002/MBC.pdf

Department of Education, Science and Training. (2002b). *Raising the Standards: A Proposal for the Development of an ICT Competency Framework for Teachers*. Retrieved 18 July, 2004, from http://www.dest.gov.au/schools/publications/2002/raisingstandards.htm

Department of Education, Science and Training. (2005). *Ministers united on education and training in the information economy*. Retrieved 27 March, 2005, from http://www.dest.gov.au/Ministers/Media/Nelson/2005/02/n1046110205.asp

Department of Education, Science and Training (DEST), Committee for the Review of Teaching and Teacher Education. (2003). *Australia's teachers: Australia's future : advancing innovation, science technology and mathematics : Agenda for Action*. Retrieved 12 March, 2005, from http://www.dest.gov.au/schools/teachingreview/documents/Agenda_for_Action.pdf

Department of Education, Tasmania. (2002). *ICT in Education (K-12) Strategy Policy 2002-2005.* Retrieved 28 March, 2005, from http://connections.education.tas.gov.au/Attachments/00000001/ICT%20in%20Schools%20final.doc

Department of Education, Tasmania. (2003). *Embedding Educational Technologies into Professional Practice Teaching and Learning Strand*. Retrieved 18 March, 2005, from http://www.education.tas.gov.au/ictpl/irt/EET.htm

Department of Employment, Education and Training, Northern Territory. (2005). *ICT Teacher Capabilities*. Retrieved 28 March, 2005, from http://www.latis.net.au/ictprofessional_support/teacher_capabilities.htm

Finger, G., Lang, W., Proctor, R., & Watson, G. (2004). Auditing the ICT experiences of teacher education undergraduates. *Australian Educational Computing, 19*(1), 3-10. Retrieved 21 March, 2005, from http://www.acce.edu.au/journal/journals/AECvol19_1.pdf

Finger, G., & Trindad, S. (2002). ICTs for learning: An overview of systemic initiatives in the Australian States and Territories. *Australian Educational Computing, 17*(2), 3-14. Retrieved 21 March, 2005, from http://www.acce.edu.au/journal/journals/vol17_2.pdf

Fitzallen, N. (2004). Profiling Teachers' Integration of ICT into Professional Practice. *AARE Conference Papers.* Retrieved 30 March, 2005, from http://www.aare.edu.au/04pap/fit04868.pdf

Ingvarson, L. (2003). Australia's teachers need a system of training and professional development. *On Line Opinion*. Retrieved 25 March, 2005, from http://www.onlineopinion.com.au/view.asp?article=265

International Society for Technology in Education. (2002). *National educational technology standards for teachers*. Retrieved 27 March, 2005, from http://cnets.iste.org/teachers/t_stands.html

MCEETYA. (2000). *Information and Communication Technology.* Retrieved 30 March, 2005, from http://cms.curriculum.edu.au/anr2000/index.asp?p=&pg=ch10_case2.htm

Taylor, L. (2003). ICT skills learning strategies and histories of trainee teachers. *Journal of Computer Assisted Learning, 19*(1), 129-140.

Watson, G., & Prestridge, S. (2001). *Changing patterns of preservice teachers' ICT competencies and what it means for preservice teacher education programs.* Paper presented at the AARE Conference, Fremantle 2-6 December 2001. Retrieved 27 March, 2005, from http://www.aare.edu.au/01pap/wat01470.htm

Wetzel, K., Wilhelm, L., & Williams, M. K. (2004). The introductory technology course: A tool for technology integration. *Contemporary Issues in Technology and Teacher Education, 3*(4), 453-465. Retrieved 21 March, 2005, from http://www.citejournal.org/vol3/iss4/general/article4.cfm