
Raising the Standards

Appendices to the Proposal for the Development
of an ICT Competency Framework for Teachers

A project undertaken by
UWS, ACSA, ACCE and TEFA

on behalf of the
Commonwealth Department of
Education, Science and Training



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Appendix 1

Report on the National Forum

for the Project

Appendix 1

Report on the National Forum for the Project

As specified by the contract for the project, a two-day national forum was held on 18, 19 October, 2001 in Canberra. The purpose of the forum was to:

- draw on existing work and research in states/territories;
- test preliminary conclusions against the knowledge and experience of participants;
- identify commonalities, differences and issues in approaches to teacher ICT competencies; and
- generate draft proposals for collaborative action across jurisdictions.

The forum attracted in excess of sixty participants with a background in ICT teacher competency and professional development from all sectors and educational jurisdictions. Sectors represented were:

- tertiary sector — 18
- government school sector — 20
- non-government school sector — 14
- professional associations — 7
- DETYA — 4
- other — 4

As preparation for the forum, all participants were emailed the three parts of the Literature Review and Mapping document for this project. The Literature Review and Mapping document, in full, is an appendix to this report.

The Program

The following program was conducted over two days.

Session 1

Introduction and keynote address

Session 2

Panel Session on *Lessons learnt in the development and implementation of teacher professional standards*. The panel comprised Jan Althorp (Australian Science Teachers Association), Will Morony (Australian Association for Mathematics Teachers), Terry Hayes (Australian Association for the Teaching of English), Patricia Simmons (Australian Federation of Societies for the Studies of Society and the Environment), Wendy Bradly (Victorian Department of Education, Employment and Training), Anne Jasman (Research Fellow, DETYA) and Anne Hazel (South Australian Department of Education).

Sessions 3 and 4

Issues from the Literature Review and Mapping. Participants, in groups, were asked to discuss and provide input on a number of significant issues identified in the Literature Review and Mapping document. Those issues were:

- the nature of competence;
- performance management and/or professional development model;
- standards for different levels or a continuum of development;
- separate or embedded ICT standards;
- generic vs. subject specific standards;
- mandatory or voluntary standards;
- multiple sets of standards for different target groups; and
- general or age related sets of standards.

Sessions 5 and 6

These included:

- a summary of the previous days activities;
- an opening address outlining a draft structure of an ICT Competency Framework;
- a group discussion of the draft structure and content; and
- feedback from the group discussions.

Interspersed between the sessions were a number of snapshots of current practice in the implementation of ICT standards. The snapshots were presented by Rita Ellul (Victorian Department of Education), Laurie Campbell (Education Queensland), Newton Sigrist (Education Department of Tasmania) and Michelle Williams (International Society for Technology in Education).

Feedback from the Forum

The following is a summary of the participant feedback. This summary was emailed to all participants following the forum.

Session 3

Groups were asked to address one of the following specific issues:

Nature of Competence

- There was general agreement that language and terminology could be problematic and that there is no one simple solution.
- Any definition is affected by context. The issue of competence must not be separated from rich learning environments.
- A possible definition of competence is the necessary skills, knowledge and attitudes needed by a teacher to be able to make effective use of ICT in their conduct of being a professional teacher.
- The issue of minimum competence is problematic.
- A concern in relation to the word 'competent' is that it could be regarded as absolute — i.e. once competent you can 'move on' to something else.
- Levels of competence may be possible — cf a taxonomy.
- Competence can be demonstrated in many different ways and contexts.

A Performance Management and/or Professional Development Model

- Feedback strongly indicated that a framework could/should accommodate both models in terms of the purpose(s) of teacher professional standards.
- There was some discussion and disagreement about whether professional development is a subset of performance management or vice versa. However, there was agreement that they are intricately related.
- The framework needs to relate professional learning to professional standards of which performance management is a subset.
- The model needs to relate performance management and professional development to the holistic performance of a teacher.
- Both dimensions must be more than skills — it should lead to the integration and transformative stages.
- Both dimensions should encourage and support effective pedagogy.
- In a performance management model, assessment is typically undertaken at the school level. Concern was expressed about the ability of schools-based assessors (e.g. Principals) to be able to make valid and reliable assessments given their own level of ICT competence.
- In contrast it was felt that professional development could be a self assessing process — which may, in turn, have implications for the framework.
- The framework could inform/be informed by existing performance management frameworks such as those that exist for Principals in South Australia and Victoria.
- There is a need to be careful not to lose sight of the purpose of the framework — i.e. to deliver improved student learning outcomes. Therefore the teaching/learning context is vital.
- Where do pre-service teachers fit? Can the framework specify a required level of competence for all beginning teachers — e.g. ISTE standards?

A Continuum or Levels of Standards

- The notion of a continuum implies a start and an end, which is, in itself, problematic.
- Is the ‘start’ point the same for beginning teachers as for experienced teachers who are starting to use ICT?
- There are problems with identifying a start point — i.e. a set of required competencies for all teachers.
- Concerns were raised about the ‘top’ end of a continuum i.e. there should be no ‘end’ point.
- Learning is not a linear process.
- The notion of staging points could be problematic.
- There is no single pathway to competence. Effective teachers reflect on their practice, direct their own learning needs and identify what they need to reach articulated examples of good practice and choose their own pathway.
- Any framework needs to be dynamic and flexible including being able to take account of changing technology.
- A framework needs to recognise current competence and facilitate the transference of credentialing.
- ICT competence must be embedded in good pedagogy.
- The framework should map the domain in relation to ICT in terms of what constitutes quality teaching/learning.

Session 4

Groups were asked to address all of the following issues.

Separate Standards or Embedded in Existing Standards

- The groups indicated a need for both, at least in the short term, which may lead to fully embedded standards in the longer term.
- There is a need for both types of standards, however the framework needs to make strong statements about future directions.
- Separate standards need to be written in such a way that they can only be achieved in context.
- There needs to be strong pedagogical links.
- Separate standards strengthen the argument for professional development funds and highlight the imperative for effective ICT use evident in the literature.
- Embedding emphasises the point that teachers need to reflect on their practice in relation to ICT use.

Generic or Subject Specific Standards

- A generic framework with subject-specific exemplars makes the contextual link and gives meaning to the standards.
- There needs to be multiple sources of exemplars, including previous and current DETYA and state/territory systems projects.
- Exemplars need to be subject specific and cover all levels of schooling.
- The same framework should be used for K–12 but there could be an argument that subject specific skills and expertise do become critical at a point (and therefore require specialised ICT competence).
- It does not matter whether generic or subject-specific standards are used, however they need to be expressed so that they can be easily interpreted in all teaching/learning contexts.

Mandatory or Voluntary

- The groups had mixed views on this choice, including:
 - mandatory for all;
 - mandatory at a minimum level then voluntary;
 - initially mandatory and mandatory at promotion; and
 - voluntary but need to create a culture to entice teachers to participate.
- Only systems can make standards mandatory.
- The framework could provide resources to help systems that want to make standards mandatory.
- Standards cannot be mandated at the national level, but there could be a national system of recognition.
- Standards cannot be mandatory until adequate infrastructure is in place including quality professional development opportunities.
- Standards could be mandatory for beginning teachers by getting all universities to agree on this.
- The issue about who develops and implements the standards (e.g. systems, professional associations) will influence whether they are mandatory or voluntary.
- There is a relationship to the role of the framework, namely whether it is used for performance management and/or professional development.
- Self improvement should be integral to the culture of teaching.

Multiple Sets of Standards for Different Target Groups

- Standards can cater for all groups within the same framework provided there is a comprehensive set of exemplars.
- Standards need to address all groups including Principals to ensure all are ‘upskilled’ — no need for different standards, just different exemplars.
- There may be an implementation issue.
- Core competencies could be created with specific ‘spokes’ for different target groups (e.g. for Principals there may be an increased emphasis on leadership and change management).

Multiple Sets of Standards for Different Levels of Schooling

- Standards should be for K–12.
- All levels can be catered for with a comprehensive set of exemplars from within the one framework.
- Different levels imply a linear approach to the development of competence.

Other Feedback from Session 4

Why framework/standards

- Improved student learning outcomes; teacher standards need to link to students standards; the challenge is to make teachers appreciate the potential of, and imperative for, effective ICT use.
- The framework needs to be able to be used by systems, schools and individuals for PD (so there needs to be flexibility and pathways).
- The framework cannot get too specific; difficult for different states and different curriculums.
- They could be used to drive curriculum reform.
- Teachers needing to know the how/when/where/why of using computers; the measure of good teachers is that they know what is appropriate.
- There is a need to define terms e.g. standards, competencies and benchmarks.

Sessions 5 and 6

Groups were asked to respond to a draft framework structure and content under the following headings:

1. Preamble
2. Underlying Assumptions and Core Values in relation to ICT use in schools
3. Dimensions of Educator’s Work
4. Different Educator Roles
5. Phases of Teacher Development
6. Connectedness of Teacher Performance to Contextual Factors
7. Standards
8. Assessment and Credentialing Strategies
9. Standards Validation, Framework Evaluation and Review Processes

Summary by Group

The suggested structures are in bold type. No comment after a heading indicates no change to the draft framework structure/content.

Group A

- **Preamble**
- **Introduction** — dimensions of ICT Competency rather than stages of a teacher’s career and delete heading 5.
- **Underlying Assumptions and Core Values** — include statements about the nature of competence, institutional standards, who should develop the standards, generic vs. subject specific and separate or embedded issues.
- **Dimensions of Teachers Work**
- **Different Teacher Roles** — include all points from headings 4 and 6.
- **Teacher Profiles** — with exemplars to enable self-assessment.
- **Standards** — emphasis on pedagogical context.
- **Assessment and Credentialing**
- **Standards Validation etc**
- **Glossary**

Group B

- **Preamble** including Underlying Assumptions and Core Values.
- **Scope of Framework** including terminology, who is the Framework for (this to include the list from heading 4 plus teacher educators, how the framework might be used, context under which it may be used (from heading 6) and dimensions of educators work from heading 3).
- **Standards** — a set of general statements as per heading 7 but expressed as a continuum, no separation between beginning and practising teachers.
- **Assessment and Credentialing** — separation of beginning and practicing teachers relates to assessment.
- **Standards Validation etc**
- **Appendix 1** — organizations and institutions agreeing to framework, ministerial decisions.
- **Appendix 2** — language and terminology.

Group C

- **Preamble/Rationale** including dynamic nature of ICT and consequences for a framework, definition of terms and refer to relevant national goals for Schooling.
- **Core Values**
 - ITC can transform learning and lead to improved student learning outcomes.
 - Professional judgement in the appropriate use of ICT in teaching.
 - Engagement in the global classroom will assist students in the awareness of themselves as global citizens.
 - Access and equity.
- **Discussion of Contexts** — student and teacher standards, contexts such as e-learning, on-line learning, etc.

- **Principles**
 - There must support infrastructure for teachers.
 - Teachers will demonstrate ICT as a learning tool.
 - Access and equity for all students.
 - ICT rich description of standards and performance indicators.
 - Standards must reflect the transformative potential of ICTs.
 - Standards to reflect the links between student outcomes, teacher professional development, teacher qualifications, etc.
- **Register of Support Documents** such as skill sets of AQF, exemplars of existing practice.

Group D

- **Preamble** — need to link to MCEETYA national framework and emphasise this is part of a national framework, need to address issues of audience here (list from heading 4 plus teacher educators).
- **Underlying Assumptions and Core Values** — including teaching and learning form the context, teachers have a confident expertise in their work, need to develop ICT rich student outcomes, ICT needs to be embedded in teaching and learning activities, teachers need to be able to judge what is appropriate in terms of ICT use, should link with other frameworks.
- **Standards** — if the term ‘standards’ is used then assessment strategies need to be identified, otherwise they are not standards (see detailed feedback for examples of standards).
- **ICT and the Role of Teachers**
- **Phases of Teacher Development**

Group E

- **Statement of Purpose** (context, rationale, audience, vision).
- **Underlying Assumptions and Core Values** — link to student outcomes, include institutional capabilities (connectedness) from heading 6, draw on review paper values and assumptions, ICT competence should be embedded in base level standards for all teachers.
- **Principles, Pervasiveness in Teaching and Learning** — need for overarching principles and recognition of the roles of ICT in teaching and learning.
- **Dimensions of Practice and Accomplishment** including professional behaviours likely to be demonstrated and phases of development as a teacher in the use of ICT.
- **Teacher Development and the Use of ICT** including levels of Standards, teacher profiles spread across different levels.
- **Standards** — define basic skills assumed, include exemplars to illustrate different roles of ICT in teaching and learning.
- **Assessment and Credentialing Strategies**

Group F

- **Preamble** — rationale, purposes, audience and scope of framework.
- **Underlying Principles and Core Values** — why we believe ICT is important.
- **Standards** — include the need for appropriate infrastructure to be in place, develop a set of general statements elaborated by exemplars.
- **Dimensions of Educators Work**
 - Phases of teacher development in relation to ICTs.
 - Personal and professional practice.
 - Classroom practices.
 - Professional legal and ethical responsibilities.
- **Assessment and Credentialing** — a variety of assessment and credentialing processes can be used.
- **Glossary**

Group G

- **Preamble**
- **Audience** — who is the document for (list from heading 4 plus teacher educators)?
- **Underlying Assumptions and Core Values** — include points from Review Paper 4.1, access and equity, dynamic nature, ownership of standards.
- **Dimensions of Educator's Work** — add school/community relationships.
- **Connectedness of Teacher Performance to Contextual Factors** — as per draft
- **Standards** — focus on core skills for classroom teachers, minimum standards for all teachers to be employable, teacher being able to select appropriate resources, recognise transformative potential of ICT, be able to role model effective practices.
- **Assessment and Credentialing**
- **Standards Validation etc**

Group H

- **Preamble** — add Connectedness of Teacher Performance from heading 6.
- **Assumptions and Core Values**
- **Dimensions of Teachers Work**
- **Different Educator Roles**
- **Phases of Teacher Development**
- **Standards** — about 6–10 general standards articulated in categories of Recognition Dimensions, Use Dimensions and Evaluation Dimensions
 - emphasis on pedagogy
 - minimum standards set for all teachers stated as one standard
 - teachers be able to apply standards to their particular teaching context
 - relate to being able to use ICT for administrative tasks.
- **Exemplars** — must be rich and multi-dimensional and include the transformational potential of ICT.
- **Assessment and Credentialing Strategies** — no comment made.
- **Standards Validation etc** — no comment made.

General Summary of Sessions 5 and 6

- There was strong support to add to the Preamble a number of later sections as described above. However, most groups suggested that a statement of ‘audience’ be included which could comprise the list from heading 4 together with teacher educators and system personnel.

There is a need for statements on purpose, rationale, scope and audience in the Preamble.

- Some suggested that a section on terminology be included in the Preamble.
- One group suggested that the framework should start with the underlying assumptions and core values.
- A statement of purpose, the dynamic nature of ICT and consequences for the framework should be included in the Preamble.
- The Preamble should include a rationale, where the framework came from and links to other relevant work (e.g. MCEETYA).
- There is a need to emphasise that this is a ‘national’ project.
- There is a need to emphasise context and links to effective pedagogy.
- Several groups suggested a need for a set of ICT-rich exemplars to cover all levels of schooling and all the various target groups such as administrators, teacher educators, etc.
- There was some support for a general set of standards, which then may need elaboration for particular sub groups.
- The framework needs to articulate the dimensions of ICT use in teaching and learning and why ICT is so important.
- The framework needs to inform, and be informed by, other standards developments.
- There needs to be endorsement of the framework at all levels, particularly by MCEETYA.
- In terms of process, there was support for the involvement of the whole profession in the development of any standards that may arise from the framework.

Appendix 2

Forum Participant List

Appendix 2

Forum Participant List

Name	Organisation
Dr Sivakumar Alagumalai	Flinders University
Mrs Lyn Alderman	University of Newcastle
Ms Jan Althorp	Australian Science Teachers Association
Mrs Anne Anderson	Catholic Schools Office Diocese of Wagga Wagga
Dr Mark Askew	Catholic Schools Office, New South Wales
Dr Wing Au	University of South Australia
Mrs Di Ballantyne	ACT Dept of Education and Community Services
Dr Alan Barnes	University of South Australia
Mr Clem Barnett	University of Ballarat
Ms Sally Blackwell	Department of Education and Training, New South Wales
Ms Janine Bowes	Quality Teacher Program: Information Exchange Project
Ms Wendy Bradly	Department of Education, Employment and Training, Victoria
Mr Tony Brandenburg	Catholic Education Office, Ballarat
Dr Christine Brown	University of Wollongong
Ms Pauline Brown	ACT Department of Education and Community Services
Mr Laurie Campbell	Education Queensland
Mr Tim Doe	Department of Education, Tasmania
A/Professor Toni Downes	University of Western Sydney
Ms Rita Ellul	Department of Education, Employment and Training, Victoria
Mr Andrew Fluck	University of Tasmania
Mr Liam Garvey	Brisbane Catholic Education Office
Mr Nigel Goodwin	University of Sydney
Mr John Gougoulis	Department of Education, Western Australia
Professor Shirley Grundy	Deakin University
Ms Susan Gurr	Commonwealth Dept. of Education, Science and Training
Ms Louise Hanlon	ACT Department of Education and Community Services
Mr Terry Hayes	Australian Association for the Teaching of English
Ms Anne Hazell	Department of Education, South Australia
Ms Bronwyn Hession	Catholic Schools Office, New South Wales
Ms Joanne Howard	ACT Department of Education and Community Services
Mr Peter Jardine	Catholic Education Office, Victoria
Ms Anne Jasman	Commonwealth Dept. of Education, Science and Training
Mr Peter Lelong	Fahan School, Tasmania
Mr Ralph Leonard	Australian Council for Computers in Education

Mrs Lorrie Maher	Association of Independent Schools of Queensland
Mrs Glenys McKay	Department of Education, Tasmania
Mr David McNeale	Diocesan Catholic Education Office, Rockhampton
Mr Will Morony	Australian Association of Mathematics Teachers
Ms Joy Murray	Department of Education and Training, New South Wales
Mr John Pettit	Department of Education and Training, New South Wales
Mr Graeme Philpotts	Department of Education and Training, New South Wales
Mrs Rachael Randall	Charles Sturt University
Mr Kevin Richardson	EdNA Schools Advisory Group
Mrs Joan Robson	Australian Catholic University
Mr Greg Robson	NT Department of Education
Mr Paul Rodney	Catholic Education Commission, New South Wales
Mrs Elise Rogers	ACT Department of Education and Community Services
Dr John Schiller	University of Newcastle
Dr Sandy Schuck	University of Technology, Sydney
Mr Newton Sigrist	Department of Education, Tasmania
Mrs Patricia Simmons	Australian Federation of Societies for the Studies of Society and the Environment
Dr Jackie Stokes	Queensland University of Technology
Mr Vince Summers	Catholic Education Office, Tasmania
Mr Peter Thomas	Victoria University of Technology
Mr John Travers	Technology School of the Future, South Australia
Ms Stavroula Tsembas	Royal Melbourne Institute of Technology
Ms Thea van Os	Catholic Education Office, ACT
Mr Michael Vineburg	Catholic Schools Office Diocese of Wagga Wagga
Ms Joan Warhurst	Australian Curriculum Studies Association
Mr Paul Watkins	Toowoomba Catholic Education Office
Mr Ian Webb	Project Research Officer
Ms Di Weddell	Commonwealth Dept. of Education, Science and Training
Ms Louise Wells	Commonwealth Dept. of Education, Science and Training
Ms Michelle Williams	Australian Council for Computers in Education
Ms Heather Woods	EdNA Schools Project
Professor Nicola Yelland	RMIT University

Appendix 3

Literature Review and Mapping

Appendix 3

Literature Review and Mapping

1 Introduction

This opening review report consists of a discussion paper about teacher standards and two documents mapping current work in teacher ICT competency standards in Australia and in selected countries overseas. The review report provides background information for participants of the forth coming national workshop on frameworks for ICT competency standards for teachers.

1.1 Project Objectives

The overall focus of the project is the development of a framework for minimum and advanced standards in pre-service teacher education programs and for teacher employers. The two mapping reports are works in progress which detail the mapping work done to date in regard to the use of non-ICT Specific teacher standards and ICT Specific teacher standards both in Australia and in selected overseas countries.

The objectives of the project are as follows:

- an opening review report, to be accessible on an appropriate website, which summarises the research and mapping work on teacher ICT performance measures;
- a national workshop of 30–40 key players; and
- a final report in web-ready format, which summarises the project work and presents proposals for a teacher ICT competency framework and ways in which the work can be supported and shared at a national level.

1.2 Preamble

This project encapsulates the integration of two policy agendas within school education. The first is the agenda to put in place a range of factors that will facilitate the effective use of ICTs in schools and the second is the ‘standards/accountability’ movement within the school education sector. One or both of these agendas are a high priority in a number of countries, but it has only really been in the last five years that the ‘standards/accountability’ agenda has begun to intersect with the ICTs in education agenda.

The move to link the two agendas has been expressed formally in *Learning in an Online World: the school education action plan for the information economy* (Commonwealth of Australia, 1999) where one of the strategies under the key action area of ‘People’ is to “Develop teacher competency standards in using ICT in curriculum practice and incorporate teacher ICT standards into human resource management within education authorities and individual schools, including recruitment and promotion practices” (5).

The ‘standards’ movement within Australia and overseas is not without controversy and concerns. Two of the major concerns relate to:

- whether standards or benchmarks distract teachers from focusing on the complex and rich tasks needed for engaged learning, in order to focus on ‘tickable’ outcomes from often trivial activities — thus ‘atomising’ the elements of students’ achievements and teachers’ work; and
- standards being developed apart from the institutional contexts in which teachers live and work and which shape their professional lives and their sense of what is possible (Doecke & Gill, 1999).

A range of more specific issues has also been identified. These are discussed in subsequent sections of this review document.

Notwithstanding these issues, the move to generate and use standards as a measure of teacher performance has continued to develop in terms of both beginning teacher standards and advanced or accomplished teacher standards. These standards have been used for a variety of purposes in Australia and overseas. The two mapping reports detail the standards and their purposes.

The history of ICT teacher standards in Australia has been quite short with the major initiatives coming from various education systems and teacher professional associations. None of these cases have developed ICT capabilities within the framework of a broader set of teacher competencies, or in relation to student outcomes and/or system's benchmarks. Thus, while there are a number of examples of professional associations and systems doing work in this area, to date the work has been uncoordinated and not well situated within a broader framework of development and use.

The move within Australia to generate a teacher competency standards framework for using ICT in curriculum practice is critical. This need was recently reinforced in the Ramsey Report of the Review of Teacher Education in NSW, *Quality Matters. Revitalising teaching: Critical times, critical choices*. (New South Wales Department of Education and Training, 2000) which states that "an important focus in initial teacher education must be on equipping future teachers with a pedagogy which enables them to integrate relevant technology...Standards for initial teacher education must be explicit about this...(and) existing teachers should be accredited and rewarded for advanced technology knowledge and skills" (70).

The discussion paper begins with an overview of the role and purposes of non-ICT specific standards and the related issues so that the subsequent discussion about ICT specific standards is situated within the broader movement towards teacher standards.

2 Non-ICT Specific Standards

2.1 Purpose/Role of Standards

There is considerable support for the development and implementation of teacher professional standards. This is indicated by the amount of work that has already been done in Australia (and overseas) in relation to teacher professional standards and competencies — both non-ICT specific and ICT specific. This work is detailed in the Australian and Overseas Mapping documents. The prime focus of the work on teacher standards has been for the purpose of improving the quality of teaching and learning.

A number of key reports and articles were analysed in terms of the possible roles and purposes of teacher standards (NSW Department of Education and Training, 1998; Education Department of Western Australia, 2001; Australian Council of Deans of Education, 1998; Senate, 1998; Department of Education, Training and Youth Affairs, 2000; Darling-Hammond, 1996; Ingvarson & Wright, 2001; Commonwealth of Australia, 1996). The analysis revealed significant commonality about the role and purpose of standards both within Australia and overseas. These roles and purposes vary across the various stakeholder groups. Below is a summary of the analysis:

- for teachers — to reflect on their professional effectiveness, to determine and prioritise areas for professional growth, to identify professional development opportunities, to assist their personal and career development planning and to increase the status of the profession in the eyes of the community;
- for school systems — to provide a focus for the recruitment, selection, accreditation, professional development and promotion of teachers;
- for students — to enhance the quality of teaching and learning through the requirement that all teachers demonstrate the knowledge, understanding, skills and professional values described in professional standards for effective teachers;
- for teacher educators — to guide program development and review;
- for pre-service/aspiring teachers — to provide authentic expectations of teachers' work and roles, and provide evaluation of the learning and work of pre-service teachers and beginning teachers; and
- for the community — to provide greater assurance of the quality and capability of teachers in schools.

Whilst there is reasonable agreement about the purposes and roles of standards there is debate about how they might be used in relation to teachers in an Australian context. This is highlighted by Ingvarson (2001) who describes the following two ways in which standards for teacher evaluation may be used:

- standards for performance management purposes to safe guard the educational interests and welfare of students and ensure that their teachers are able to fulfil their contractual responsibilities; and
- standards for professional development, appraisal and recognition of excellence which emphasise teachers continually review and improve their practice in the light of contemporary practice and profession-defined standards. This responsibility is typically delegated to professional bodies in most professions.

The former satisfies the public accountability of teachers and education systems with the responsibility for this type of evaluation resting with the employer. The latter focuses on facilitating the continuing professional development of teachers with responsibility resting with the teachers themselves. It is the view of the research team that the latter approach is essential if teachers are to accept and embrace teaching standards. Ingvarson (1998, 1999, 2000, 2001), one of the leading scholars within Australia in the area of teacher standards, also strongly advocates this position. In arguing for this approach Ingvarson identifies two different approaches to professional development. The first is traditionally financed by governments and employers to the level necessary to implement reforms, policies and school improvement efforts they initiate. The second is designed to support and promote improvement in teaching, and to recognise and reward teachers who attain standards for high quality teaching in their teaching field — Ingvarson (1998) calls this a standards-based professional development system.

When arguing for the second approach Ingvarson (1998) contends that such a standards-based professional development system can: “provide much clearer long term goals for professional development; place greater responsibility for professional development in the hands of the profession and thereby strengthen teachers’ sense of ownership and responsibility for its quality; and provide a basis for career paths that place greater status and value on good teaching and, thereby, incentives with the capacity to involve most teachers in collaboratively reviewing their practice in the light of current research and thinking about good teaching” (22).

Ingvarson (1998) defines the characteristics of a standards-based professional development system as follows:

- professional bodies should have the locus of governance and control;
- the goals of such a system must be based on profession-defined teaching standards/expertise and be long term and stable;
- purposes include lifting the general quality of teaching through the implementation of standards, strengthening incentives to engage in professional development, attracting and retaining good teachers and providing better career paths;
- providers include teacher professional associations and district/university/system collaboratives;
- high levels of accomplishment must be demonstrated through performance assessments;
- payment for assessment and professional development is primarily a teacher responsibility;
- professional development practices are usually long term, based on on-going local networks, school-university consortia and school-based groups with the teacher as a contributor; and
- incentives/links to career structure to provide for extrinsic and intrinsic rewards, advanced certification linked to career/salary progression, achievement of professional standards and professional/peer recognition.

The final element is the critical one, in terms of linking professional growth to career development and employment. For without this link, professional standards will only ever be for the highly motivated and accomplished teachers. They will not be embraced by the majority of teachers, nor be usable as standards for all competent teachers. Generating this link requires considerable collaboration between the profession and the employers. In fact, it provides the bridge back to the strategic goals and initiatives of education systems. Managing the tensions and relationship between the two becomes the critical success factor with either or both approaches.

Key Issue/Discussion Point

- is it possible to have one framework to satisfy both needs as suggested by the research — i.e. for professional development/recognition and for accountability purposes? If so, how?

2.2 Issues Surrounding non-ICT Specific Standards

As well as the central issue relating to the possibility of having one framework to satisfy both the needs of the profession (for development) and the systems (for accountability), there are a range of other issues that are relevant to the development of frameworks for standards. These are discussed below.

2.2.1 The Nature of Competence

There is considerable debate in the literature about the definition and nature of competence. For example, Keating (1998) takes a somewhat narrow view by defining competencies as individual and measurable skills, demonstrated and assessed against agreed standards of competence (85). He sees competencies as current and can include knowledge and attitudes.

Others take a broader view of the nature of competence. *The National Competency Framework for Beginning Teaching* (Commonwealth of Australia, 1996) defines competency as “the ability to combine and apply relevant attributes to particular tasks in particular contexts” (11). The report discusses the structure of competencies as involving complex combinations of attributes — including high levels of knowledge, values, skills, and personal dispositions, sensitivities and capabilities — and the ability to put those combinations into practice in an appropriate way (13).

Supporting this view, the *Competency Framework for Teachers* (Gonczi et al., in Education Department of Western Australian, 2001) states that the term competency standard refers to “a combination of attributes underlying some aspect of successful professional performance” (7).

Other writers prefer to use other terminology to describe the performance of teachers and organisations. For example, the *Strategy 2000: Staff Capability Review Framework* (Australian National Training Agency, 2000) adopts the term capability in terms of both individual and organisational capability. The Review gives the following definitions:

- individual capability is the ability (current competence) plus potential, self-efficacy (belief in one’s own capability) and values, in familiar and/or specialist contexts and in response to new and challenging circumstances; and
- organisational capability is ability (current systemic competency plus potential) and flexible capacity in meeting the evolving needs of society and maintaining competitive advantage (15).

Still others reject the term competence as being too narrow, preferring to define professional standards. For example, Ingvarson and Wright (2001) state that “standards as defined here are not competencies or criteria derived from some kind of breakdown of a job into its component parts with checklists as indicators. They are based on values and research, not the deconstruction of competence” (3).

This issue also extends to different meanings being associated with the use of certain words. From the project research it has become evident that the use of particular language and terminology can be problematic and that for many the problems are significant. For example, Doecke and Gill (2001) refer to “the problem with words”. The authors discuss the changing meaning of the word standards and the view that the word standards evokes a “range of competing views, some of which are antithetical to the interests...of teachers” (7).

Key Issues/Discussion Points

- a common discourse/code of language needs to be created;
- do we use competencies, standards, capabilities, proficiencies?
- what are the implications of choosing a particular terminology?
- how is the current level of cynicism by teachers to the word standards to be overcome?

2.2.2 Generic vs Subject Specific Standards

From the project research into the literature and current activities, two types of non-ICT specific standards emerge:

- *generic standards* which can be related to any discipline area and any level of teaching. In Australia examples of such frameworks include those developed by education systems (for example, in Queensland, Victoria and Western Australia) and by professional bodies such as the Australian Councils of Deans of Education. Overseas examples may be found in New Zealand and Ontario, Canada.
- *subject specific standards*, in particular those under development in Science, Mathematics and English Literacy. These standards are being developed by the relevant national professional subject associations. The associations see the development and maintenance of high quality teachers and teaching in their subject areas as a core activity. It is interesting to note that overseas (notably in the UK and US) where subject associations are not directly involved, the Teacher Training Agency (TTA) in the UK, the Interstate New Teachers Assessment and Support Consortium (INTASC) and National Board for Professional Teaching Standards (NBPTS) in the US have also chosen to develop subject specific standards.

Generally, the debate about which is more appropriate in particular circumstances is unresolved. Similarly, there are questions around the need for standards specific to particular age groups. For example, the TTA and NBPTS have developed standards for teachers of different age groups of students.

Key Issues/Discussion Points

- which model is most effective for embedding ICT competencies — generic or subject specific standards?
- do you have separate sets of standards for different age levels being taught such as those used by the NBPTS?
- given the absence of subject specific standards in the majority of key learning areas in Australia would a framework for ICTs be constrained to embedding ICT competencies in a generic framework?

2.2.3 Professional Development Continuum

From research into current practice and the literature three different approaches to standards frameworks are evident:

- *a set of generic standards for beginning teachers.* Examples include the beginning teacher standards developed in Victoria (Department of Education, Victoria 1998b), similarly the framework developed by the Australian Council of Deans of Education (1998) and the guidelines on the *Acceptability of Teacher Education Programs for Teacher Registration Purposes* (Queensland Board of Teacher Registration, 1999). Overseas examples include the standards developed by the Teacher Training Agency (1998d) in the UK.
- *a set of standards that describe a highly accomplished teacher.* Once a teacher is successfully assessed against these standards they could be considered “at the peak of their profession”. Examples of this type of framework include the English, Mathematics and Science frameworks being developed under the SPIRT project and the NBPTS standards in the US.
- *standards which involve multiple levels or a continuum of development.* An example of such a framework is the *Competency Framework for Teachers* in Western Australia which comprises three levels of development. A further example is the *Professional Code of Practice* (Standards Council of the Teaching Profession, 1998b) which comprises four stages of teaching — 1. beginning teacher, 2. experienced teacher, 3. leading teacher level 2 and 4. leading teacher level 3.

From the perspective of the research team, standards which involve a continuum of development are consistent with the concept of standards for ongoing professional development. This is evident in the literature. For example, the Australian College of Education (2000) articulate five principles upon which standards should be identified and used including:

- any construction of professional standards for accomplished teachers should be consistent with the concept of a career-long continuum from probationary teacher to retirement and be applicable to all ranks from beginning teachers onwards.

Key Issues/Discussion Points

- is a continuum approach to standards appropriate for all teachers?
- could a continuum, with appropriate staging points provide a professional development pathway for all teachers and a focus for professional development policies and programs?
- could a continuum cover pre-service, beginning and accomplished teacher standards?
- how would this fit in with subject specific standards which are only for highly accomplished teachers?
- could/would a continuum bring together all the different current sets of standards frameworks?

2.2.4 Who Should Develop the Standards?

There is overwhelming evidence from the literature that teacher professional standards must be developed *by the profession, for the profession*. This evidence comes both from within Australia and internationally and includes the viewpoints of government, the profession and the unions (Senate, 1998; Australian College of Education, 2000; Australian Education Union, 2001). The research further indicates that standards should be developed as partnerships between employers and the profession and that the profession must include teacher professional associations.

In the report *Towards Identifying Professional Teaching Standards for NSW Schools* (1998), the NSW Department of Education and Training state that: “It is clear that any attempt to establish standards that do not involve proper consultation with the teaching profession will lack credibility. Any effective process of establishing standards...must ensure ‘ownership’ of the standards by the profession through grass roots participation...of subject and teacher associations” (55). However, the report also says that “a key strategic issue is the extent to which employing authorities are prepared to mandate, rather than merely aspire to, professional standards as the basis for selection and career-long development of teachers” (53). This further illustrates the tension in the debate about who should be the driving force behind teacher professional standards.

Ingvarson and Wright (2001) also argue that professional certification will not realise its full potential if it does not lead to tangible forms of recognition from employers and unions. They cite the Western Australian model (Education Department of Western Australia, 2001) in the development of level 3 classroom teacher classification as a way that this could happen and resolve the potential tension between profession-developed standards and their use by employing bodies. This model is fully described in the Australian Review document.

While the literature strongly supports standards development and implementation by the whole profession, the case within Australia is predominantly to the contrary. In the majority of cases existing standards frameworks have been developed and implemented by employing authorities or their agencies such as teacher registration boards. Two exceptions to this are the frameworks (English Literacy, Mathematics and Science) emerging from the SPIRT projects and the Western Australian *Competency Framework for Teachers*. Both are detailed in the Australian Review document. In particular, the Western Australian model demonstrates that a shared responsibility can be highly successful.

In comparing initiatives in the US (NBPTS) and the UK (TTA), Ingvarson (2001) makes a case for an independent national body as follows: "... the message from these two reforms is that the strategy of establishing an independent national body with a clearly defined certification function such as the NBPTS has much more potential than performance management system such as that in the UK" (13).

Key Issues/Discussion Points

- how to involve the whole education community — employers, unions and teacher professional associations?
- how to gain national support at the highest levels to succeed?
- how to convince systems/employing authorities to be partners in the development and implementation of standards?
- what are the respective roles of the Commonwealth, state/territory schools systems and the non-government school sectors?
- how to get teachers involved?
- how to get teachers to see that this is worthwhile?
- how to incorporate incentives into teacher employment agreements?
- is there a case for a national body as argued in A Class Act to facilitate and unite the various standards movements?
- how to bring together the various standards activities in a coordinated way?

2.2.5 Assessment of Standards

There are a number of consistent messages throughout the literature (Ingvarson, 1999; Ingvarson, 2001; DETYA, 2001b) in relation to the assessment and credentialing of standards:

- the status of the assessment is determined by the rigor and validity of the assessment;
- assessment validity is a function of the status, quality and independence of the assessors;
- the two types of assessment validity must be addressed — *procedural validity* which is concerned with how standards are developed and by whom and *content validity* which addresses the issue that the standards properly relate to the domain of what is to be assessed;
- assessment must be accessible to all beginning and practising teachers;
- it must be easily administered and affordable for the assessing body and participants;
- assessment should involve a range of tools to reflect the varying aspects of teaching practice. A common model is the combination of a portfolio and some form of assessment centre;
- there needs to be support mechanisms and assistance for teachers undertaking assessment;
- detailed feedback must be provided from the assessment process, including opportunities for further development; and
- credentialing must be recognised by the employing authority and in some tangible form such as a salary increase.

The following are examples of assessment models in existing standards frameworks:

Example 1

In the implementation of the Western Australian Competencies at level 3, a combination of two types of assessment are used — a written portfolio, and a reflective review undertaken in a ‘round table’ format.

Assessment is not undertaken by the employer, but is managed and coordinated by the same body that developed the framework — a professional consortium representative of the whole professional community based at Murdoch University. The credential resulting from successful assessment is valid for three years.

Example 2

The Australian Association of Mathematics Teachers (AAMT), in the implementation of their standards, is currently proposing to have a portfolio comprising a range of items designed to best match the criteria being measured including a case study. In addition, teachers will attend an assessment centre for approximately a half day.

Example 3

In Tasmania, assessment for practising teachers of the five modules (www.discover.tased.edu.au/ec/irt/Units/units.htm) as part of the Educational Computing Professional Learning project is carried out using a portfolio of professional learning which could comprise a wide range of media including exemplars of work, video tapes, testimonials, curriculum vitae and other materials which the teacher and the assessor consider relevant. The following key principles are regarded as essential for recognition:

- validity — does the evidence of learning address what it claims to?
- authenticity — has the evidence been verified as genuine?
- currency — is the evidence relatively recent?
- sufficiency — is there sufficient evidence to justify the claims you are making for credit?
- reliability — is the evidence sound enough to ensure that different assessors would reach similar conclusions?

Assessment is carried out by In-school Resource Teachers, trained and funded by the Department of Education. There is no indication from the literature as to whether the attainment of competence has a ‘use by date’.

Key Issues/Discussion Points

- should assessment be mandatory or voluntary?
- how would the issues of legally defensible, economically affordable, administratively feasible and links to career advancement be addressed? And by whom?
- how to ensure the integrity of any professional standards system?
- how to resolve the issue of currency? For how long is an assessment valid? Who decides this?
- issue of portability of competencies/certification across jurisdictions — how could this be addressed?
- how to ensure that standards assessment is seen as integral to teachers’ ongoing development as professionals and not perceived as something done to teachers?
- what happens to teachers who are unable to demonstrate the required level of competence?
- what combination of assessment tools are needed to assess the diverse range of teacher activity?
- is a portfolio alone adequate for valid and reliable assessment? Is a combination of portfolio and assessment centre appropriate?
- how do you overcome the difficulty of getting teachers to articulate their practice in terms of how and why they do things?
- how are assessors selected and trained?
- how to make an assessment system affordable in terms of time and cost?
- what is an appropriate form of credentialing?

3 ICT Specific Standards

3.1 The Need for ICT Competent Teachers

The need for ICT competent teachers stems from the need for ICT competent students and for ICT rich learning environments that enhance students' learning across the curriculum. Recent national and systemic documents abound with references to these needs. For example, it is specifically addressed in the *National Goals for Schooling in the Twenty-First Century* (1999) — Goal 1.6 states when students leave school, they should: “be confident, creative and productive users of new technologies, particularly information and communication technologies, and understand the impact of those technologies on society.”

More recently, the Cuttance Report, *School Innovation: Pathway to the knowledge society*, (Commonwealth of Australia, 2001) cites a range of evidence to substantiate the potential of ICT to enhance learning environments and improve student learning outcomes in both cognitive and non-cognitive domains as follows:

- first order effects refers to improved learning and stronger student motivation;
- second order effects relate to ICT creating new contexts and environments for practice — i.e. a potential catalyst for change of work roles, patterns, procedures and organisational groupings compared to those adopted in traditional classrooms.

The literature (ISTE, 2000; Meredyth et al., 1999) strongly supports the notion that ICT competent teachers are fundamental to achieving the goals for students. However, the National Education Performance Monitoring Taskforce (NEPMT) report (MCEETYA, 2000) states that a problem was identified as part of their surveying of education systems as to the capacity of teachers to assess student ICT skills and knowledge due to the low level of teacher skills and knowledge. To overcome this problem Meredyth et al. (1999) suggest in part that a regime should be established in school systems in which ICT skills are expected and rewarded through standards for hiring, evaluating and promoting teachers.

Over the last fifteen years systems, schools, universities, professional associations and individual teachers in Australia have addressed the need to develop teachers' competencies using a variety of strategies and approaches. The recent DETYA report *Making Better Connections* (DEST, 2002) maps the range of strategies and approaches in use. In a number of cases, systems and professional associations have developed ICT specific standards as a part of the professional development strategy or the wider ICT strategy. This practice is also found overseas, where a number of systems and professional associations have also generated ICT specific competencies.

The ICT specific standards or capability statements currently in use in Australia include:

- Queensland (Minimum Standards for Teachers — Learning Technology — http://education.qld.gov.au/2001/mst_int.htm),
- Victoria (Learning Technology Teacher Capabilities — www.sofweb.vic.edu.au/pd/tchcap)
- Tasmania (Educational Computing Units — www.discover.tased.edu.au/ec/irt/Units/units.htm).

The nature of the development of ICT specific standards for teachers, to a large degree, mirrors that of non-ICT specific teacher professional standards in terms of the types of standards frameworks, the approaches and associated issues.

The researchers identified two types of ICT specific standards:

- *generic*. This can be applied to any curriculum area at any level of schooling. Examples of this include Queensland (Minimum Standards for Teachers — Learning Technology — http://education.qld.gov.au/2001/mst_int.htm), Victoria (Learning Technology Teacher Capabilities — www.sofweb.vic.edu.au/pd/tchcap) and the ISTE (Educational Technology Standards and Performance Indicators at the Foundation level for all teachers — <http://cnets.iste.org>); and
- *subject specific standards*. An example of this is the sets of standards developed by the Teacher Training Agency (1999) in the UK (www.canteach.gov.uk/info/ict/nof/tta00_05.pdf) for a wide range of subject areas.

Also evident in the literature are three different approaches (as is the case for non-ICT specific standards) to the development of standards:

- *generic ICT standards for beginning teachers.* The ISTE Foundation Teacher standards and the NSW Computer Proficiency for Teachers (Ministerial Advisory Council on the Quality of Teaching, 1997) are examples of this;
- *standards that describe a highly accomplished user of ICT.* The Graduate Certificate in Education — Computing for Teaching and Learning (Department of Education, Tasmania, 2000) is an example of this; and
- *CT standards which involve multiple levels or a continuum of development.* Examples of this include the Milken Professional Competence Continuum (1999) (www.mff.org/edtech/projects.taf) and the Victorian Learning Technologies Skills Development Matrix (Department of Education, Victoria, 1998a).

Similarities with non-ICT specific standards also extend to the issues surrounding ICT specific standards including: the nature of competence; generic vs subject specific standards; professional development continuum; who should develop the standards; and the assessment of standards. The discussion of these issues presented in Section B also applies to ICT specific standards.

3.2 Issues Surrounding ICT Specific Standards

3.2.1 The Existence of Separate ICT Specific Standards

The above similarities might suggest that ICT specific standards are just another set of standards that need to sit alongside the generic and subject-specific ones. That is, the existence of such standards are not problematic within themselves, but problematic in their definition and use.

However, these standard statements are different from either the generic or subject specific standards in that they focus on a particular technology and how it can or should be used to enhance and transform traditional teaching and learning in educational settings. It is worth noting that similar types of standards do not exist for the other more traditional paper-based technologies that have been the foundation of teaching and learning for the last 200 years, nor do the ICT specific standards address any of the non-digital information and communication technologies that are also currently used in schools to enhance and transform teaching and learning. These are the traditional paper-based, analogue and broadcast technologies. Given that having teachers who are competent in these technologies is as critical as having them competent in the newer digital technology, one might ask why the newer, digital information and communication technologies are sufficiently different or special that they need specific competencies of their own.

If the digital ICTs are one of a range of teaching and learning technologies that all teachers today need, in order to have the confidence and competence to use for personal, professional and pedagogical purposes:

- why single them out?
- why only narrowly focus on them to the exclusion of the other learning technologies?
- why not embed them (along with all other appropriate technologies) in the generic standards such that they apply to all aspects of a teachers professional work?
- why not embed them (along with all other appropriate technologies) in the subject-specific standards (and age-related standards) such that their specific use with the content and pedagogies associated with particular disciplines or stages of education can be properly addressed within the context of their use?

These questions also have corollaries:

- if ICT competent teachers are a high priority of governments, systems and the profession why are we still publishing today generic and subject-specific standards that ignore or at best marginalise the role that digital technologies need to play in teachers' professional work?
- how can we build rich descriptors for generic and subject-specific standards that appropriately address the use of digital technologies in ways that exploit their full potential to enhance and transform the work of teachers and the learning of their students?

The answers to these two sets of questions are fundamental to any decision about a national framework for ICT teacher standards.

Two sets of reasons that could be put forward for separate ICT standards are:

- ICTs are ‘special’ and ‘new’ because of their potential to transform the very nature of learning and schooling at the classroom, school and system levels (ISTE, 2000; Black & Atkin in DETYA (2001a, 20); and
- that the imperative to embrace ICTs has not been substantially taken up within existing non-ICT specific standards frameworks. There is a paucity of ICT specific descriptors and performance indicators in current non-ICT specific standards.

In conversations with developers of non-ICT specific standards during the process of collecting the data for this project, it became clear to the researchers that the developers of non-ICT specific standards do not share the concern clearly evident in the literature about the need to make explicit the knowledge, skills and attitudes required by teachers to make effective use of digital ICTs in schools. They believe that the issue can be adequately addressed through appropriate standards assessment procedures and criteria — almost as if it is a ‘taken for granted’ use, just as the use of books or other common technologies such as calculators and pens are taken for granted.

Two other very important issues have also emerged in the analysis of the literature and current practices that also need to be addressed before a framework can be considered. These are:

- that ICT specific standards may only focus on technical skills and not on higher order skills such as problem solving using ICTs, and knowledge and attitudes about the way technology is transforming society; and
- that, in Australia, the development of all ICT specific standards for teachers has been in isolation from related standards for educational leaders, student ICT competencies, institutional capabilities and standards for teacher educators. The literature (ISTE, 2000; Teacher Training Agency (TTA), 1999; Milken Family Foundation, 1999) strongly suggests that each element must be progressed in concert.

In terms of the latter issue the literature (ISTE, 2000; TTA, 1999; and Milken, 1999) strongly suggests that each element must be addressed simultaneously. This is critical if the transformative outcomes that are possible with effective use of ICTs are to be achieved. The reforms suggested by these outcomes will need proactive and understanding leadership, technology rich environments, policy support, strong political will and high quality infrastructure to avoid the frustrations of previous ICT initiatives.

There is a strong argument from the literature to embed ICT standards, descriptors or performance indicators within existing standards frameworks. The arguments are:

- embedding is consistent with the message that ICTs are integral to effective teaching and learning and the broader range of teachers’ professional work;
- embedding mirrors what is aimed for in terms of integrating ICT use into classroom practice; and
- embedding is consistent with the message that effective professional development strategies for the application of ICTs to enhance and transform teaching and learning must be embedded in the daily work of teachers and should address the student learning outcomes relevant to the age and nature of the taught curriculum.

A range of research supports the notion of embedding as follows:

Recommendations from Coughlin (1999) reinforce the embedding approach rather than a separate approach when they identify the need for ICT instruction to be part of all subjects and activities, particularly field experiences within the teacher education program rather than as stand-alone subjects if the program is to be effective. This is further supported by DETYA (2001a, 24) which reports that a number of US studies have highlighted the deficiencies in the use of separate ICT subjects as the dominant strategy for pre-service teachers. Further, it states that the bulk of literature supports the notion of integrated approaches being superior to separate subjects of instruction in terms of pre-service teachers being able to make use of ICT in their teaching experience. Sykes in *Making Better Connections* (DEST, 2002) states teacher development that is embedded in the curriculum and integrated with the assessment of student learning is considered far more likely to lead to changes to teacher practice than teacher development programs that are conducted as isolated experiences.

Chadbourne (2000/2001) addresses the need for specificity within non-ICT specific standards. He argues that there should be multiple versions of generic standards to accommodate the diversity of teachers' learning needs and the capacity of teachers to engage in standards-making rather than standards-taking. This is the structure used by the NBPTS in the US and the TTA in the UK — i.e. a common structure of generic standards each customised for a particular curriculum area/level (primary, secondary, head teachers, etc). Interestingly the UK (TTA, 1999) example refers to ICT specific standards that have been developed for virtually all subject areas — each based on a common ICT competency framework. See the Overseas Review document for details.

Notwithstanding the above arguments, there is a very real danger that in the process of embedding ICT descriptors and performance indicators in non-ICT specific frameworks they will not get the prominence that is needed to move policy, curriculum and teaching practice to the point where ICTs are part of the 'taken for granted' tool kit and their use part of the every day repertoire of all teachers.

There is clearly a plausible argument that in order to get to the 'taken for granted' stage, a combination of separate and embedded needs to exist. The research team argue that significant work is essential to ensure that separate ICT specific standards frameworks are developed at the same time as significant energy and collaboration occurs so that ICTs are specifically embedded in non-ICT specific standards frameworks by making the existing descriptors and performance indicators 'ICT' rich. In the longer term, as the imperative associated with ICTs further permeates the educational community and their use as a teaching and learning tool becomes more commonplace, the need for a separate framework would diminish.

3.2.2 Teacher ICT Competence, Curriculum and Student Learning Outcomes

As stated earlier a major driving force behind the development and implementation of a teacher ICT standards framework is to improve the standards of student ICT competence and student learning outcomes. The development of student ICT competence can be addressed in two ways (or a combination of both):

- separate generic ICT student learning outcomes/competency statements that can apply in any curriculum area; and
- subject specific learning outcomes expressed in curriculum frameworks, course documents, etc.

Both approaches are evident in Australian education systems. Nevertheless, it could be argued that practice does not match the rhetoric. To meet the imperative of realising the education potential of ICTs the researchers argue that, as for teachers, ICT rich student learning outcomes' statements should be embedded in curriculum frameworks, curriculum profiles and course documents as well as in separate ICT competency statements.

From project research it is evident that ICT student learning outcomes are not addressed in any significant way in KLA documents with the exception of the technology key learning area. Clearly ICT rich student learning descriptors and performance indicators need to be embedded across all key learning areas. This further supports the notion that effective ICT use is integral to the teaching/learning process.

Several states and territory education systems including the Australian Capital Territory, New South Wales and South Australia have developed or are in the process of developing separate student ICT competency statements. This work, in part is being driven by/supported by the work of the National Education Performance Monitoring Taskforce (NEPMT). The NEPMT report (MCEETYA, 2000) states that sets of student ICT standards will have to be developed for years 5/6 and 9/10 respectively for the purposes of national monitoring.

The researchers support this work as part of the multi-dimensional approach (including teacher ICT competence, school administrator competence, teacher educator competence and institutional capability) that is essential if the national goals for schooling in relation to ICTs are to be realised.

3.2.3 The Relationship between ICT Specific and non-ICT Specific Standards

In considering the above issues of separate verses embedded standards another important aspect of the complexity of the relationship between ICT specific standards and generic standards comes to the fore. This aspect is the duality of ICTs having a role to enhance current practice and also a role in transforming current practice. There should be no doubt that ICTs have the potential to transform how, what, where and why students learn what they do. While there are only limited examples of the transformative power within the educational sector, the examples with the financial, manufacturing and business sectors make it clear that new times need new approaches, and that the nature and functionality of the new technologies, the digital ICTs, enable that transformation.

At the current time ICTs play four different, but overlapping roles in education. *Making Better Connections*, (DEST, 2002) reports four types of application of ICT in schools:

- ICT as an object of study through courses such as computing studies or computer literacy modules inside other subjects;
- ICT as a tool for learning to enhance students' abilities to deal with the existing curriculum and existing learning processes;
- ICT as an integral component of broader curricular reforms that change not only how students learn but what they learn; and
- ICT as an integral component of the reforms that alter the organisation and structure of schooling itself.

These are explained as follows:

- the first type tends to mean that ICT skills, knowledge and attitudes are added into the school program through a separate ICT subject, while teachers' practices in other subjects remain relatively unchanged;
- the second type focuses on integrating ICTs into the daily work of all teachers; in some cases teachers' existing pedagogical approaches and classroom behaviours remain the same, while in others, ICT use tends to change the pedagogical approaches the teacher employs while not necessarily changing the content of what is learned;
- the third type is clearly transformative at the classroom level: it changes content as well as pedagogy (what students learn as well as how they learn); and
- the fourth type is transformative at the systemic level, leading to changes in the organisational and structural features of schooling as well (21).

While the dimensions of needed capacities for the first two can easily be derived from existing generic and subject-specific teacher standards, the dimensions of needed capacities for the latter two cannot. The following are three such capacities that may not be readily derived from existing generic or subject specific standards. Sadly, they also do not obviously feature in any of the existing ICT specific standards that have been published:

- teachers need the knowledge and understandings of how ICTs are used within their discipline, not only in an educational setting, but also in industry, government and in the broader society;
- teachers need an understanding of how ICT use impacts on society and conversely, the way in which social, political and economic processes structure how and by whom technologies are accessed and used so they can meaningfully relate ICT use in teaching and learning to the students', their families', and the broader community experience of ICT in their personal, community, educational and work-related lives;
- teachers need an understanding of the transformative potential of ICT use in redefining the who, when, where and why of the teaching and learning process — in relation to the work they currently do in classrooms, to their own professional development, and to the possibility of transforming the nature of the formal educational process within a rapidly changing society.

An ICT Standards framework must address all these dimensions of the application of ICTs in schools if they are to complement existing generic and subject-specific standards at the same time as doing justice to the transformative potential to reshape these very standards.

3.2.4 Institutional Capabilities

There is a considerable body of literature and research supporting the proposition that a multi-dimensional approach is needed to successfully implement the use of ICTs in schools. In particular, research, both nationally and internationally, indicates that certain conditions need to be present in terms of institutional capabilities.

In the pre-service sector *Making Better Connections* (DEST, 2002) recommends that a national set of institutional and program capabilities are needed to address the capacity of the institution, programs and staff to provide the appropriate learning experiences so that graduates will achieve the beginning teacher standards. The report further recommends that collaborative work is needed to develop institutional support and infrastructure, and the capacity of Deans/Heads of Schools to understand the complexity of effective technology integration and the various enabling factors that need to be addressed.

There are examples in the literature of assessment regimes to measure institutional capability in the pre-service area. For example, the Teacher Preparation STaR Chart in the US (CEO Forum, 2000) is an online self-assessment tool for colleges of education which is currently being used by a number of Australian teacher education institutions.

For practising teachers and school systems the literature and research (ISTE, 2000; Milken, 1999; Commonwealth of Australia, 1999; Commonwealth of Australia, 2001; Meredyth et al., 1999) provides a number of sets of institutional capabilities that are necessary for schools to effectively use technology for learning, teaching and educational management. These capabilities focus on physical, human, financial and policy decisions as follows:

- vision with support and proactive leadership from the education system;
- educators skilled in the use of technology for learning;
- content standards and curriculum resources;
- rethinking curriculum design, timetables, teaching spaces and activities;
- student-centred, constructivist approaches to learning;
- assessment of the effectiveness of technology for learning;
- access to contemporary technologies, software and high quality telecommunications networks;
- technical assistance for maintaining and using technology resources;
- community partners who provide expertise, support and real-life interactions;
- ongoing financial support for sustained technology use; and
- policies and standards supporting new learning environments.

Clearly the issue of institutional change and capability must be addressed in a teacher ICT standards framework.

Key Issues/Discussion Points

- how can the importance of institutional capabilities be brought to the realisation of educational policy makers and leaders?
- how can these institutional and other supporting capabilities be developed and implemented?
- how can they be progressed simultaneously at all levels — national, systemic and school levels?
- who has the responsibility for this?
- what are the respective roles of the Commonwealth, state and territories and schools?
- is there the political will to undertake such a task?
- do the same conditions apply in the pre-service area?

4 Towards an ICT Standards Framework

4.1 Underlying Premises and Principles

Evident from the research (Australian College of Education, 2000; Geiger, 2000; Louden, 2000; NSW Department of Education and Training, 1998; Higher Education Council, 1996; DETYA, 2001b; Teacher Training Agency, 1998d; Meredyth et al., 1999) is the importance of a professional standards framework to be based on a set of underlying assumptions and principles. They can be summarised as follows:

- accomplished teachers make a difference;
- standards development must be based on a sound understanding of the complex nature of teachers' work;
- the framework should assist teachers to uncover their personal beliefs about teaching;
- standards, whilst developed nationally, must be able to be translated into local contexts;
- the framework should assist teachers to make the necessary curriculum links to effectively integrate ICT use in their classroom practice;
- the framework needs to address social justice issues such as access to professional development, access to appropriate resources, geographic isolation and ethnicity;
- standards must support and promote exemplary practice;
- standards must support the concept of learning communities to share ideas and experience;
- standards must be linked to and provide a focus for professional development;
- standards must be consistent with the concept of life-long learning and the notion of a continuum of development;
- the framework must acknowledge the notion that teachers need time and support to develop competencies including staged milestones along a continuum;
- standards must be rigorous, but attainable;
- assessment must be flexible enough to enable competence to be demonstrated in a variety of different ways;
- assessment processes must be valid, fair, transparent and affordable; and
- credentialing must provide appropriate incentives and career recognition.

Furthermore, in particular relation to ICTs:

- the framework should encourage teachers to describe their experiences with ICTs and the assumptions they have about ICTs;
- generic and subject specific standards should have ICT rich descriptors and performance indicators. These ICT rich descriptors and indicators need to broaden the ICT descriptors to include paper-based, analogue and broadcast information and communication technologies as well as the new digital computer-based technologies;
- ICT specific standards should derive from the generic and subject-specific standards — i.e. use the five characteristics of a highly accomplished teacher, but also address the transformative role in society and education;
- an ICT Standards Framework must be supported simultaneously by a range of complementary initiatives, including institutional capabilities, technological capacity, infrastructural capacity and policy support; and
- ICT specific standards should be developed in concert with standards that relate to leadership capacity, technological capacity, infrastructural capacity and policy support within institutions and systems.

4.2 Structure of a Framework for ICT Specific Standards

In considering a possible structure for a teacher ICT standards framework it is useful to draw on the models in the literature (Education Queensland, 2001; Education Department of Western Australia, 2001). A typical framework structure comprises the following elements:

Underlying Assumptions and Core Values

- this describes the basis on which the framework is premised in terms of educational philosophy, pedagogy and assumed values held within the teaching profession

Phases of Teacher Development

- a continuum of development from beginning to highly accomplished

Dimensions of Teachers' Work in relation to ICTs

- describes the key elements of teachers' work in relation to the effective use of ICT

Standard Title

- a concise action orientated statement that describes the key area of a teacher's professional practice, including a brief description of the aspect of professional practice covered by the standard

Standard Descriptors

- a description in output terms of the key components of professional practice covered by the standard. Statements need to be focused on performance and be demonstrable

Indicators of Effective Practice

- indicators of effective practice are competency-related professional actions that provide examples of the professional behaviours likely to be demonstrated by teachers who have attained a particular standard. Indicators are examples only and may not necessarily apply to all professional, school and classroom contexts

Underpinning Skills and Knowledge

- this identifies the essential knowledge, skills and understandings that underpin the aspect of professional practice described in the standard and indicates broad areas of learning and development that teachers might consider to address in this aspect of practice

Narratives/Vignettes of Practice

- to illustrate how the standard may operate in actual practice and to promote discussion about the meaning and implementation of the standard

Assessment and Credentialing Strategies

- details how standards are to be implemented, assessed and credentialed

Standards Validation and Framework Evaluation Processes

- a description of how the standards have been validated against actual practice and an evaluation strategy to ensure that the framework is dynamic and able to evolve in a planned way.

Key Issues/Discussion Points

- narratives, vignettes and other examples from individual teachers' work are important to describing the standards. How to collect narratives? Before, during or after the development of the framework?
- where do examples of good practice fit in?
- how to ensure that standards are able to be realised within different contexts?
- how to ensure that professional standards 'speak' to all teachers?
- validation of standards must be integral to the framework — how could this occur?
- how to ensure that evaluation processes are integral to take account of the changing nature of technology and its application in the classroom?

- what is the relationship between technical competence and effective classroom implementation of ICTs? Does one imply the other?
- does there need to be multiple frameworks — for example, for teachers, administrators and students?
- can multiple sets of standards be developed from a single framework?
- how can one framework address the different approaches such as generic ICT standards and embedded ICT descriptors and performance indicators?

4.3 Critical Issues for a Teacher ICT Standards Framework

The following summarises the key issues in relation to the development of an ICT standards framework for teachers. These issues have emerged from the review of current practice and research, both within Australia and overseas.

The proposals, as suggested for each issue, are based on current thinking from the literature relating to current non-ICT specific and ICT specific standards activity and research. The issues will be a major focus for discussion and participant input at the Project Forum being held on 18–19 October in Canberra.

Issues	What is Proposed
Nature of Competence	A teacher ICT standards framework which addresses a range of issues including teacher ICT competence
Technical Competence or a Comprehensive View of Competence	A comprehensive view of competence including technical and higher order cognitive knowledge, skills and attitudes
A Performance Management or Professional Development Model	An ICT Standards Framework which follows a professional development model
Separate or Embedded ICT standards	There is a need to have both. A separate set of ICT standards is necessary in the short term to ensure that they do not lose the prominence that is currently needed. Embedding is the preferred longer term strategy but work needs to start now.
Generic vs Subject Specific standards	The literature indicates that both are necessary so that all teachers can identify with the standards and become involved
Mandatory or Voluntary	The strong imperative in relation to ICT use in schools can only be realised if ICT standards apply for all teachers.
Standards for particular levels of teachers (e.g. beginning, accomplished and highly accomplished) or a continuum of development	A continuum of development is proposed so as to provide entry points and professional development pathways for all teachers.
Is there a minimum set of standards needed as a starting point?	All beginning teachers should be able to meet minimum standards.
Who develops, implements and assesses the standards?	A partnership involving the whole education community (employers, industrial groups, professional associations) is needed to address a range of issues including: <ul style="list-style-type: none"> • acceptance by the profession • 'ownership' of the standards • gaining support from the whole education community • ensuring the credibility and validity of the standards • incentives and credentialing • resolving the tension in relation to roles and responsibilities between the groups.

Issues	What is Proposed
The respective roles of the Commonwealth, the states and territory education systems and the non government sector	The framework needs to be developed at a national level to ensure consistency across Australia, yet be sensitive to local issues and be able to be interpreted at the local level. Within the current constitutional context professional associations would be best placed to work at the national level.
Are multiple sets of standards needed for different target groups such as classroom teachers, head teachers, subject leaders, principals and administrators?	The literature provides competing views on this issue. The research team will be seeking input from forum participants.
Are multiple sets of standards needed for teachers in different levels of schooling based on age groupings — early childhood, lower primary, middle schooling, upper secondary?	The literature provides competing views on this issue. The research team will be seeking input from forum participants.
Standards for Teacher Educators	A set of ICT standards for teacher educators must be developed as part of, or in concert with, a teacher ICT Standards Framework.
The dynamic nature of education in general and ICT in particular?	The framework must be structured in such a way as to be able to change and adapt progressively over the longer term to respond to developments in educational knowledge and practice, and to developments in ICT.
The relationship between an ICT Standards Framework and Curriculum	ICT student outcomes should be embedded in curriculum frameworks, course documents and student profiles.
The relationship between teacher and student ICT standards	Student ICT standards must be developed and implemented in concert with teacher ICT standards for consistency. Student competence is one measure of teacher competence.
The role of Institutional Capabilities	Two sets of institutional capabilities must be developed as part of, or in concert with, the framework: <ul style="list-style-type: none"> • capabilities for teacher education institutions; and • capabilities for education systems and schools.
A vision for educational leaders and decision makers	A strategy is needed to convince the education community at all levels of the imperative to realise the potential of ICTs in teaching and learning.

5 Notes

5.1 Characteristics of an Accomplished Teacher

The standards literature abounds with descriptions of the characteristics and attributes of an accomplished teacher. Not surprisingly there is a considerable amount of similarity between the different descriptions. They are described in terms of a number of dimensions (typically between 5 and 8) which can be summarised as follows:

- commitment to students and their learning;
- knowledge of subject discipline and pedagogy;
- effective monitoring, assessment and reporting of student progress;
- commitment to reflect critically on their own practice and to ongoing professional development; and
- participation and contribution to the whole educational community at a range of levels.

A more detailed account of the various standards frameworks is provided in the Australian and Overseas Review documents.

5.2 Issues Raised from Initial Feedback to this Draft

- under section 2.2.2 Generic Vs Subject Specific Standards a different way is suggested in looking at the different types by suggesting three types. “One way of addressing this could be to use a variation of the three-level model adopted by vocational education:
 - 1. generic (Key competencies) which underpin all teaching;
 - 2. enterprise — i.e. relating to a particular system and/or school; and
 - 3. subject specific. All three would need to be addressed in every unit of competence”.
- there is some concern that many of the issues raised at the end of section 2.2.5 Assessment of Standards are industrial and that care needs to be taken that the industrial issues do not overwhelm the educational issues.
- feedback indicates that year 10 ICT competence will be measured in South Australia using certificate 1 of the IT training package — i.e. in a vocational context — with likely start date of 2002. “The IT Cert I is applications based and would not be suitable by itself for assessing teacher competence but the approach could be similar.” There is then reference to the Education Industry Training Advisory Board (ITAB) (does one exist?) as maybe worth exploring.
- a strong case for improving/more strongly emphasising the link between ICT standards and curriculum in a number of ways:
 - although links to curriculum are mentioned in the issues table in section D it needs specific mention with a ‘powerful’ lead in as is the case with other key issues;
 - it should be a key issue for discussion at the forum;
 - there is a need to emphasise ICT student learning outcomes in curriculum frameworks, KLA documents, student learning profiles, syllabi etc. These documents must provide direction;
 - when referring to gaining the support of authorities specific mention needs to be made of Boards of Study, curriculum writing authorities, as well as the need for institutional capabilities.
- in relation to framework structure it is strongly advised that the potential structure and content of an ICT framework should get a fair chunk of time at the forum.
- in relation to potential Commonwealth/state tensions a note of warning that when we talk about states/territories it should not automatically assume only state/territory education departments. There are of course the Catholic and Independent sectors.

- teacher educators — there are a number of different types of teacher educators — content specialists, general education specialists and curriculum specialists. There is a need to be aware of the different groups and how an ICT Standards Framework may/may not apply to each group. It is suggested that the latter group is the most likely “target” for ICT competence in terms of their own teaching practice and the models of practice and case studies they present to students.
- other issues for the forum raised in the feedback:
 - the need for multiple sets of standards (e.g. teachers, subject leaders, school administrators etc) — what is the level of support for this?
 - the issue of standards for different levels of schooling (primary, secondary etc) should be tested at the forum.

Appendix 1

A Mapping of Australian Standards Developments

This document describes standards developments within Australia as follows:

- non-ICT specific standards for beginning and practising teachers (including any specific ICT references);
- ICT specific standards systems for practising teachers;
- student ICT specific standards; and
- subject specific competency/standards frameworks (including any specific ICT references).

Summary of Competency/Standards Developments

	Non-ICT Specific		ICT Specific		Student ICT Competencies
	Beginning	Practising	Beginning	Practising	
National	Yes	No	No	No	No
Australian Capital Territory	No	No	No	No	Year 10 with plans to extend to years 6 & 12
New South Wales	No, however some research published	No, however some research published	Yes	No	Years 6 & 10 under development
Northern Territory	No	No	Yes	Yes	No
Queensland	Yes	Yes	No	Yes	No
South Australia	No	Yes	No	No	No
Tasmania	No	No	No	Yes	No
Victoria	Yes	Yes	No	Yes	No
Western Australia	No	Yes	No	No	No

National

Beginning Teachers

The National Competency Framework for Beginning Teaching (Commonwealth of Australia, 1996) details five areas of competence as follows:

- using and developing professional knowledge and attitudes;
- communicating, interacting and working with students and others;
- planning and managing the teaching and learning process;
- monitoring and assessing student progress and learning outcomes; and
- reflecting, evaluating and planning for continuous improvement.

Each area of competence comprises of a number (6 to 8) of elements or descriptors. Each element is supported by a case study and a set of indicators of effective practice. Note — the case studies are not intended as samples of exemplary practice but are brief descriptions of incidents of teaching and reveal the complex, ambiguous nature of teaching. They are real stories from practising teachers. Each case study is linked to an area of competence.

The Framework is broadly based on an ‘integrated’ conception of competencies — i.e. it integrates performance and attributes and describes the minimum and essential desirable qualities and characteristics for all beginning teachers.

Mention of ICTs is made only once under the area of competence three: planning and managing the teaching and learning process, under the indicators for effective practice for element 3.2 — in the context of being able to organise resources (47).

Preparing a Profession — Report of the National Standards and Guidelines for Initial Teacher Education Project (Australian Council of Deans of Education, 1998)

This report describes a set of graduate attributes which are deemed as necessary for effective beginning teaching and a potentially successful teaching career, one of which specifically relates to ICTs. They are grouped under the following fourteen headings:

- general professional attributes;
- duty of care, health and safety;
- students and their communities;
- indigenous education;
- content studies;
- curriculum;
- literacy;
- numeracy;
- teaching and learning;
- relationships with learners and behaviour management;
- technology;
- assessment and evaluation;
- working with others; and
- working in schools and systems.

The technology attribute states that graduates should have an understanding of and ability to use appropriate technologies, particularly information technologies, to facilitate learning for administrative purposes and for professional interaction. Further, they should have a thorough understanding of how learning and information and communication technologies can be used in their particular curriculum levels and areas, be able to evaluate software, be able to develop strategies to manage classrooms that use new technologies and have the capacity to develop competency in new systems and technologies as they emerge (15).

Other National Standards

National Office of Overseas Skills Recognition

NOOSR (NOOSR, 2000) specifies the following Professional Teacher Education Requirements for teachers trained overseas as follows:

“You must be currently qualified and/or licensed to teach in the country in which you obtained your qualifications. You must provide written evidence from an appropriate official teacher licensing or employment authority from the country in which you obtained your teaching qualifications. The evidence you provide must relate to your current status as a qualified or licensed/registered teacher. If you are not currently employed as a teacher, you are still required to provide evidence that you are eligible to work or be licensed to work as a teacher.

You must have either a qualification assessed as comparable to an Australian Bachelor degree by the National Office of Overseas Skills Recognition plus at least one year of tertiary level professional teacher education, OR an integrated degree of at least 4 years’ duration or part-time equivalent which is assessed as comparable to an Australian Bachelor degree by NOOSR, including at least one year of professional teacher education. An integrated course would include studies relating to professional teacher education and studies in the teaching discipline(s).”

The Australian College of Education

Standards of Professional Practice for Accomplished Teaching in Australian Classrooms (Australian College of Education, 2000).

In this paper the characteristics to be demonstrated by professional teachers are identified as follows:

- having a broad, deep, and critically aware knowledge, understanding of and enthusiasm for the intellectual content, discourses, and values associated with disciplines from which the subjects (or curriculum areas) they teach are derived, and as appropriate to the specific contexts within which they teach;
- enjoying teaching students and by holding the highest expectations of what each student is capable of achieving;
- treating all students honestly, justly and equitably;
- being able to empathise with students;
- having an appropriate sense of humour;
- exemplifying the qualities and values that they seek to inspire in their students;
- being reflective practitioners who critique the impact of their teaching and professional values upon students, colleagues and others in the wider learning community;
- displaying adeptness and discernment in the creative use and critical evaluation of information technologies for assisting their own teaching and in advancing the learning of their students;
- providing regular, accurate feedback to students and monitoring the growth in students' learning;
- demonstrating excellence in the practical, pragmatic craft of teaching and in managing a learning environment that is interesting, challenging, purposeful, safe, supportive, positive and enjoyable;
- exercising a high level of communication and interpersonal skills;
- being committed to their own professional development;
- exercising educational leadership; and
- taking due account of the educational implications of the community's cultural diversity (13).

MCEETYA Taskforces

Teacher Preparation, Recruitment and Training Taskforce (TPRTT)

In June 2001 the TPRTT recommended the development of a "Common and Agreed National Framework for the Development of Standards for the Teaching Profession". This recommendation was subsequently endorsed by MCEETYA. The framework was to include the following elements:

- purpose/vision/elements;
- principles;
- core elements of framework;
- outcomes;
- process; and
- strategies.

However, in July/August this year all MCEETYA Taskforces were restructured and work on the development of the Framework stopped.

National Education Performance Monitoring Taskforce (NEPMT)

In relation to monitoring progress towards the National Goals for Schooling the NEPMT commissioned a report in relation to student ICT goals (MCEETYA, 2000). The report:

- describes the context of learning ICT skills and knowledge as an outcome of schooling;
- identifies and describes performance measurement approaches, definitions and sources of data currently used in relation to schooling, research and national and international reporting on ICT skills and knowledge;
- evaluates the ICT measures currently in use in the context of the Goals for Schooling in the 21st Century;

- develops a strategy for monitoring the profile of ICT skills and knowledge of the school population, including: the most appropriate types of performance to be assessed, the comparisons to be made, the target populations, and the sampling approach to be employed;
- identifies further work required to establish an operational monitoring program; and
- incorporates views and assessments of the costs and benefits to school systems of introducing a national monitoring program.

In part the report cites the need for the development of student ICT standards for years 5/6 and 9/10 to support the monitoring of national goals in relation to ICTs. Work is continuing on this project with a tendering process underway for the next phase.

Australian Capital Territory

Non-ICT Specific — Beginning and Practising Teachers

From research undertaken there are no generic standards for beginning or practising teachers in the ACT.

ICT Specific — Beginning and Practising Teachers

There are no developed ICT specific competencies/standards in the ACT.

Student ICT Competencies

The ACT Department of Education and Community Services (DECS, 2001) has implemented a system of year 10 ICT Competencies. The fifteen competency elements are group under five headings as follows:

1. Accessing Information Processes and Tools
 - Use an online catalogue to identify and locate resources for a specific information need;
 - Use keyword search strategies to refine searches;
 - Use a browser and search engine to locate and retrieve appropriate information from the World Wide Web; and
 - Use the information literacy process to develop own information literacy skills.
2. Communication and Collaboration Processes and Tools
 - Use electronic mail (compose, send, receive, read and store);
 - Participate in a team to complete a collaborative project within the school (or beyond); and
 - Select different media (e.g. text, graphics, audio, video) to obtain information.
3. Organisational Processes and Tools
 - Use a word processing application to create a printed document;
 - Use a spreadsheet application for simple calculations and to print graphs;
 - Use a database application to create and print a report; and
 - Use the basic features of a network including file management facilities and the World Wide Web.
4. Authoring Processes and Tools
 - Use a software application to develop a published piece of original work which includes graphics; and
 - Comply with copyright conventions.
5. Presentation and Visual Display Processes and Tools
 - Develop and deliver a presentation using basic applications appropriate to the task identified; and
 - Design and produce a visual display using a limited range of tools and applications to share information and ideas with a specified audience.

Students who demonstrate competence in all 15 elements during year 10 are awarded a Year 10 ICT Competency Certificate.

Plans are currently being developed to extend the student ICT competencies for assessment in years 6 and 12.

New South Wales

Non-ICT Specific — Beginning and Practising Teachers

Research for the project indicates that there are no professional standards/competencies, generic or ICT specific for practising teachers in NSW. However, the following report was commissioned by the NSW Department of Education in 1998. The status of this report is at this time unclear.

Towards Identifying Professional Teaching Standards for NSW Schools (NSW Department of Education and Training, 1998) describes seven elements of competence stating that exemplary teachers:

- have a mastery of the content and discourse of their discipline(s);
- are expert in the art and science of teaching;
- are accomplished in assessing and reporting the learning outcomes of their students;
- manage the classroom and other teaching sites in an exemplary way;
- are committed to their students and their holistic development;
- are reflective practitioners and embody the qualities of the educated person and exemplary citizen;
- are leaders of learning communities.

Element 2 which relates to effective teachers being expert in the art and science of teaching states that “effective teachers are capable of using information technologies creatively and with critical discernment” (66).

ICT Specific — Beginning Teachers

The New South Wales Department of Education and Training published the report *Computer Proficiency for Teachers* (MACQT, 1997). The report states that: “The major challenges to be faced in the integration of technology in the classroom will be the pedagogical implications, the impact on the structure and content of curriculum, classroom organisation and practice and the changed role of the teacher” (5). Further, the report states that the key issue is pedagogical rather than technical, and that teachers need to come to terms with the pedagogical challenges that effective classroom use of ICTs pose. In addition, it argues that the development of critical and discerning attitudes and values related to computers and associated software and applications is equally as important as competence.

It argues that some basic competencies are desirable for all teachers, however that not all teachers need be expert in all aspects of ICTs. The following are the basic competencies required for beginning teachers:

Basic operations

- an understanding of the functions of various computer components
- use of a variety of software, including basic word processing, database and spreadsheet functions
- information retrieval through the use of CD-ROMs and other commercial programs
- preparation of graphics and art works
- simple desktop publishing
- drill and practise activities.

Information technology

- using multimedia presentations
- using interactive presentations
- the ability to use the Internet and electronic mail programs
- awareness of overall developments in communications and information technologies and of their potential for student learning.

Evaluation of software

The ability to:

- select and evaluate technology-based learning materials
- determine underlying pedagogical assumptions, gender and ethnic bias, educational relevance, social impact, suitability for the classroom environment, for cooperative learning and for peer interaction
- generate lesson plans
- match computer applications to specific curriculum content and processes
- evaluate software for educational purposes
- structure subject programs and lesson to incorporate useful and appropriate computer activities
- evaluate student learning from computer-based activities.

Pedagogical issues

- understanding of how computer technology can enhance student learning and help learners explore their world
- the creation of self-regulating learning environments
- the management of classroom environment and school resources
- the ability to use computers for student profiling and reporting, lesson preparation and class/faculty administration.

Values and ethics

- recognising plagiarism
- understanding the issues of copyright, censorship and privacy
- recognising the issues of appropriate access to, and verification of, information gained from such sources as the Internet
- interpersonal skills for working in environments where colleagues have a wide range of abilities in using the new technologies.

This set of competencies is:

- used by the Teacher Qualification Advisory Panel as part of the process of advising on the suitability of teacher education programs; and
- mandatory (since 2000) for teachers employed by the Department.

Research undertaken by this project indicates that now all NSW teacher training institutions make use of these competencies in program design and assessment.

The report included a survey of NSW teacher training universities and a range of schools. The results of the surveys indicated that in general universities provide beginning teachers with the skills to understand and have some competencies in using computer applications in schools. However, information from the school survey indicated that the level of competence was not sufficient for what was required by the schools.

The school survey also identified the following major computer skills as being essential:

- word processing skills;
- understanding of various software titles /types and how to use them;
- basic survival/trouble shooting and maintenance skills.
- classroom management skills; and
- skills in accessing and evaluating various software programs and using them as a teaching tool across the Key Learning Areas.

The school survey also identified a number of common key themes:

- the need to have someone on staff to trouble shoot technical problems;
- professional development needed to be ongoing and time had to be provided for teachers to practise and refine newly learned skills;
- teachers should be able to evaluate software and its application across the KLAs;
- teachers need to develop different classroom management skills whether there was one computer in the room or a computer laboratory; and
- teachers, especially beginning teachers, needed a positive attitude to technology.

ICT Specific — Practising Teachers

There are no developed ICT specific competencies/standards for practising teachers in NSW.

Student ICT Competencies

The NSW Department of Education and the NSW Board of Studies have each commenced work on developing student ICT competencies for year 6 and year 10 students respectively. Research indicates that these developments will undergo an implementation trail in 2002.

Northern Territory

Non-ICT Specific — Beginning and Practising Teachers

There are no articulated competencies/standards for beginning or practising teachers in the Northern Territory.

ICT Specific — Beginning and Practising Teachers

The Department of Education have published a set of *Base Line Competencies in ICT* (Northern Territory Department of Education, 2001) for both practising and pre-service teachers. It is not intended that all teachers reach all the competencies. They represent a set of guidelines that might be realised in practice to use a given application effectively. The competencies are application specific and where relevant are provided in both Macintosh and Windows versions.

The competencies are grouped as follows:

- basic computer operations and concepts;
- setup, maintenance and troubleshooting;
- networks;*
- word processing and desktop publishing;
- multimedia;*
- spreadsheets and graphing;
- database;
- communications;
- media;*
- computer coordinator skill;* and
- network support officer skills.*

* competencies for these areas are still in draft form (August 20, 2001).

Student ICT Competencies

There are no ICT competencies developed for students in the Northern Territory.

Queensland

Non-ICT Specific — Beginning Teachers

All teachers wishing to teach in Queensland schools must be registered with the Queensland Board of Teacher Registration. The Board has two major functions:

- to ensure that teacher education programs are acceptable for the purpose of teacher registration;
- registration of teachers.

The guidelines on the *Acceptability of Teacher Education Programs for Teacher Registration Purposes* (Queensland Board of Teacher Registration, 1999) are produced to assist institutions to develop programs which will enable graduates to be registered as teachers in Queensland.

The Guidelines detail seven areas for the accreditation of teacher education programs as follows:

- Institutional Procedures for Program Development;
- Selection for Entry to Program;
- Philosophy and Goals of Programs;
- Structure of Programs;
- Content of Programs;
- Teaching and Learning Approaches of the Program; and
- Assessment of Student Work.

In relation to ICTs the Guidelines make two specific references under Content of Programs as follows:

- Teacher education graduates should have an understanding of the implications of learning technology, information technology and communication technology for educational practice (12);
- Teacher education graduates should have an understanding of and ability to use appropriate technologies:
 - to facilitate learning;
 - for administrative purposes; and
 - for professional interaction (14).

Non-ICT Specific — Practising Teachers

Education Queensland are currently developing a teacher professional standards framework — *Professional Standards for Teachers — Guidelines for Professional Practice* (Education Queensland, 2001). The latest draft version was published in July 2001 at http://education.qld.gov.au/learning_ent/ldf/standards/teachers.html.

The standards are being developed as part of Education Queensland Strategic Plan 2000–2004, are generic in nature defining knowledge, skills and abilities and apply to all teachers in state education in Queensland.

The purpose of the standards is to:

- provide a platform for teachers to identify and then drive their continuing learning and development;
- inform program development for pre-service education; and
- represent the aspirations of the teaching profession.

Teachers employed by Education Queensland may use the standards to identify and develop plans to support their personal learning and development needs. It is envisaged that teachers will elect to “dip in and out of” individual standards as they engage with the standards rather than considering the standards as a whole. As such teachers, either individually or in collaboration with colleagues and mentors, may reflect on selected standards when:

- reviewing student learning and teaching practice;
- formulating goals to strengthen teaching practice;
- establishing personal learning and development plans; and
- monitoring their achievement of personal learning and development goals.

The Standards have been developed using a deliberate professional learning and development agenda, not as part of the performance management arrangements for Education Queensland. It is also intended that the standards are seen as an important guide for those seeking to enter the teaching service.

The Standards provide eleven inter-related dimensions of teacher practice. They structure innovative and flexible learning experiences for individuals and groups that:

- foster language, literacy and numeracy development;
- are intellectually challenging;
- connect with the world beyond the school;
- are inclusive, participatory and socially critical;
- incorporate the use of information and communication technologies;
- are underpinned by valid and reliable assessment processes.

Further, it is envisaged that these learning experiences will be provided by teachers who have the skills, knowledge and commitment to:

- provide safe and secure learning environments;
- support the social development and participation of young people;
- build relationships with families, community and business;
- participate in professional work teams; and
- engage in professional practice.

The format of the Standards is as follows:

- a standard title;
- a standard descriptor;
- indicators; and
- underpinning skills and knowledge.

The standard relating to ICTs is as follows:

Integrate information and communication technologies to enhance student learning

This standard covers the requirement for planning, implementing and monitoring teaching and learning strategies that integrate a range of information and communication technologies to promote and enhance student learning.

Statement	Indicators
1. Determine student learning needs in relation to the use of available information and communication technologies.	<ul style="list-style-type: none"> • A range of strategies is used to gather data on students' prior learning, interests, and learning styles in relation to information and communication technologies. • Collected data is analysed to determine student learning needs in relation to information and communication technologies.
2. Select information and communication technology-based learning strategies and resources to meet student learning needs and styles.	<ul style="list-style-type: none"> • Information and communication technologies-based resources, software and learning strategies are evaluated and selected according to their capacity to promote learning goals and meet students' needs, characteristics and learning styles. • Systems, resources and technology-based learning strategies are selected that: <ul style="list-style-type: none"> – support individualised and collaborative learning – promote the involvement of all group members – recognise individual learning differences – ensure equity and access for all students – allow students to manage the pace and sequence of learning. • Individual learning needs and personal circumstances are taken into account in allocating access to systems and resources.
3. Create learning experiences in which students actively use information and communication technologies to organise, research, interpret, analyse, communicate and represent knowledge.	<ul style="list-style-type: none"> • Learning plans are developed which reflect an understanding of the way information and communication technologies may be used to promote and enhance student learning across a range of teaching and learning activities. • Information and communication technologies-based learning strategies are selected that foster computer-mediated communication and enable students to engage in learning through a range of collaborative activities. • Learning activities are structured to incrementally develop information and communication technology skills. • Safe and effective student access to technology is planned and implemented taking into account available resources and the nature of the teaching and learning activity. • A range of group management strategies is implemented to ensure the achievement of learning goals, the active participation of all students and the management of inappropriate behaviour. • Learning activities are selected and implemented that involve students in actively accessing, organising, researching, interpreting, analysing, communicating and representing knowledge through the application of information and communication technologies. • Learning activities are planned and implemented that involve students in reflecting critically on the use, applications and outputs of information and communication technologies. • Student activity is monitored and assistance with using hardware, software and networks is provided. • Common technical problems relating to the use of computer software and hardware are addressed and major technical problems are identified and reported in line with school policy and procedures.

Statement	Indicators
4. Evaluate the effectiveness of information and communication technologies approaches to teaching and learning.	<ul style="list-style-type: none"> • The effectiveness of information and communication technology-based approaches to teaching and learning is evaluated by monitoring students' understanding, patterns of use, performance on specific tasks and feedback. • Evaluation outcomes are incorporated in reviews of information and communication technology-based approaches to teaching and learning. • Information and insights gained through the review of information and communication technology-based approaches to teaching and learning are shared colleagues and other relevant personnel.
5. Use information and communication technology tools to access and manage information on student learning.	<ul style="list-style-type: none"> • Education Queensland and school policies and procedures related to the use of information and communication technologies tools for accessing and managing student information are known and followed. • Student information is maintained using appropriate systems and software.

Underpinning knowledge and skills

This aspect of professional practice is informed by a knowledge and understanding of:

- Education Queensland and school policy and documents on Information and Communication Technologies, including Schooling 2001, Guidelines for the use of Computers in Learning, CD ROM — Computers in Learning, Minimum Standards for Teachers — Learning Technology;
- Relevant curriculum frameworks, syllabus or program documents;
- Productive Pedagogy;
- Strategies for integrating information and communications technologies skills across curriculum areas;
- Information and communication technology-based teaching and learning strategies;
- Learning technology resources — print, CD-ROM, DVD, software packages, on-line resources;
- Systems for program delivery — stand alone and networked computers, on-line systems, broadcast, telecommunications;
- Electronic support and communications systems — Email, Bulletin Board, www;
- Data collection technology — student management systems, electronic markbooks, curriculum management systems;
- Management of computer resources in learning environments; and
- Content area and trans-disciplinary knowledge.

In terms of assessment it is expected that teachers may able to demonstrate a particular standard in a range of different contexts and in a variety of ways by reflecting on their professional practice. Teachers may reflect individually on the way in which they apply the standards to guide their personal learning and development planning. However, others may choose to work through the process:

- individually;
- with a critical friend or mentor; or
- in team situations such as a group of teachers who are involved in team teaching, teaching the same year level or who are members of the same teaching department or broader school teams.

ICT Specific — Beginning Teachers

There are no published separate ICT standards for beginning teachers.

ICT Specific — Practising Teachers

In 1997, as part of an Enterprise Bargaining Agreement (which expires at the end of 2001), Education Queensland developed and implemented a set of *Minimum Standards for Teachers — Learning Technology* (Education Queensland, 1998). All schools received funding to develop, maintain and increase teachers' skills in the learning technology standards and the application of these to learning and teaching in all key learning areas.

The standards are divided into four key areas as follows:

- Information Technology skills which focus on the operation and use of both hardware and software;
- curriculum application including classroom planning and management which addresses the use of learning technology in key learning areas and encompasses classroom management strategies;
- school planning which looks at the processes and procedures which promote continuity and coordination of learning technology activity at the whole school level (this relates to the development of a Management and Learning Technology Plan by every school); and
- student centred learning which deals with the application of effective learning and teaching processes to learning technology.

Process

Schools were invited to develop and explore their own processes for implementation of the minimum learning technology standards for teachers, however the following process was suggested as having been trailed as effective:

- brainstorm issues relating to current learning technology programs within the school;
- collect data on the two main areas
 - human resource audit (using minimum learning technology standards checklist);
 - physical resource audit (hardware and software registers, location of resources, etc);
- collate data — establish a database;
- analyse data to inform future decision making about resourcing and professional development;
- design professional development programs for teachers;
- survey teachers for preferred professional development modes;
- implement professional development courses and training programs; and
- apply skills and strategies from professional development to classroom practice and school planning.

A checklist of descriptors (see below) was developed for teachers to use to assess their current level in each of the four key areas. Schools can gather data from staff to establish the current levels of teachers to inform the design and development of professional development programs.

The systemic target for the year 2001 is “*all teachers with a minimum level of skill in the use of computers for learning.*” This means that teachers are expected to attain the Minimum Standards for Teachers — Learning Technology in all four areas. Not all descriptors are mandatory.

Assessment and Credentialing

The key elements of the assessment and credentialing process are:

1. Responsibility for assessing the standards lies with the Principal or their delegate.
2. The process used for assessment is a school based decision. The determination of the process requires consultation with staff and, in larger schools, consideration by the Local Consultative Committee in accordance with the requirements of the Enterprise Bargaining Agreement.
3. In order to receive a learning technology credential, teachers must demonstrate the attainment of all bolded descriptors in each of the four key areas. The emphasis must be on the application of the standards to the teaching and learning process.
4. When a principal is satisfied that a teacher has achieved the standards in all four key areas, an Education Queensland credential should be sought by forwarding the proforma in Appendix A to the Centre for Teaching Excellence. (Principals have the capacity to recognise the prior learning of experienced teachers in each of the four key areas).
5. An Education Queensland certificate will be issued for presentation to the teacher by the Principal.
6. If a teacher wishes to gain credit with a tertiary educational institution in Queensland, they present the Education Queensland certificate and the mandated contents of a portfolio (see Appendix B) to their course convenor.
7. Non-teaching staff may also seek a credential using a similar process, by consulting either the Principal of their base school or the line manager in their workplace.

A range of support materials were also produced to assist schools in the assessment process.

To date project research has not been able to ascertain whether any study has been undertaken as to whether the stated goal for all teachers has been achieved.

1 IT Skills — Minimum Standards for teachers

Goal: A teacher will develop skills in the use of computers for their own personal ends, such as administration, preparation and presentation.

Standards: A teacher will produce documents for their own use, for example, timetables, markbooks, certificates, worksheets and letters.

A teacher will be able to perform the following IT Skills on the computer platform located in their own classroom or school setting.

	Descriptors	Checklist
Hardware	<ul style="list-style-type: none"> • recognises basic system components and connections (monitor, keyboard, CPU, printer) • operates a printer — changes ribbon or cartridge, loads paper or envelopes • recognises input devices (keyboard, mouse) • determines the configuration (knowledge of the memory capacity e.g. 8mb and the hard drive capacity e.g. 800mb) • starts up and shuts down system or software 	
Software	<ul style="list-style-type: none"> • understands basic operating system functions <ul style="list-style-type: none"> – files and directories or folders – menus and desktops – deleting, copying and moving files – backup systems – virus protection • performs basic word processing operations <ul style="list-style-type: none"> – create new documents – open and close files – save and edit – cut and paste – basic formatting and printing of a document • is aware of categories of software: publishing, word processing, spreadsheet, database, multimedia, communications 	
Telecommunications	<ul style="list-style-type: none"> • uses basic functions of a WWW browser to search and locate information (e.g. activate link, move forward and back, print page, etc) • sends and receives an email message 	

2 Curriculum Applications Including Classroom Planning and Management — Minimum Standards for teachers

Goals: A teacher will incorporate the use of computers as teaching/learning tools in achieving and extending curriculum goals. A teacher will ensure equitable access, participation and outcomes for students in their use of computers for learning.

Standards: A teacher has an awareness, knowledge and understanding of the use of learning technology across the curriculum. A teacher plans and implements computer based activities with his/her students.

Descriptors	Checklist
Selecting worthwhile activities	<ul style="list-style-type: none"> • is familiar with Education Queensland's Computers in learning policy and guidelines • explores a range of software types and their possible applications: <ul style="list-style-type: none"> – content free (generic) – curriculum software – electronic information systems (CD ROM and Internet) • identifies software appropriate for a variety of student needs within their class • uses prepared evaluations of software packages and matches software with curriculum goals
Organising worthwhile activities	<ul style="list-style-type: none"> • organises student access to CD ROMs and Internet based resources for research projects or for special education students, organises access to appropriate adaptive technologies • delivers and assesses student learning activities using at least one curriculum software package and one generic software package • designs computer based learning tasks which have explicit links to curriculum goals and learning outcomes
Classroom Management	<ul style="list-style-type: none"> • recognises the various models of computer access appropriate for student activities (e.g. whole class, small group, individual) • adjusts students access to computers in response to the nature of the learning activity • implements procedures which: <ul style="list-style-type: none"> – provide students with flexible (vary duration) access – provide students with regular access – meet the need/s of curriculum activities • organises student use of computers as part of the planned learning activities given the available resource base: e.g. <ul style="list-style-type: none"> – book computer lab – contracts – learning centres – rosters
Review and Evaluation	<ul style="list-style-type: none"> • reflects on the planned learning activities which incorporate the use of computers • identifies the strengths and weaknesses of the activity and the resources • shares their learning experiences with a colleague

3 School Planning — Minimum Standards for teachers

Goals: A teacher will participate in ongoing discussions and experimentation related to the use of computers in the curriculum.

Standard: A teacher has an awareness and knowledge of the learning technology elements of the school Management and Learning Technology (MALT) plan.

Descriptors

Checklist

-
- A teacher is aware of and understands the learning, teaching and curriculum section of the school's MALT plan

 - A teacher is aware of learning technology professional development programs for staff

 - A teacher is aware of learning technology funding and decision making processes in the school

 - A teacher can identify the link between the learning, teaching and curriculum section of the MALT plan and their planning and classroom practice

 - A teacher discusses continuity in the integration of learning technology with other staff across year levels and curriculum areas

4 Student Centred Learning — Minimum Standards for teachers

Goal: A teacher will participate in ongoing discussions and experimentation related to the use of computers in the curriculum.

Standard: A teacher has an awareness of the principles of effective learning and teaching in his/her use of learning technology.

	Descriptors	Checklist
Understand the learner	<ul style="list-style-type: none"> • Identifies students' prior experience with and attitudes to computers at home and at school • Adapts computer based activities for students with special abilities, needs and interests • Accommodates the learner as an individual and independent learner as well as a member of a group • Provides a variety of computer based learning activities to cater for diversity of learning styles 	
Understand the learning process	<ul style="list-style-type: none"> • Is aware of how computers can support all elements of the learning process: perception, processing and (re) presentation • Provides a clear focus and purpose for computer based activities • Balances guided and self directed activities 	
Supportive and challenging environment	<ul style="list-style-type: none"> • Creates a warm supportive atmosphere which fosters risk taking • Uses open ended software and open ended tasks to promote problem solving • Uses the technology to extend the learning environment beyond the walls of the classroom 	
Worthwhile partnerships	<ul style="list-style-type: none"> • Facilitates peer tutoring and cooperative learning processes • Utilises support staff, teacher aides, parents and community members • Identifies and liaises with a more experienced teacher in the use of learning technology 	
Social and cultural contexts	<ul style="list-style-type: none"> • Provides opportunities for learners to share their perceptions of technology in society • Reflects on the impact of new technologies and cultural change on the curriculum, structure and organisation of schooling, and the nature of childhood 	

Student ICT Competencies

There are no developed ICT competencies for students in Queensland.

South Australia

Non-ICT Specific — Beginning Teachers

The Teachers Registration Board of South Australia registers teachers for a period of three years. Registration is based on tertiary qualifications, however this is currently under review. The current *Minimum Prescribed Qualifications for Registration* (Teacher Registration Board of South Australia, 2001) does not make any mention of professional standards (other than academic qualifications). In addition, there is no specific mention of ICT standards.

Non-ICT Specific — Practising Teachers

From the document *Teachers'Work* (South Australian Department of Education, 2001), first published in 1992, and updated in February 2001.

The purpose of the document is to “assist teachers, directors and principals to clarify practice, establish priorities, guide improvement and avoid role ambiguity. In doing this it will become an important resource in the establishment and implementation of effective performance management processes.” *Teachers'Work* is used only as a guide for teacher practice.

It describes eight core areas or dimensions of teachers' work with descriptors and indicators for each descriptor:

Programming and Planning

- The teacher should provide a balanced and challenging program relevant to the learning needs of children/students, and consistent with the ideals and aims of public schooling in South Australia.

In particular, under this core area there is specific mention of ICT competencies as follows:

Descriptor	Performance Indicators
incorporates the use of Information and Communication Technology strategies into the planning for the learning program	<ul style="list-style-type: none"> • can articulate how Information and Communication Technology (ICT) can enhance learning • provides children/students with the opportunity to use Information and Communication Technology in their learning • develops programs based on Information and Communication Technology to achieve identified learning outcomes.

Relationships for Learning

- The teacher should develop and maintain working relationships which support a cooperative, collaborative and congenial learning climate and foster links with the home/community.

Teaching Methodology

- The teacher should apply curriculum knowledge and teaching methods which facilitate successful children/student learning.

Children and Student Needs

- The teacher should respond to the needs, rights and contributions of all children/students and take into account their gender, abilities and geographical, cultural, linguistic and socio-economic backgrounds in order to promote equality of educational opportunity.

Managing the Learning Environment

- The teacher should establish structures and processes to achieve a productive learning environment.

Behaviour Management

- The teacher should employ behaviour management strategies which ensure a safe, orderly and success-oriented learning environment.

Assessment and Reporting

- The teacher should assess, record and report student achievement to encourage and assist learning.

Professional Responsibilities

- The teacher should actively carry out the non-instructional responsibilities which are part of the teacher's role.

ICT Specific — Beginning and Practising Teachers

There are no developed ICT competencies/standards for beginning or practising teachers in South Australia.

Student ICT Competencies

There are no developed ICT competencies for students in South Australia.

Tasmania

Non-ICT Specific — Beginning and Practising Teachers

The Tasmanian Government is in the process of establishing a Teacher Registration Board to be operational from the beginning of 2002. In 2002 the Board will begin registering all beginning teachers and subsequent to this will require the registration of all practising teachers. At this stage registration will be based on suitability, and appropriate academic qualifications or academic qualifications and experience.

ICT Specific — Beginning Teachers

The Department of Education does not have any mandatory ICT competencies for beginning teachers.

ICT Specific — Practising Teachers

The Department of Education has implemented the Educational Computing, Professional Learning project (Department of Education, Tasmania, 2001) for all Tasmanian Government teachers. Part of the project is to ensure all teachers have competent skills in the use of computers in five modules as follows:

- Introduction to Computers in Education;
- Word Processing and Publishing in Education;
- Internet and e-mail in Education;
- Multimedia and Web publishing; and
- Integrating ICT into Teaching and Learning.

Completing the modules is voluntary although a high percentage of teachers (over 75% have completed the first 3 modules).

The following is part of the Introduction to Computers in Education module:

Unit 1 — Introduction to Computing in Education

Learning Outcome	This will be evident when, for example, participants	Types of Evidence
Create and manage files and information	<ul style="list-style-type: none"> • Use icons and menus to open, close and save new files/directories • Copy and delete files • Open a file created previously • Change drives to open and transfer different files 	<ul style="list-style-type: none"> • Demonstration • Planning documents • Work samples • Testimonial from teaching peers and/or managers • List of references • Evaluative and reflective commentary
Select and manipulate material for specified needs	<ul style="list-style-type: none"> • Select a section of a document for editing • Insert or delete a piece of text • Change font, font size and bolding to achieve desired effect • Insert numbers and bullets in a document • Set up margins and indents within a document • Save edited version of a document 	
Manage and use educational software	<ul style="list-style-type: none"> • Recognise standard icons in software for general application • Identify the educational value of features in a piece of software • Assess software for application in different learning areas • Recognise classroom implications of using a range of software 	
Produce material for personal and/or classroom use	<ul style="list-style-type: none"> • Prepare a document for personal or classroom use • Lay out text to achieve desired effects • Use spell-checker and remove effects • Arrange page set up and preview text prior to printing 	

Each module is supported by notes and exercises.

Assessment is carried out using a portfolio of professional learning. Outcomes can be demonstrated in a number of ways including Recognition of Prior Learning, through professional development programs and courses or through work in the work place. Evidence for assessment can include a wide range of media including exemplars of work, video tapes, testimonials, curriculum vitae and other materials the teacher and the assessor consider relevant. The following key principles are essential for recognition:

- Validity — does the evidence of learning address what it claims to?
- Authenticity — has the evidence been verified as genuine?
- Currency — is the evidence relatively recent?
- Sufficiency — is there sufficient evidence to justify the claims you are making for credit?
- Reliability — is the evidence sound enough to ensure that different assessors would reach similar conclusions?

Assessment is carried out by In-school Resource Teachers trained and funded by the Department.

In addition, teachers can undertake the **Graduate Certificate in Education (Computing for Teaching and Learning)** (Department of Education, Tasmania, 2000). This is a national vocational education qualification accredited through the Australian Quality Training Framework. This post-graduate qualification is for experienced, qualified teachers and school leaders who wish to demonstrate their competence as teachers using computers for teaching and learning. To gain the award seven modules must be completed including the first two essential modules — Teaching and Learning and Implementing Good Practice. It comprises nine modules as follows:

Module 1 — Teaching and Learning

Adopt, adapt and invent good and emerging uses of computer-based technologies for teaching and learning practices

- 1.1 Incorporate computer-based technologies into teaching and learning in ways that reflect understanding and application of good and emerging educational practices.
- 1.2 Provide learners with computer-based opportunities to access, extend, transform and create as well as share ideas and information in different areas of learning.
- 1.3 Use IT to access and report information on the progress and achievement of learners, as appropriate.
- 1.4 Use computer-based technologies to access, devise and produce educational resources to support learning.

Module 2 — Implementing Good Practice

Coordinate processes for the implementation of good practices where IT is used to support learning

- 2.1 Coordinate and collaborate with individuals and groups to implement agreed practices for the use of IT to support learning.
- 2.2 Coordinate and collaborate with individuals and groups to create functional and secure computer-based learning environments.
- 2.3 Arrange human, physical and financial resources to ensure educational purposes drive implementation decisions.

Module 3 — Professional Activities

Apply IT knowledge and skills to professional activities that use IT to support learning

- 3.1 Use computer-based communication tools for professional interaction.
- 3.2 Operate ethically and legally when using IT in professional activities related to teaching and learning.
- 3.3 Use IT for educational recording purposes related to teaching and learning practices.

Module 4 — Learning Environments

Integrate computer-based technologies into learning environments to enhance good practice

- 4.1 Plan the use of computer-based technologies to assist learners in meeting their needs, goals and aspirations.
- 4.2 Create computer-based learning environments that support good and emerging teaching and learning practices.
- 4.3 Match computer-based learning environments with selected learning outcomes to enhance teaching and learning.

Module 5 — Management and Access

Manage the accessibility of computer-based technologies for learners

- 5.1 Manage computer-based learning systems and environments.
- 5.2 Direct the installation and customisation of computer software as appropriate for the needs of learners.
- 5.3 Negotiate codes of practice for the use of computer-based technologies to support teaching and learning.
- 5.4 Ensure equitable access to hardware and software within the learning environment.

Module 6 — Leadership Practices

Provide leadership for the integration of information technologies for learning within the organisations' educational plan

- 6.1 Utilise key people with IT knowledge and skills from the organisation and wider community.
- 6.2 Provide processes which involve all stakeholders in developing a shared vision.
- 6.3 Facilitate the formulation of a strategy to integrate IT into the organisation.

Module 7 — Research and Development

Facilitate the research, review and development of good practices that use IT to enhance learning outcomes

- 7.1 Set up processes for ongoing research by stakeholders to review and develop good practices in IT.
- 7.2 Facilitate collaboration and networking with other organisations in education and in the community.
- 7.3 Facilitate appropriate modifications to management, learning and communication practices that use IT.

Module 8 — Evaluation and Review

Manage monitoring and evaluation processes to review and improve intended outcomes

- 8.1 Use appropriate models of evaluation to determine the effectiveness of integration of IT to support learning.
- 8.2 Ensure evaluation processes, including the monitoring of equity issues.
- 8.3 Develop action plans to address the outcomes from evaluation and feedback.

Module 9 — Collaboration and Communication

Incorporate collaboration and communication with stakeholders and the community into strategies for the use of IT to support learning

- 9.1 Provide information to stakeholders to promote and sustain evolving and ongoing use of IT for learning.
- 9.2 Share information and understanding with stakeholders about the integration of IT for learning in the organisation.
- 9.3 Provide community access and information, as appropriate, and networks for community support that promote good practices and innovation using IT to support learning.

Currently teachers are subsidised by the Department of Education to undertake the Graduate Certificate and those who complete the certificate gain a one year salary increment if they are not already at the top of their pay scale. For those working outside the Tasmanian Department of Education the fee for assessing Recognition of Current Competence (RCC) is \$300 per module or \$1000 for the complete qualification. Up to 50% credit transfer towards a Master of Education has been negotiated with The University of Tasmania for those gaining the Graduate Certificate in Education (Computing for Teaching and Learning).

At this stage it is only possible to gain the qualification through RCC but at a later stage it may be possible to undertake coursework. Assessment involves presenting evidence and having it assessed against learning outcomes. Participants are supported through the process by a qualified assessor.

Student ICT Competencies

There are no developed ICT competencies for students in Tasmania.

Victoria

Non-ICT Specific — Beginning Teachers

The Standards Council of the Teaching Profession, by authority of the Education (Standards Council) Act 1997, evaluates pre-service teacher education courses for recommendation for employment of their graduates as teachers in Victorian schools. It provides formal advice to the Secretary of the Department of Education.

The Secretary's decision on each course is communicated to government schools and also to the Registered Schools Board which registers teachers for employment in non-government schools in Victoria, as well as to the originating university.

In *Guidelines for the Evaluation of Teacher Education Courses* (Standards Council of the Teaching Profession, 1998a) the following are the expectations of graduates in using learning technologies to enhance student learning and teaching organisation:

- demonstrate a critical and creative approach to learning situations;
- demonstrate a developing competence and confidence in the use of a range of learning technologies in the classroom. Beginning teachers need not be expert in all aspects of learning technologies, they are however expected to be computer literate and proficiency is desirable in:
 - using basic computer applications, including word processing, data base and spread sheet packages;
 - using desktop publishing and presentation software;
 - using multi-media and interactive presentations;
 - using communication technologies, including the world wide web and electronic mail; and
 - using courseware specific to particular KLAS.
- demonstrate an awareness of a range of learning technology resources and how they can be integrated constructively and creatively with other resources to produce a challenging and rigorous curriculum;
- create a classroom environment in which learning technologies are an integral component;
- employ learning technologies to assist students develop critical skills of analysis, reasoning, problem-solving and decision making and provide opportunities for students to be engaged in activity which is essentially self-regulating and cooperative;
- demonstrate confidence and competence in solving common basic problems in using software, hardware and networks in classroom contexts;
- demonstrate use of computers for aspects of reporting and record keeping, administrative duties, lesson preparation and presentation, and professional interaction; and
- demonstrate alertness and responsiveness to the social and ethical considerations associated with discriminating and responsible use of learning technologies such as equity of access, privacy and copyright. Beginning teachers should also be equipped with strategies to assist students in dealing with sensitive material which may challenge, offend or deny societal or personal values (8).

Non-ICT Specific — Practising Teachers

Ministerial Advisory Committee for the Victorian Institute of Teaching (Standards Council of the Teaching Profession, 1998b) — Professional Standards for Teachers describes five generic dimensions of teaching encompassing the work that teachers do:

1. Professional Responsibilities
2. Content of Teaching and Learning
3. Teaching Practice
4. Assessment and Reporting of Student Learning
5. Interaction with the School and Broader Community.

Within each dimension there is a list of characteristics with performance indicators for each of the four stages of teaching development — beginning teacher, experienced teacher, leading teacher level 2, leading teacher level 3.

Specific mention of ICT capability includes:

Under Professional Responsibilities, one characteristic states:

- ‘working with colleagues to plan, implement and evaluate new ideas, teaching strategies and applications of learning technologies that improve learning outcomes for students’.

Under Stage 3 of this characteristic the performance indicator states that teachers should:

- ‘encourage colleagues to explore and evaluate new ideas, learning technologies and teaching strategies that improve learning outcomes for students’.

Under Content of Teaching and Learning, a stage 4 performance indicator states that teachers should:

- ‘initiate, plan and manage school-wide review of programs in response to new education directions and new learning technologies that enhance student learning’.

Under Teaching Practice stages 1 and 2 performance indicators respectively state that teachers should:

- ‘demonstrate effective use of teaching and learning tools such as curriculum materials, learning technologies and other resources which improve learning outcomes’; and
- ‘utilise a range of learning tools and technologies in the classroom to appropriately support the learning process strategies’.

Under Assessment and Reporting of Student Learning, a stage 2 performance indicator states that teachers should:

- ‘effectively use computer applications for reporting purposes’.

ICT Specific — Beginning Teachers

ICT competencies for beginning teachers are included in the generic standards as detailed above.

ICT Specific — Practising Teachers

Victoria, through the Professional and Leadership Development Centre, has developed and published a resource package in the relation to *Learning Technology Teacher Capabilities* (Department of Education, Victoria, 1998a). The package comprises five documents:

- Learning Technologies — Capabilities Statement
- Learning Technologies — Capabilities Guide
- Learning Technologies — Skill Development Matrix
- Professional Development Support Matrix
- Learning Technologies — Teacher Survey and Analysis Program.

Learning Technologies — Capabilities Guide is a resource document designed to guide the development of personal and school professional development plans.

Learning Technologies — Capabilities Statement identifies teacher learning technology capabilities in five areas which relate to the five dimensions of teaching (from Professional Standards for Teachers — www.sofweb.vic.edu.au/macvit/). The five areas are:

- Approaches to Teaching and Learning
- Classroom management and practice
- Curriculum planning and development
- Monitoring and reporting student progress
- Learning technologies skills for classroom and administrative purposes.

Each area is elaborated with a number of capabilities, each supported by a suggested professional development strategy. For example:

Area for Development	Learning Technologies Teacher Capabilities	Professional development strategies
Classroom management and practice	Understand the range of classroom organisational structures that effectively support use of learning technologies	<ul style="list-style-type: none"> • observe the physical arrangement of a range of leading practice classrooms where learning technologies have been successfully integrated • using SOFWeb, research various models of classroom organisation and management styles for integrating learning technologies into the classroom • trial different arrangements of available technology that provide equitable student access and consider health and safety issues • explore classroom strategies for learning with technology that use a range of student groupings

Learning Technologies — Skill Development Matrix identifies six areas for skill development in the use of learning technologies for classroom and administrative purposes:

- Using and managing technology
- Using basic computer applications
- Using desktop publishing and presentation software
- Using multimedia
- Using communications technologies
- Using learning technologies in the key learning areas.

Professional development goals and strategies at three stages of development are identified in each of the six areas.

The 3 stages of development are:

Stage 1

- exploring a new facet of learning technologies
- developing new skills
- beginning to understand the role that learning technologies might play in the classroom.

Stage 2

- refining personal skills
- incorporating the learning technology into existing classroom practice
- developing classroom practices that effectively integrate learning technologies.

Stage 3

- developing advanced skills
- exploring innovative possibilities for classroom use of learning technologies
- sharing knowledge and skills with others.

The three stages of development are a compressed version of the five stages identified by the Apple Classrooms of Tomorrow Project (Apple Computer, 1996).

An example from one part of the Skills Matrix:

Areas for Development	Professional development goals	Professional development strategies
Using basic computer applications	<p>Stage 1</p> <p>Develop skills in a range of basic computer applications</p>	<ul style="list-style-type: none"> • Undertake a self-paced learning course to develop basic skills in an application, for example word processing • Seek the assistance of an experienced user for a specific purpose, for example developing a database of resources • Undertake a beginner's training course in the use of an application, for example spreadsheets • Join a computer user group to share knowledge of basic computer applications with other staff and students • Work with an experienced computer user to incorporate use of basic computer applications in lesson preparation and presentation, record keeping and report writing • Visit leading practice classrooms to observe how basic computer applications are integrated in classroom programs
	<p>Stage 2</p> <p>Use basic computer applications where appropriate for classroom and administrative purposes</p>	<ul style="list-style-type: none"> • Incorporate student use of one or more basic computer applications into units of student work • Develop classroom activities that creatively combine two or more basic computer applications • Undertake a training program for intermediate or advanced users of a basic computer application • Develop strategies that integrate routine use of basic computer applications into classroom activities
	<p>Stage 3</p> <p>Seek out enhanced ways of using the full potential of basic computer application packages in classroom programs</p>	<ul style="list-style-type: none"> • Lead a cross-KLA or year level team to extend the use of basic computer applications in classroom programs • Model innovative ways of using basic computer applications for other staff • Form a user group of staff and students to extend and refine use of a computer application • Develop and deliver an activity for other staff in the creative classroom use of an application's advanced features

The **Professional Development Support Matrix** identifies professional development programs, resources and facilities available through the Department of Education to support teachers in each of the six skill development areas.

Learning Technologies — Teacher Survey and Analysis Program provides a format that schools can adapt to local circumstances in order to develop information about:

- learning technologies' capabilities for which teachers would like further assistance;
- a profile of teachers' personal learning technologies skills;
- a profile of teachers' classroom use of learning technologies; and
- areas that should be the focus of personal and school professional development plans.

Software is also included to enable schools to enter data from completed surveys and generate reports to assist professional development planning. The survey analysis program is a customised Microsoft Excel spreadsheet file.

Student ICT Competencies

There are no developed ICT competencies for students in Victoria.

Western Australia

Non-ICT Specific — Beginning Teachers

From research there has been some preliminary planning for the establishment of a College of Teaching. It is planned that the College is to be a professional body for teachers which gives control over recognition of qualifications and teaching standards and membership of the professional of teachers. Registration with the College will be a prerequisite for teaching in Western Australian schools. It is further proposed that all practising teachers will be required to undertake ongoing professional development in order to maintain their standing with the College. Details have yet to be made public.

Anecdotal evidence indicates it is likely that phase 1 of the *Competency Framework for Teachers* (Education Department of Western Australia, 2001), as detailed below, will become the set of competencies required for beginning teachers.

Non-ICT Specific — Practising Teachers

In 1999 the Western Australian *Competency Framework for Teachers* (Education Department of Western Australia, 2001) was developed. The Framework lists five dimensions of teachers' work (facilitate student learning, assessing student outcomes, engaging in professional learning, participating in curriculum policy and program initiatives in an outcomes based environment, forming partnerships within the school community) over three phases of development. The framework was developed as a tool for classroom teachers to:

- reflect on their professional effectiveness;
- determine and prioritise areas for professional growth;
- identify professional development opportunities; and
- assist their personal and career development planning.

A further purpose is suggested 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.

The phases and dimensions are presented as follows:

Phase 1

- Engage students in purposeful and appropriate learning experiences;
- Monitor, assess, record and report student learning outcomes;
- Reflect critically upon professional experiences in order to enhance professional effectiveness;
- Participate in curriculum policy and program teamwork; and
- Establish partnerships with students, colleagues, parents and other caregivers.

Phase 2

- Cater for diverse student learning styles and needs through consistent application of a wide range of teaching strategies;
- Apply comprehensive systems of assessment in determining student attainment of learning outcomes;
- Contribute to the development of a learning community;
- Provide support for curriculum policy or program teams; and
- Support student learning through partnerships and teamwork with members of the school community.

Phase 3

- Use innovative and/or exemplary teaching strategies that are highly responsive and inclusive;
- Use innovative and/or exemplary assessment strategies that are highly responsive and inclusive;
- Promote the development of a learning community;
- Contribute to the leadership of curriculum policy or program initiatives; and
- Facilitate quality teamwork within the school community.

Each dimension has a number of descriptors with each descriptor having several critical elements supported by a number of indicators of effective practice.

Specific mention of ICT competencies is made in only phases 1 & 2 under two specific descriptors. However, anecdotal evidence from experience in the assessment of teachers for phase 3 indicates that most teachers who successfully meet this level of competence are in fact effective users of ICTs.

The Framework makes a number of assumptions including that the five dimensions are interrelated and that although the competencies are generic they can be applied to specific teaching and learning contexts, and that the phases describe a continuum of increasing teacher understandings and skills development.

This Framework is significant for two reasons:

- firstly, the development of the Framework was contracted out to a consortium representing the profession based at Murdoch University. The same consortium undertakes the assessment of teachers for phase 3 — currently the only level being assessed. That is, it is not directly under the control of the employer as is the case with other standards/competencies systems currently operating in Australia.
- secondly, successful phase 3 assessment leads to a promotion and salary increase for a 3 year period with the Department of Education. That is, there is a strong incentive for teachers to undergo assessment and improve their practice. This is currently unique in the Australian context.

Assessment is currently based on a portfolio (of approximately 25 pages in length) prepared by the teacher undergoing assessment and a half day roundtable discussion group comprising four to five teachers undergoing assessment with two assessors. Applicants are given a set of guidelines to assist in the preparation of their portfolio.

Assessors are drawn from the previous years' successful applicants and are provided with appropriate training. Currently there is no cost for a teacher to undergo an assessment. Feedback is provided for unsuccessful applicants.

ICT Specific — Beginning and Practising Teachers

There are no specific ICT competencies/standards for beginning or practising teachers in Western Australia.

Student ICT Competencies

There are no developed student ICT competencies in Western Australia.

Subject Specific Standards

Strategic Partnerships with Industry for Research and Training (SPIRT) Projects

Three projects to undertake work in the area of teacher professional standards were funded under the Australian Research Council Strategic Partnerships with Industry for Research and Training (SPIRT) for the triennium 1999–2001. The teaching areas involved are English literacy (the Standards for Teaching English Language and Literacy in Australia, STELLA), mathematics (Excellence in Teaching Mathematics: Professional Standards Project) and science (ASTA Professional Standards for Highly Accomplished Teachers of Science Project).

English Literacy

The STELLA Project (AATE/ALEA, 2000/2001) is a joint project of the Australian Association for the Teaching of English (AATE), and the Australian Literacy Educators' Association (ALEA). The universities involved are Monash University, Edith Cowan University and the Queensland University of Technology. The standards bodies are the Ministerial Advisory Committee on the Victorian Institute of Teaching, The Centre for Teaching Excellence (Queensland) and the Education Department of Western Australia.

The aims of the STELLA project are to:

- develop an approach to the identification of standards that English language and literacy teachers recognise as grounded in their own professional knowledge, experience and values;
- distinguish between the level of performance expected of beginning teachers (P–12) and the level of performance expected of teachers seeking advanced standing at a later stage of their teaching career; and
- provide a comprehensive set of standards-based materials including a professional performance standards framework, a set of contextualised case study narratives exemplifying the standards and a standards-based assessment portfolio.

The following is a latest published draft of the English Literacy Framework from www.aate.org.au/STELLA/StandardsST.html.

Working Model for a Professional Standards Framework. Version 4 — 28 June 2000

What Good English/Literacy teachers believe, know and are able to do

Believing

- Ideology: What ideas and values inform English literacy teaching?
What consequences are there for students?
- Fairness: What range of learning opportunities is offered and taken up by students?
- Respect: Are classrooms and schools characterised by dignity and mutual regard?
- Significance: What is most worth teaching and learning?
- Difference: How inclusive and responsive is English literacy teaching?

Knowing

- Repertoire: What range of constructions of literacy and literacy assessment can the teacher draw from?
How well does the teacher know, understand and adapt the recommended/ prescribed curriculum framework documents of her state?
What range of resources does the teacher draw on when planning and enacting the curriculum?
- Rigour: How deeply does the teacher understand the discipline and traditions of English literacy teaching?
- Design: What principles inform curriculum development?
- Justification: What reasons does the teacher give for planning, teaching and assessment decisions?
- Insight: How well does the teacher know the individual learner and his/her capabilities and disposition?

Teaching/Learning

- Success: What opportunities are available to all students to achieve success and recognition for their accomplishments?
- Timing: What decisions does the English literacy teacher make about momentum, order and balance in teaching?
What interventions need to be made to support literacy learning?
- Negotiation: Are classrooms characterised by dialogue about learning goals, processes and outcomes?
- Persistence: Do lessons support a sustained focus on and pursuit of significant learning goals?
- Engagement: Is the teacher providing all students with opportunities to participate in literacy learning that is personally and culturally significant to them?
- Trust: Does the teacher develop an environment where students have the confidence to take risks in their learning?
- Expectation: Does the teacher create a classroom environment where students are able to accept the challenge of significant learning?
- Responsibility: Does the teacher accept responsibility for the learning progress of each child in her classroom?

Professional Engagement

- Reflection: Does the teacher reflect on, analyse, review and revise her own teaching practices in order to improve her teaching and her students' learning?
- Critique: What part does the teacher play in the questioning and evaluation of curriculum, classroom, school and wider literacy practices?
- Inquiry: To what extent does the English literacy teacher contribute to and learn from current research about teaching?
- Collaboration: What roles does the teacher play in facilitating the teaching and learning of colleagues and the development of the professional ethos of the school?
How does the teacher work with or provide feedback to parents?
- Leadership: Does the teacher articulate educational ideas and take action to develop support for policy and curriculum change in the school community and in the wider community?

Mathematics

The Excellence in Teaching Mathematics: Professional Development Project (AAMT, 2000) is engaged in research and development, with adoption and implementation of its results in the hands of the Australian Association of Mathematics Teachers (AAMT) Council. Staff from Monash University are leading the research work. The project will publish standards describing excellence in the teaching of mathematics, and assessment processes for certifying teachers as 'highly accomplished' against these standards.

The components of the project's final publication will be:

- descriptors;
- elaboration, consisting of examples, narratives and further explanation to clarify the standards and make them live for teachers;
- assessment information and examples; and
- background information about the project and associated publications.

The Consultation Draft Descriptors of Excellence in Teaching Mathematics (www.aamt.edu.au/stand.htm) identifies three interrelated domains for a standards framework:

- professional knowledge of — students, including knowing and understanding the relevance of student learning styles and cultural and social contexts, — mathematics in the knowing and understanding of their subject domain, and of students' learning of mathematics including having a rich knowledge of how students learn mathematics and of how to construct appropriate learning environments;

- professional attributes — personal attributes that assist them to engage students in their learning including enthusiasm and commitment; personal professional development by being committed to the continual improvement of their teaching practice; community responsibilities in terms of being active contributors to the range of communities relevant to their professional work including colleagues within and outside their school; and
- professional practice — establishing learning environments where the norms and values maximise students' learning opportunities; teaching in action in terms of arousing curiosity, challenging students' thinking and having them actively engage in learning; assessment — use a range of appropriate assessment strategies and provide purposeful feedback to students, parents and school authorities.

Science

The Australian Science Teachers Association (ASTA) has embarked on a three year collaborative research project (ASTA, 2000) with Monash University to develop standards for highly accomplished science teaching and methods for assessing whether teachers have attained those standards. The long term goal of the project is to lay the groundwork for a national voluntary system for giving professional certification to highly accomplished teachers of science.

Aims of the project:

The aim of the project is to conduct the research and development necessary to establish a national voluntary system for the certification of highly accomplished science teachers.

The outcomes of the project will be:

- A set of rigorous, validated ASTA professional standards that describe what the profession believes accomplished teachers of science should know and be able to do;
- A package of exercises for assessing teacher performance that have met strict criteria of feasibility, credibility, validity and cost; and
- A specially trained group of ASTA members in each state who have the capacity to apply and score these assessments reliably and fairly.

The standards will provide a framework describing the knowledge, skills and attitudes that teachers need to produce successful learning. They aim to capture the essence of effective performance in teaching science.

One of the core purposes of the science SPIRT project is to develop processes for assessing the performance of highly accomplished science teachers: processes that probe the subject-specific nature of what good science teachers know and do; processes that call for the kind of judgement that only expert science teachers can make; and processes that promote teachers' professional development as a direct result of undertaking them.

To date (August 2001) no outcomes of the project have been published.

Personal Development, Health and Physical Education

Preliminary work is underway by a group of teachers coordinated from the University of Technology Sydney to develop a set of standards in this area.

Catholic Education and Independent School Sectors

There is no one national picture for the non-government school sector. In the Catholic sector each sector may have its own approach. Often this may be aligned with the state/territory within which they are situated, however it may be different. From research by the project the only systemic standards development and implementation in the Catholic school sector has been in Tasmania.

In the independent school sector it is impossible to give a cohesive picture given the very fact that each school is independent. However, research indicates that there is support for the current standards movement, at least at the national level. There are no plans to develop or implement any system of teacher professional standards at this time.

Pre-service Education

A limited survey of teacher training institutions revealed three types of approaches to ICT competence:

- separate units of work (some compulsory, some elective) focusing on the development of ICT competence and the integration of ICTs into the classroom;
- the development of ICT competence and integration of ICTs into classroom use is embedded in existing ‘method’ units; and
- a combination of the above approaches.

In states and territories where ICT Competency standards are articulated for beginning teachers by the education system, such as Queensland and New South Wales, the teacher training institutions use those standards as a guide for the learning outcomes of their students.

Appendix 2

A Review of Overseas Standards/Competency Developments

Introduction

As cited in the *Making Better Connections* report (DEST, 2002), “a number of well-developed sets of standards, in terms of teacher capabilities and student capabilities (International Society for Technology in Education, 2000; Coughlin & Lemke, 1999; the CEO Forum on Education and Technology, 2000) are being published and used in a variety of educational setting and systems. There are also examples of institutional and system standards, in terms of curriculum and infrastructure and support (CEO Forum on Education and Technology, 1997; International Society for Technology in Education 2001)” (63).

The following is a description of standards from a selection of overseas countries. It includes non-ICT specific standards, with particular reference to ICT statements, as well as ICT specific standards.

New Zealand

In 1999 the New Zealand Ministry for Education published *Professional Standards: Criteria for Quality Teaching* (New Zealand Ministry for Education, 1999). The document focuses on standards for secondary teachers for performance management purposes. It explicitly states it is intended to strengthen existing performance management systems.

The standards comprise three levels — beginning classroom teacher, classroom teacher and experienced classroom teacher.

The standards were mandated from the beginning of 2000 and successful attainment includes access to increased pay scales. Access to the top pay scale is available only if a teacher meets the experienced classroom teacher level and other pay levels are accessed dependent on meeting the standards at the appropriate level. The standards are assessed at the school level in a way to be determined by each school.

The standards have nine dimensions with each dimension elaborated by descriptors for each of the three levels — beginning classroom teacher, classroom teacher and experienced classroom teacher. The nine dimensions are:

- professional knowledge;
- professional development;
- teaching techniques;
- student management;
- motivation of students;
- Te Reo Me ona Tikanga (Maori language);
- effective communication;
- support for and co-operation with colleagues; and
- contribution to wider school activities.

The only explicit mention of ICTs is under the Teaching Techniques dimension for beginning classroom and classroom teachers respectively:

“(teachers) are, with professional guidance, developing effective strategies in regard to:

use of currently available technologies

make use of appropriate technologies and resources” (8).

A draft policy for ICT in schools, published in 2001, makes no specific mention of teacher ICT competencies.

Ontario, Canada

Standards of Practice (Ontario College of Teachers, 1999)

Ontario College of Teachers is a self regulatory body responsible for, among other things, the accreditation of pre-service and in-service programs. Pre-service covers teacher education programs at all Ontario universities and in-service includes Additional Qualifications Courses, Principal's Qualification Program and Supervisory Officer's Qualification Course.

The standards of practice were developed to support the following principles:

- the standards of practice describe what it means to be a member of the teaching profession in Ontario;
- the standards of practice are reflective of the beliefs and values expressed by the participants in the development process;
- the standards of practice recognise and value diversity in teaching;
- the standards of practice are based on the premises that personal and professional growth is a developmental process and that teachers move through a variety of career and life stages; and
- the standards of practice for the teaching profession are interdependent.

The standards of practice have been developed for a range of purposes as follows:

- focus on the responsibility of the teaching profession to enhance student learning;
- provide a common understanding of what makes “being a teacher” a unique professional experience;
- clarify the knowledge, skills and values implicit in the practice of teaching;
- provide the basis for ongoing personal and professional growth and the accreditation of professional learning programs;
- represent the aspirations and goals of the teaching profession;
- enhance the dignity of the teaching profession;
- acknowledge the contribution the teaching profession makes to Ontario society; and
- assist the College in fulfilling its mandate to govern the practice of teaching in the public interest.

The standards are not intended to be the criteria for ongoing performance appraisal of individual members of the College. Performance appraisal is the responsibility of the employer.

There are five statements comprising the Standards of Practice:

- Commitment to students and student learning;
- Professional knowledge;
- Teaching practice;
- Leadership and community; and
- Ongoing professional learning.

Each statement is evidenced by a number of key elements (typically 3 to 5) with each key element expanded by a number of descriptors (3 to 4).

The only statement making mention of ICT is under the Teaching Practice Standard as follows:

“...enhance the learning environment with a variety of curriculum resources and available technologies”.

There is no mention in the literature of how teachers are assessed against the standards.

In a separate, but related development, the University of Toronto (cited in Education Queensland, 1999) has developed a set of six standards that should be acquired by students in teacher education programs. Through the acquisition of these standards ‘entry’ level teachers would develop the ability to:

- work with all students in an equitable, effective and caring manner by respecting diversity in relation to ethnicity, race, gender and special needs of each learner;
- develop and apply knowledge of curriculum, instruction, principles of learning, the use of technology and evaluation needed to implement and monitor effective and evolving programs for all learners;

- appreciate and practise the principles, ethics and legal responsibilities of teaching as a profession;
- be active learners who continuously seek, assess, apply and communicate knowledge as reflective practitioners throughout their careers;
- initiate, value and practise collaboration and partnerships with students, colleagues, parents, community, government and social and business agencies; and
- develop a personal philosophy of teaching which is informed by and contributes to the organisational, community, societal and global contexts of education.

United States

In the United States the accreditation of pre-service institutions and programs is the responsibility of the National Council for Accreditation of Teacher Education (NCATE). Approximately 500 out of 1300 teacher training institutions' programs in the US are accredited by NCATE.

The Interstate New Teachers Assessment and Support Consortium (INTASC), a program of the Council of Chief State School Officers (CCSSO), has a major responsibility in the licensing of beginning teachers in over 30 states.

The National Board for Professional Teaching Standards (NBPTS) provides advanced certification for practising teachers.

Each organisation has developed sets of standards which are consistent with one another. According to Darling-Hammond (1999), "these sets of standards create a developmental continuum for teachers, from pre-service teacher education through licensing and induction, through advanced study and ongoing professional development" (13).

A description of the standards for each of the three organisations follows.

NCATE Unit Standards (NCATE, 2001)

The standards have been developed within a conceptual framework which establishes the shared vision for a unit's efforts in preparing educators to work effectively in P-12 schools. It provides direction for programs, courses, teaching, candidate performance, scholarship, service and unit accountability. The conceptual framework is knowledge-based, articulated, shared, coherent, consistent with the unit and/or institutional mission and continuously evaluated.

The six standards are categorised under the headings of Candidate Performance and Unit Capacity as follows:

1. Candidate Performance

Standard 1: Candidate Knowledge, Skills and Dispositions
Candidates preparing to work in schools as teachers or other professional school personnel know and demonstrate the content, pedagogical, and professional knowledge, skills and dispositions necessary to help all students learn. Assessments indicate that candidates meet professional, state and institutional standards.

Standard 2: Assessment System and Unit Evaluation
The unit has an assessment system that collects and analyses data on the applicant qualifications, candidate and graduate performance, and unit operations to evaluate and improve the unit and its programs.

2. Unit Capacity

Standard 3: Field Experiences and Clinical Practice
The unit and its school partners design, implement and evaluate field experiences and clinical practice so that teacher candidates and other school personnel develop and demonstrate the knowledge, skills and dispositions necessary to help all students learn.

- Standard 4: Diversity
The unit designs, implements, and evaluates curriculum and experiences for candidates to acquire and apply the knowledge, skills and dispositions necessary to help all students learn. These experiences include working with diverse higher education and school faculty, diverse candidates and diverse students in P–12 schools.
- Standard 5: Faculty Qualifications, Performance and Development
Faculty are qualified and model best professional practices in scholarship, service and teaching, including the assessment of their own effectiveness as related to candidate performance. They also collaborate with colleagues in the disciplines and schools. The unit systematically evaluates faculty performance and facilitates professional development.
- Standard 6: Unit Governance and Resources
The unit has the leadership, authority, budget, personnel, facilities and resources, including information technology resources, for the preparation of candidates to meet professional, state and institutional standards.

INTASC Models for Standards for Beginning Teacher Licensing and Development (INTASC, 1992)

All INTASC standards are based on 10 principles as detailed below. These, in turn, are the basis for subject-specific standards. The 10 principles in summary are:

Principle # 1:

The teacher understands the central concepts, tools of inquiry, structures of the discipline(s) he or she teaches and can create learning experiences that make these aspects of subject matter meaningful for students.

Principle #2:

The teacher understands how children learn and develop, and can provide learning opportunities that support the intellectual, social and personal development of each learner.

Principle #3:

The teacher understands how students differ in their approaches to learning and creates instructional opportunities that are adapted to diverse learners.

Principle #4:

The teacher understands and uses a variety of instructional strategies to encourage students' development of critical thinking, problem solving and performance skills.

Principle #5:

The teacher uses an understanding of individual and group motivation and behaviour to create a learning environment that encourages positive social interaction, active engagement in learning and self-motivation.

Principle #6:

The teacher uses knowledge of effective verbal, nonverbal and media communication technologies to foster active inquiry, collaboration and supportive interaction in the classroom.

Principle #7:

The teacher plans instruction based on knowledge of subject matter, students, the community and curriculum goals.

Principle #8:

The teacher understands and uses formal and informal assessment strategies to evaluate and ensure the continuous intellectual, social and physical development of the learner.

Principle #9:

The teacher is a reflective practitioner who continually evaluates the effects of his/her choices and actions on others and who actively seeks out opportunities to grow professionally.

Principle #10:

The teacher fosters relationships with school colleagues, parents and agencies in the larger school community to support students' learning and well-being.

INTASC have developed specific subject standards for Special Education (INTASC, 2001) and Mathematics (INTASC, 1995). Currently under development are also standards for Arts Education, Elementary Education, Foreign Languages, Science and Social Studies.

Each of the sets of standards are based around the above 10 principles with ICT competencies embedded in the descriptors. For example, in the Special Education Standards (INTASC, 2001), under principle 1, descriptor 1.10 states:

“Special education teachers have knowledge of the range of assistive technology (e.g., augmentative communication devices, student-specific software, optical devices) that support students in the learning environment and know how to access resources related to this technology (e.g., through the Internet, district/state agencies, professional organizations)” (12).

The National Board for Professional Teaching Standards (NBPTS)

The NBPTS is a national body funded by the US Department of Education and the National Science Foundation. It seeks to identify and recognise teachers who effectively enhance student learning and demonstrate the high level of knowledge, skills, abilities and commitments reflected in the following five core areas (NBPTS, 2001):

- teachers are committed to students and their learning;
- teachers know the subjects they teach and how to teach those subjects to students;
- teachers are responsible for managing and monitoring student learning;
- teachers think systemically about their practice and learn from experience; and
- teachers are members of learning communities.

All sets of standards are based on the above five core principles. As of March 2001, twenty seven sets of standards covering a wide range of subject areas were completed with another four under development. The standards are developed by committees of teachers and undergo a review every five years.

The standards are grouped into four developmental levels: early childhood (ages 3–8), middle childhood (ages 7–12), early adolescence (ages 11–15) and young adulthood (ages 14–18).

Research indicates approximately forty states in the US have adopted legislation that provides support or incentives for teachers to pursue or achieve National Board Certification. Support may take the form of subsidies for Board assessment costs. Incentives typically involve a salary differentiation for those who are certificated.

National Board certification is based on an assessment of teacher performance against Board standards. It is valid for a period of ten years at which time teachers can undertake a renewal process. Two types of assessment are required:

- a portfolio comprising a number of tasks to be completed over an extended period of time. The completion of the portfolio is expected to take approximately 100 hours and may extend over more than one year; and
- written exercise tasks completed over one day at an assessment centre.

Candidates are strongly encouraged to join support networks to assist in their portfolio tasks.

From a scan of published standards there appears to be only a passing mention of ICTs.

International Society for Technology in Education (ISTE)

ISTE (2000) has developed a range of standards as follows:

- for the accreditation of teacher education programs;
- for beginning teachers;
- for school administrators; and
- for students.

In relation to accreditation of teacher education programs four areas of standards have been articulated:

1. Educational Technology Foundations for all teachers.
2. Educational Computing and Technology Literacy for resource teachers — this builds on the Foundations.
3. Standards for Computer Science educators — this builds on 1 & 2.
4. Educational Computing and Technology Leadership — this builds on 1 & 2.

Standards are articulated at four phases of teacher preparation:

1. general preparation — for all pre-service teachers in their general degree;
2. professional education — for pre-service teachers in teacher training courses;
3. student teaching/internship — for pre-service teachers immediately prior to commencing teaching; and
4. first year teaching — for practising teachers at the end of their first year of teaching.

Each phase is elaborated by a performance profile which suggest ways programs can incrementally examine how candidates meet the standards.

The research indicates that the various ISTE standards are being used by local school districts to guide policy development and inform teacher professional development programs.

Foundation Level Standards

The Educational Technology Standards and Performance Indicators at the Foundation level for all teachers (ISTE, 2000) are:

1. Technology Operations and Concepts

Teachers demonstrate a sound understanding of technology operations and concepts. Teachers:

- demonstrate introductory knowledge, skills and understanding of concepts related to technology (as described in ISTE 's Technology Standards for Students); and
- demonstrate continual growth in technology knowledge and skills to stay abreast of current and emerging technologies.

2. Planning and Designing Learning Environments and Experiences

Teachers plan and design effective learning environments and experiences supported by technology. Teachers:

- design developmentally appropriate learning opportunities that apply technology-enhanced instructional strategies to support the diverse needs of learners;
- apply current research on teaching and learning with technology when planning learning environments and experiences;
- identify and locate technology resources and evaluate them for accuracy and suitability;
- plan for the management of technology resources within the context of learning activities; and
- plan strategies to manage student learning in a technology-enhanced environment.

3. Teaching, Learning and the Curriculum

Teachers implement curriculum plans that include methods and strategies for applying technology to maximise student learning. Teachers:

- facilitate technology-enhanced experiences that address content standards and student technology standards;
- use technology to support learner-centred strategies that address the diverse needs of students;
- apply technology to develop students' higher order skills and creativity; and
- manage student learning activities in a technology-enhanced environment.

4. Assessment and Evaluation

Teachers apply technology to facilitate a variety of effective assessment and evaluation strategies. Teachers:

- apply technology in assessing student learning of subject matter using a variety of assessment techniques;
- use technology resources to collect and analyse data, interpret results and communicate findings to improve instructional practice and maximise student learning; and
- apply multiple methods of evaluation to determine students' appropriate use of technology resources for learning, communication and productivity.

5. Productivity and Professional Practice

Teachers use technology to enhance their productivity and professional practice. Teachers:

- use technology resources to engage in ongoing professional development and lifelong learning;
- continually evaluate and reflect on professional practice to make informed decisions regarding the use of technology in support of student learning;
- apply technology to increase productivity; and
- use technology to communicate and collaborate with peers, parents and the larger community in order to nurture student learning.

6. Social, Ethical, Legal and Human Issues

Teachers understand the social, ethical, legal and human issues surrounding the use of technology in Pre K–12 schools and apply those principles in practice. Teachers:

- model and teach legal and ethical practice related to technology use;
- apply technology resources to enable and empower learners with diverse backgrounds, characteristics and abilities;
- identify and use technology resources that affirm diversity;
- promote safe and healthy use of technology resources; and
- facilitate equitable access to technology resources for all students.

Institutions undergoing accreditation through NCATE/ISTE must prepare a folio comprising an overview of courses, experiences, faculty and facilities supporting the program, a completed program matrix (provided by NCATE/ISTE) and course syllabi. An example of a part of the matrix from Educational Computing and Technology Literacy area (ISTE, 2000a) follows:

1.0 Prerequisite Preparation — Foundations.

Professional studies culminating in the educational computing and technology literacy endorsement prepare candidates to use computers and related technologies in educational settings. All candidates seeking initial certification or endorsements in teacher preparation programs should have opportunities to meet the educational technology foundations standards.

1.1 Basic Computer/Technology Operations and Concepts.

Candidates will use computer systems to run software; to access, generate, and manipulate data; and to publish results. They will also evaluate performance of hardware and software components of computer systems and apply basic troubleshooting strategies as needed.

Performance Indicators — Candidates will:	Courses or Experiences to Fulfill the Program Standards
1.1.1 operate a multimedia computer system with related peripheral devices to successfully install and use a variety of software packages.	
1.1.2 use terminology related to computers and technology appropriately in written and oral communications.	
1.1.3 describe and implement basic troubleshooting techniques for multimedia computer systems with related peripheral devices.	
1.1.4 use imaging devices such as scanners, digital cameras, and/or video cameras with computer systems and software.	
1.1.5 demonstrate knowledge of uses of computers and technology in business, industry and society.	

Technology Standards for School Administrators (TSSA)

The TSSA Standards project (ISTE, 2001a) is funded through a contract with the US Department of Education’s “Preparing Tomorrow’s Teachers to Use Technology” (PT3) program. The standards have been developed by a collaborative of organisations. Project management is being provided by ISTE.

The “standards represent a national consensus among educational stakeholders of what best indicates effective school leadership for comprehensive and effective use of technology in schools” (ISTE, 2001a).

(This material was originally produced as a project of the Technology Standards for School Administrators Collaborative).

The following draft has been published for consultation and feedback (August 2001) with final publication expected to occur in October 2001:

1. Leadership and Vision — Educational leaders inspire the development of a shared vision for the comprehensive integration of technology and foster an environment and culture conducive to the realisation of that vision. Educational leaders:
 - facilitate the development of the vision for technology shared by all stakeholders and communicate it widely;
 - develop, implement and monitor a dynamic, long-range and systemic technology plan that supports the vision;
 - maintain cohesion and momentum within the school community to reach the shared vision;
 - foster and nurture a culture of responsible risk-taking that promotes continuous innovation in technology;
 - use data to drive leadership decisions; and
 - advocate for research-based best practices in all uses of technology.

2. Learning and Teaching — Educational leaders ensure that curricular design, instructional strategies and learning environments integrate appropriate technologies to maximise learning and teaching. Educational leaders:
 - identify, use and evaluate appropriate technologies to enhance and support curriculum and instruction that lead to high levels of student achievement;
 - facilitate and support collaborative technology-enriched learning environments that are conducive to innovation;
 - provide for the use of technology to meet the individual needs of learners in a student-centred learning environment;
 - facilitate the use of technologies to guide and support instructional methods that promote higher-level thinking, decision-making and problem-solving skills; and
 - assure that quality professional development opportunities exist for learning and teaching with technology.
3. Productivity and Professional Practice — Educational leaders apply technology to enhance their professional practice and to increase their own productivity and that of others. Educational leaders:
 - use technology to facilitate change for organisational improvement;
 - model the routine, intentional and effective use of technology;
 - use technology resources to engage in sustained, job-related professional development; and
 - employ technology for communication and collaboration among peers, staff, parents and the larger community.
4. Support, Management and Operations — Educational leaders provide direction to integrate technology tools into productive learning and administrative systems. Educational leaders:
 - develop, implement and monitor policies and guidelines to ensure compatibility of technologies;
 - allocate financial and human resources to ensure full implementation of the technology plan;
 - integrate strategic plans, technology plans, other improvement plans and policies to align efforts and leverage resources; and
 - design policies and procedures to drive continuous system improvements and to support technology replacement cycles.
5. Assessment and Evaluation — Educational leaders use technology to facilitate a comprehensive system of effective assessment and evaluation. Educational leaders:
 - use technology to collect and analyse data, interpret results and communicate findings to improve instructional practice and student learning;
 - assess staff knowledge, skills and performance in using technology and use results to facilitate quality professional development and inform personnel decisions;
 - use technology to assess and evaluate managerial and operational systems; and
 - assess and evaluate, using multiple methods, appropriate uses of technology resources for learning, communication and productivity.
6. Social, Legal and Ethical Issues — Educational leaders understand the social, legal and ethical issues related to technology and apply that understanding in practice. Educational leaders:
 - ensure equity of access to technology resources that enable and empower all learners;
 - identify, communicate, model and enforce social, legal and ethical practices related to technology use;
 - promote and enforce security and online safety related to the use of technology; and
 - promote and enforce environmentally safe and healthy practices in the use of technology.

ISTE Institutional Capabilities

In addition, ISTE specifies the following institutional elements (ISTE, 2000b) as having to be in place at the university, the college or school of education and the school site (each of these elements are detailed at the four phases of teacher preparation described above):

- shared vision: there is a proactive leadership and administrative support from the entire system;
- access: educators have access to current technologies, software and telecommunications;
- skilled educators: educators are skilled in the use of technology for learning;
- professional development: educators have consistent access to professional development in support of technology use in teaching and learning;
- technical assistance: educators have technical assistance for maintaining and using the technology;
- content standards and curriculum resources: educators are knowledgeable in their subject matter and current in the content-standards and teaching methodologies in their discipline;
- student-centred teaching: teaching in all settings encompasses student-centred approaches;
- assessment: there is continuous assessment of the effectiveness of technology for learning;
- community support: the community and school partners provide expertise, support and resources; and
- support policies: school and university policies, financing and rewards structures are in place to support technology in learning.

Milken Professional Competency Continuum

In 1997 the Milken Family Foundation (1997), a privately funded education research foundation in the US began a project to explore the essential conditions under which the use of technology is likely to improve student learning and to develop strategies for assessing whether those conditions exist in a given school or district. The result of that effort is a framework of progress indicators to help schools develop technology programs that are systemic and intentional.

This framework of progress indicators, called the Seven Dimensions for Gauging Progress (Lemke, Coughlin, et al., 1998), identifies the elements of the educational system that must work interdependently if schools are to bring technology-enriched learning opportunities to students. The seven dimensions are:

1. Learners
2. Learning Environments
3. Professional Competency
4. System Capacity
5. Technology Capacity
6. Community Connections
7. Accountability.

As of August 2001 the third dimension, Professional Competency, is the only dimension to be fully developed and published.

The Milken Professional Competency Continuum (PCC) identifies five key areas of professional competence (Coughlin & Lemke, 1999):

1. Core Technology Skills
2. Curriculum, Learning and Assessment
3. Professional Practice
4. Classroom and Instructional Management
5. Administrative Competencies.

Within each of these five areas specific indicators of competency are identified. For example, under Core Technology Skills the following indicators are listed:

- The educator has a firm understanding of the principles of operation of the computer system and peripherals, and this understanding has translated into the ability to adapt quickly to new technologies as they become available.
- The educator is familiar with technologies specific to the disciplines he or she teaches, and he or she is able to successfully use these technologies in support of students.
- The educator has mastered the use of basic software applications and is able to generalise these skills to quickly learn new applications.
- The educator has sufficient skill and experience to be able to make efficient and effective use of complex electronic information resources.
- The educator understands the power of computer networks and is able to use those networks to facilitate communications, professional growth and student learning.
- The educator is familiar with multimedia and presentation technologies and is able to guide students in the application of these technologies to the creation of knowledge products.

The structure of the continuum is based on a simplification of the “stages of instructional evolution” identified in the research from the Apple Classrooms of Tomorrow program (Sandholtz, Ringstaff & Dwyer, 1997):

Stage One — Entry

- At this stage, educators, students and the community are aware of the possibilities that technology holds for improving learning—yet learning, teaching and the system remain relatively unchanged by technology. Educators at this level lack access to technology and the requisite skills to implement and sustain significant changes in practice.

Stage Two — Adaptation

- Technology is thoroughly integrated into the classroom in support of existing practice. Educators at this stage have developed skills related to the use of technology but have primarily applied these skills to automate, accelerate and enhance the teaching and learning strategies already in place.

Stage Three — Transformation

- At this stage, technology is a catalyst for significant changes in learning practice. Students and teachers adopt new roles and relationships. New learning opportunities are possible through the creative application of technology to the entire school community.

Each area of competence is represented in a matrix of sub categories with descriptors for each of the three stages of development. For example, the area of Core Technology Skills is subdivided into the following areas:

- hardware/computer
- hardware/other
- applications
- information tools
- network tools
- multimedia/presentation tools.

Further, each area of competence is accompanied by a short narrative/vignette of exemplary practice and a range of strategies/advice about how best to achieve those competencies in terms of professional development.

Part of the Professional Competency Continuum also details competencies for school administrators as follows:

- administrators at the building and district level model the effective use of technology in support of learning and administrative functions;
- administrators are able to initiate and support professional development processes that reflect attention to principles of adult learning;
- administrators are competent in leading and managing systemic change processes at the classroom, school and/or district levels; and
- administrators maintain a solid knowledge of the applications of technology to student learning.

California

The California Commission on Teacher Credentialing (CCTC, 2001) has developed a comprehensive set of standards for:

- the approval of teacher education programs; and
- the induction of beginning teachers.

For the approval of teacher education programs the following ICT standards apply:

- each candidate is familiar with basic principles of operation of computer hardware and software, (e.g. cleaning input devices, avoiding proximity to magnets, proper startup and shut down sequences, scanning for viruses, and formatting storage media) and implements basic troubleshooting techniques for computer systems and related peripheral devices before accessing the appropriate avenue of technical support (e.g. checking the connections, isolating the problem components, distinguishing between software and hardware problems).
- each candidate uses computer applications to manage records (e.g. gradebook, attendance and assessment records and to communicate through printed media (e.g. newsletters incorporating graphics and charts, course descriptions and student reports).
- each candidate interacts with others using e-mail and is familiar with a variety of computer-based collaborative tools (e.g. threaded discussion groups, newsgroups, list servers, online chat and audio/video conferences).
- each candidate examines a variety of current educational digital media and uses established selection criteria to evaluate materials, for example, multimedia, Internet resources, telecommunications, computer-assisted instruction and productivity and presentation tools.
- each candidate chooses software for its relevance, effectiveness, alignment with content standards and value added to student learning.
- each candidate demonstrates competence in the use of electronic research tools (e.g. access the Internet to search for and retrieve information and the ability to assess the authenticity, reliability and bias of the data gathered).
- each candidate considers the content to be taught and selects the best technological resources to support, manage and enhance student learning in relation to prior experiences and level of academic accomplishment.
- each candidate analyses best practices and research findings on the use of technology and designs lessons accordingly.
- each candidate demonstrates knowledge of copyright issues (e.g. distribution of copyrighted materials and proper citing of sources and of privacy, security and safety issues (e.g. appropriate use of chat-rooms, confidentiality of records, including graded student work, publishing names and pictures of minors and Acceptable Use Policies).

For the induction of beginning teachers a draft set of 19 standards has been published. The ICT specific standard states:

- each participating teacher communicates through a variety of electronic media (e.g., presentations incorporating images and sound, web pages and portfolios).
- each participating teacher interacts and collaborates with others using computer-based collaborative tools (e.g., threaded discussion groups, newsgroups, electronic list management applications, online chat and audio/video conferencing).
- each participating teacher demonstrates competence in evaluating the authenticity, reliability and bias of the data gathered, determines outcomes and evaluates the success or effectiveness of the process used. He/she frequently monitors and reflects upon the results of using technology in instruction and adapts lessons accordingly.
- each participating teacher optimises lessons based upon the technological resources available in the classroom, school library media centres, computer labs, local and county facilities and other locations.
- each participating teacher designs, adapts and uses lessons which address the students' needs to develop information literacy and problem solving skills as tools for lifelong learning.
- each participating teacher uses technology in lessons to increase students' ability to plan, locate, evaluate, select and use information to solve problems and draw conclusions. He/she creates or makes use of learning environments inside the classroom, as well as in library media centres or computer labs, that promote effective use of technology aligned with the curriculum.
- each participating teacher uses technology as a tool for assessing student learning and for providing feedback to students and their parents. He/she uses computer applications to manipulate and analyse data (e.g. create, use and report from a database; create charts and reports from a spreadsheet).

United Kingdom — Teacher Training Agency (TTA)

A principal aim of the TTA is to promote effective and efficient professional development for teachers and headteachers, targeted on improvements in the quality of teaching and leadership which will have the maximum impact on pupils' learning. The cornerstone of this work is the development of national standards for the teaching profession to define expertise in key roles.

National standards have been developed for:

- the award of Qualified Teacher Status (QTS);
- Special Educational Needs Coordinators (SENCOs);
- Subject Leaders; and
- Headteachers.

The main aims of the national standards are to:

- set out clear expectations for teachers at key points in the profession;
- help teachers at different points in the profession to plan and monitor their development, training and performance effectively, and to set clear, relevant targets for improving their effectiveness;
- ensure that the focus at every point is on improving the achievement of pupils and the quality of their education;
- provide a basis for the professional recognition of teachers' expertise and achievements; and
- help providers of professional development to plan and provide high quality, relevant training which meets the needs of individual teachers and headteachers, makes good use of their time and has the maximum benefit for pupils.

The national standards set out the professional knowledge, understanding, skills and attributes necessary to carry out effectively the key tasks of that role. It is the sum of these aspects which defines the expertise demanded of the role, in order to achieve the outcomes set out in the standards.

The standards emphasise national priorities, particularly in support of the Government's key educational targets in relation to literacy, numeracy and information and communications technology.

The standards are intended to aid development rather than being barriers to progression in the profession. They provide the basis for a more structured approach to appraisal, helping teachers and headteachers to set relevant targets, to assist in the evaluation of progress, to identify further development priorities and to confirm success.

The specification of ICT standards for beginning teachers is given in the document — *Initial Teacher Training National Curriculum for the Use of ICT in Subject Teaching* (TTA, 1998a). This document supports the relevant Initial Teacher Training (ITT) National Curriculum documents for specific subjects.

The *Initial Teacher Training National Curriculum for the Use of ICT in Subject Teaching* is concerned with how ICT can be used effectively in the teaching of other subjects by specifying the competencies needed by pre-service teachers. All ITT courses must include the content specified in this document, however the way in which training providers cover the content and assess is up to each institution.

At the heart of the *Initial Teacher Training National Curriculum for the Use of ICT in Subject Teaching* are **three key principles** which trainees need to know, understand and be able to apply:

1. Decisions about when, when not and how to use ICT in lessons should be based on whether the use of ICT supports good practice in teaching the subject. If it does not, it should not be used.
2. In planning and in teaching, decisions about when, when not and how to use ICT in a particular lesson or sequence of lessons must be directly related to the teaching and learning objectives in hand.
3. The use of ICT should either allow the trainee or the pupil to achieve something that could not be achieved without it; or allow the trainee to teach or the pupils to learn something more effectively and efficiently than they could otherwise; or both.

The document categorises the standards into two main areas:

- effective teaching and assessment methods; and
- trainee's knowledge and understanding of, and competence with, ICT.

In addition, separate documents exist for a range of subject areas which relate this document to the specific subject — e.g. English, Science, Information Technology, etc). Each document comprises four sections:

- explanation of how ICT can contribute to student learning in that specific subject;
- sets out the ITT National Curriculum for the use of ICT in subject teaching standards with a commentary to help trainers to relate it to the teaching of the specific subject;
- a case study; and
- further useful information and resources.

Specific ICT References

Specific reference is made to ICTs for Qualified Teacher Status, Headteachers and Subject Leaders.

Qualified Teacher Status (TTA, 1998a)

Qualified Teacher Status refers to the pre-service training of teachers. Both primary and secondary pre-service teachers must have for their specialist subject(s) a secure knowledge and understanding of the content specified in the ITT National Curriculum for Information and Communications Technology in subject teaching in the area of Knowledge and Understanding.

Similarly, in the area of Planning, Teaching and Class management, teachers must have a secure knowledge and understanding of, and know how and when to apply, in relation to their specialist subject(s), the teaching and assessment methods specified in the ITT National Curriculum for Information and Communications Technology in subject teaching. Specifically, they must use teaching methods which sustain the momentum of pupils' work and keep all pupils engaged through:

- exploiting opportunities to improve pupils' basic skills in literacy, numeracy and ICT, and the individual and collaborative study skills needed for effective learning, including information retrieval from libraries, texts and other sources; and;
- selecting and making good use of textbooks, ICT and other learning resources which enable teaching objectives to be met (8).

Headteacher Standards (TTA, 1998b)

Headteacher Standards make specific reference to ICT standards and state that headteachers should have knowledge and understanding of:

- the application of information and communications technology to teaching and learning, and management;
- effective teaching and assessment methods, including the use of information and communications technology (6).

Subject Leaders Standards (TTA, 1998c)

Subject Leaders Standards make specific reference to ICT standards and state that subject leaders should have knowledge and understanding of:

- how to develop pupils' literacy, numeracy and information technology skills through the subject; and
- the current use and future potential of information and communications technology to aid teaching and learning of the subject, and to assist with subject management (6).

ICT in Subject Teaching

As part of the New Opportunities Fund (NOF, 1998) the UK Government allocated funds in 1998 to support training in the use of ICT for teachers and school librarians. The main aim of the ICT training initiative is to raise the standard of pupils' achievements by increasing the expertise of serving teachers in the use of ICT in subject teaching to the level of all Newly Qualified Teachers (NQT).

The Expected Outcomes for teachers include ensuring that teachers know:

- when, when not and how to use ICT in teaching their subject;
- how ICT can be used in teaching the whole class;
- how ICT can be used when planning, including the use of ICT for lesson preparation and the choice and organisation of ICT resources;
- how to assess pupils' work when ICT has been used; and
- how ICT can be used to keep up-to-date, share best practice and reduce bureaucracy.

For teachers of pupils up to the age of 11 (primary), the Expected Outcomes apply to:

- English
- mathematics
- science
- art
- design and technology
- geography
- history
- music
- physical education
- religious education
- early years
- the compulsory contributory subjects of the Northern Ireland Curriculum (for teachers in Northern Ireland)
- and where relevant for teachers in Wales, Welsh.

Particular emphasis is given to how ICT can support the teaching of literacy and numeracy in England, and to the School Improvement Program in Northern Ireland.

For teachers of pupils aged 11 and above, the Expected Outcomes apply to their specialist subject(s) from English, mathematics, science, history, geography, modern foreign languages, design & technology, information technology, music, art, physical education, religious education, business studies/economics, Irish (in Northern Ireland) and Welsh (in Wales).

The Expected Outcomes are divided into two sections:

- Effective Teaching and Assessment Methods; and
- Teachers' Knowledge and Understanding of, and Competence with, ICT.

Effective Teaching and Assessment Methods — Summary

1. Teachers should know when the use of ICT is beneficial to achieve teaching objectives in the subject and phase, and when the use of ICT would be less effective or inappropriate. In making these decisions, they should know how to take account of the functions of ICT and the ways that these can be used by teachers in achieving subject teaching and learning objectives.
2. Teachers should know how to use ICT effectively to achieve subject-related objectives.
3. For those aspects of lessons where ICT is to be used, teachers should be able to identify in their planning:
 - the way(s) in which ICT will be used to meet teaching and learning objectives in the subject;
 - key questions to ask and opportunities for teacher intervention in order to stimulate and direct pupils' learning;
 - the way(s) in which pupils' progress will be assessed and recorded;
 - criteria to ensure that judgments about pupils' attainment and progress in the subject are not masked because ICT has been used;
 - any impact of the use of ICT on the organisation and conduct of the subject lesson and how this is to be managed;
 - how the ICT used is appropriate to the particular subject-related objectives in hand and to pupils' capabilities, taking account of the fact that some pupils may already be very competent, e.g. because of home access or through participation in extra-curricular activities, and some may need additional support.
4. Teachers should know how to organise classroom ICT resources effectively to meet learning objectives in the subject.
5. Teachers should be able to recognise the specific contribution that ICT can make to teaching pupils with special educational needs in mainstream classrooms, based upon the need to provide access to the curriculum in a manner appropriate to pupils' needs, and to identify where ICT can provide subject-specific support.
6. Teachers should be able to choose and use the most suitable ICT to meet teaching objectives, by reviewing a range of generic and subject-specific software critically.
7. Teachers should know how to contribute to the development and consolidation of pupils' ICT capability within the context of the subject being taught.
8. Teachers should understand how to monitor and assess pupils' learning in the subject when ICT is being used, and how to evaluate the contribution that ICT has made to the teaching of their subject(s).
9. In addition, teachers of pupils aged 3–5 should understand the importance of introducing pupils in nursery and reception classes to the use of ICT and recognise the contribution that ICT can make to this age group.

Teachers' Knowledge and Understanding of, and Competence with, Information and Communications Technology

10. In relation to the ICT content set out in paragraphs 11 to 18, teachers should be able to:
 - a. evaluate a range of information and communication technologies, and the content associated with them, justifying the selection and use of ICT in relation to aspects of their planning, teaching, assessment and class management, including for personal professional use, e.g. in downloading on-line materials for teaching or writing reports; and
 - b. understand and use correctly the specialist terms associated with the ICT used in the subject which are necessary to enable them to be precise in their explanations to pupils, to discuss ICT in relation to the subject at a professional level, and to read inspection and classroom-focused research evidence with understanding.

11. Teachers should be competent in those areas of ICT which support pedagogy in every subject, including that they:
 - a. can employ common ICT tools for their own and pupils' benefit, e.g. word processing, e-mail, presentation software, data handling and can use a range of ICT resources, at the level of general users (rather than as network or system managers); and
 - b. know and understand the characteristics of information.
12. Teachers should, in relation to the relevant subject and age(s) of pupils:
 - a. know how to use ICT to find things out;
 - b. know how to use ICT to try things out, make things happen and understand how they happen; and
 - c. know how to use ICT to communicate and exchange ideas.
13. Teachers should know those features of ICT which can be used, separately or together, to support teaching and learning in the relevant subject(s) and phase.
14. Teachers should understand the potential of ICT to make the preparation and presentation of their teaching more effective.
15. Teachers should:
 - a. in relation to the phase(s) and subject(s) to be taught, understand the ICT requirements of the statutory curriculum for pupils and the application of ICT as a key skill; and
 - b. be familiar with expectations of pupils' ICT capability, relevant to the age range of the pupils they teach, and know the level of ICT capability they should expect of pupils when applying ICT in the subject(s).
16. Teachers should know how each of the following is relevant to the age range of the pupils they teach and their specialist subject(s):
 - a. generic procedures and tools, including:
 - i. understanding the key features and functions used within the subject; and
 - ii using ICT to prepare material for pupil use.
 - b. reference resources, including:
 - i. how to search reference resources;
 - ii how to incorporate the use of reference resources into teaching.
 - c. the information and communications technology specific to the teaching of the subject(s);
 - d. the contribution made by ICT to the professional, commercial and industrial applications of their subject(s);
 - e. the major teaching programs or "courseware" to ensure that material is matched to the pupils' capabilities:
 - i. where content and activities are presented in sequence to teach specific topics; and
 - ii. where teaching activities are combined with assessment tasks and tests.
17. Teachers should be aware of:
 - a. the current health and safety legislation relating to the use of computers, and be able to identify potential hazards and minimise risks; and
 - b. legal considerations, including those related to:
 - i. keeping personal information on computers, as set out in the Data Protection Act;
 - ii. copyright legislation relating to text, images and sounds and that relate to copying software; and
 - iii. material which is illegal in this country.
 - c. ethical issues including:
 - i. access to illegal and/or unsuitable material through the Internet;
 - ii. acknowledging sources;
 - iii. confidentiality of personal data;
 - iv. the ways in which users of information sources can be (and are) monitored; and
 - v. material which may be socially or morally unacceptable.

18. Teachers should know how to use ICT to improve their own professional efficiency and to reduce administrative and bureaucratic burdens.

An extensive evaluation has been undertaken and published as *The New Opportunities Fund ICT Training for Teachers and School Librarians: a report on the quality assurance findings in England* (NOF, 2001).

Some points from the conclusions include:

- The understanding of the purpose of the training and the Expected Outcomes need to be improved for all staff in schools.
- Teachers/school librarians have not always identified their training needs against the Expected Outcomes, either because the systems for doing so at school level or with the training provider have been ineffective. Training is most effective where it is matched to identified training needs against the Expected Outcomes and where those individual needs are revisited on a regular basis to ensure progress.
- The support of the school's senior management team for the training is very important. ICT training needs to be an integral part of the school's overall development strategy for the NOF training to have an impact.
- Teachers and school librarians need clear personal targets and objectives and systems to ensure that they can measure their progress against the Expected Outcomes (19–20).

International Computer Driving Licence (ICDL)

The ICDL (ECDL Foundation, 2001) certifies that the holder has knowledge of the basic concepts of Information Technology and is able to use a personal computer and common computer applications at a basic level of competence. In practice the ICDL certificate indicates that the holder has passed one theoretical test that assesses his or her knowledge of the basic concepts of ICT and six practice-based tests which assess the holder's basic competence in using a personal computer and working with common computer applications.

Although developed in Europe the ICDL is available internationally. In Australia the ICDL is administered by the Australian Computer Society which in turn can licence approved assessors.

The course comprises seven modules as follows:

- Basic concepts of Information Technology
- Using the computer and managing files
- Word processing
- Spreadsheet
- Database
- Presentation
- Information and Communication.

To qualify for the ICDL a pass rate of at least 70–80% is expected. The ICDL syllabus is updated on a regular basis to reflect the evolution of ICTs. Recently two advanced modules have been added in the areas of word processing and spreadsheets.

The ICDL assesses only functional ICT competencies and makes no attempt to include any of the pedagogical or management skills required of a teacher.

Denmark

A recent initiative in Denmark (by the University of Copenhagen in collaboration with the Danish Ministry of Education) has been the development of the Pedagogical ICT Driving Licence (University of Copenhagen, 2001). The university manages the program. Research indicates this initiative is also being adapted for use in Norway.

Separate courses are provided for primary and secondary teachers. The courses are conducted online in groups of about 20–25 teachers, each group then being divided into teams of 2 to 4. Teams must successfully complete eight approved modules to obtain a Pedagogical ICT Driving Licence. In each modular task a pedagogical theme is considered and treated from an ICT perspective.

Primary School Modules:

- basic knowledge of computers and electronic communication;
- process-oriented work and text processing;
- basic internet use;
- the use of spreadsheets;
- layout and pictures in communication;
- information retrieval in databases and data processing;
- screen presentation — multimedia and the web; and
- school development.

Secondary School Modules are as follows:

Compulsory modules

- ICT and education;
- internet in education; and
- production of own educational material.

Optional Modules

- talking to the eye — presentations;
- digital pictures;
- digitising the world;
- production of own web sites;
- data collection and processing;
- model construction and simulation;
- multimedia;
- project work and ICT;
- languages and ICT; and
- textual work and text production.

Subject-specific Modules

There are a number of subject-specific modules for the secondary sector including 35 subject-specific modules for upper secondary.

The research has been unable to ascertain the status of the Pedagogical ICT Driving Licence in terms of whether it is voluntary and whether there are any incentives for receiving the licence. No information on participation rates has been located by the project research.

Organisation for Economic Cooperation and Development (OECD)

The OECD *Quality in Teaching* report (CERI, 1994), based on investigations of developments in 11 member countries (Austria, Australia, Finland, France, Italy, Japan, New Zealand, Norway, Sweden, UK and USA), identified the following aspects of teacher quality:

- knowledge of substantive curriculum areas and content;
- pedagogical skill, including the acquisition of knowledge and ability to use a repertoire of teaching strategies;
- reflection and the ability to be self critical, the hall-mark of teacher professionalism;
- empathy and the commitment to the acknowledgement of the dignity of others; and
- managerial competence as teachers assume a range of managerial responsibilities within and outside the classroom.

Subsequent to this mapping the OECD identified the following as characteristics of high quality teachers:

- demonstrate commitment;
- have subject specific knowledge and know their craft;
- love children;
- set an example of moral conduct;
- manage groups effectively;
- incorporate new technology;
- master multiple models of teaching and learning;
- adjust and improvise their practice;
- know their students as individuals;
- exchange ideas with other teachers;
- reflect on their practice;
- collaborate with other teachers;
- advance the profession of teaching;
- contribute to society at large.

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