

Notions of ICT Literacy in Australian School Education

Lina MARKAUSKAITĖ

The University of Sydney

CoCo, School of Development & Learning, Faculty of Education & Social Work (A35)

Sydney, NSW 2006, Australia

e-mail: l.markauskaite@edfac.usyd.edu.au

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Abstract. Understanding about the objectives of ICT literacy and the ways in which it should be enhanced vary. A comprehensive theoretical framework for the analysis of notions of ICT literacy is presented. Current notions of ICT literacy in different segments of policymaking and implementation in Australia are analysed and compared. Two dimensions (intended and implemented) and three theoretical perspectives (ICT policy, literacy policy and teaching and learning) are covered in this analysis. Similarities and differences in the understanding of ICT literacy at the national and regional levels and in various segments of decision-making and implementation are revealed. The complexity of the ICT literacy phenomenon is described. It is shown that, at the intended level, the formation of the notion of ICT literacy is strongly influenced by thinking about ICT literacy in ICT and educational policies. At the implemented level, the notion of ICT literacy is strongly influenced by various local factors and even implementation routines.

Key words: ICT literacy, school education, federal and regional educational policies, comparative analysis, document analysis, Australia.

Introduction

Preparing of citizens for life, work and learning in the “knowledge society” is a priority in many countries. The development of students’ Information and Communication Technology (ICT) literacy¹ has become one of the most important goals of school (K-12) education. However, opinions on what type and level of ICT-related capabilities are essential vary from just basic skills to operate a computer, send e-mails and browse the Internet (ECDL, 2004) to a broad range of interdependent cognitive and technical capabilities, interpersonal and metacognitive capacities, values and other human attributes (NRC, 1999).

¹“ICT literacy” is used as an umbrella term in this paper. It is defined as a broad transferable set of cognitive, non-cognitive and metacognitive capacities as well other human attributes, related to the use of ICT in various spheres of a “knowledge society”. The concept covers various other terms with a similar or narrower meaning, including “ICT skills”, “ICT competence”, “computer literacy”, “digital literacy”, “ICT fluency”, “information literacy” and “ICT proficiency”.

Countries differ in the role they afford to ICT in the future of their nations and individual citizens. Consequently, they propose different targets and apply different strategies for the enhancement of ICT literacy (Kearns, 2002). Moreover, there can be disagreement within a country about the purpose of ICT literacy and the ways in which it should be enhanced (Markauskaite and Dagiene, 2004). The lack of a shared vision and understanding among various levels and sectors of national policymaking usually results in uncoordinated and ineffective educational measures for the enhancement of ICT literacy at school.

The concept of ICT literacy and its synonyms has been broadly investigated by a number of scholars. For instance, P.C. Candy (2000) has conducted a comprehensive review of research on information literacy and accomplished in-depth analysis of digital literacy and self-directed learning skills (Candy, 2004). D. Bawden (2001) has analysed how the concepts of information literacy and digital literacy are described by various researchers. M. Lonsdale and D. McCurry (2004) conducted a more generic study. They reviewed current conceptions of literacies, including new literacies related to ICT capacities. Many other scholars have investigated the definitions of ICT literacy in policy documents. For example, A.M.R. Correia and J.C. Teixeira (2003) researched the notions of information literacy and digital literacy in European Union policies. S. Virkus (2003) conducted an overview of the concepts of information literacy in both regional European policies and in policies of individual European countries. A. Muir and C. Oppenheim (2001) reviewed the notions of information literacy in governmental policies of the European Union, Australia, Japan, New Zealand, Singapore, South Australia and United States. P. Kearns (2002) researched the main trends in ICT skill-related policies in the United Kingdom, United States, Canada, Australia and Scandinavian countries. He also reviewed and compared the concepts of generic skills in Australia, Britain, United States and New Zealand (Kearns, 2001). A number of other scholars researched policies for and development of information literacy in various individual countries (Audunson and Nordlie, 2003; Boekhorst, 2003; Bruce and Candy, 2000; Gomez and Pasadas, 2003; Homann, 2003; Sinikara and Jarvelainen, 2003; Skov and Skaerbak, 2003).

These researchers investigated the notion of ICT literacy from different perspectives, such as general literacy, information skills, ICT skills and workplace skills. A majority of them applied classical literature review based research methods. Several scholars aimed to compare and/or contrast various concepts of ICT literacy (Bawden, 2001; Kearns, 2001; 2002; Virkus, 2003). However very few of them applied explicit theoretical frameworks for the comparative analyses (Lonsdale and McCurry, 2004). Because of the lack of a structured analytical framework, a majority of researches provided only narrative reviews of various ICT literacy definitions. While they detected that the understandings of ICT literacy were not the same in various segments of policymaking, they did not reveal explicitly what kind of similarities and differences exist.

The aim of this paper is twofold. First, it aims to propose an explicit theory-based structural framework for a comparative analysis of the notion of ICT literacy at different levels and in different segments of policymaking and implementation. Second, it aims to investigate the notion of ICT literacy in Australian school education.

The Commonwealth of Australia, because of its specific features, provides an appropriate and internationally interesting case for a comparative analysis of the notion

of ICT literacy at different levels and in different segments of policymaking and implementation. First, Australia is a big and heterogeneous country. The Australian education system is comprised of eight independent regional educational systems. Therefore, traditional methods of cross-cultural comparative analysis (Hantrais, 1996; May, 1997) are relevant and can be applied for the investigation of educational policies within a single country. Second, over the past 35 years there have been numerous federal attempts to develop a national educational policy and to eliminate major inconsistencies between different educational systems (Reid, 2005). A common understanding of key educational policy concepts, such as ICT literacy, has been an important goal of the Federal policies (MCEETYA, 2001). Third, since 1989, the objective "to develop students' skills in information processing and computing" has been a national goal for schooling in Australia (Meredyth et al., 1999). Moreover, since 1999, all states and territories have been attempting to reach agreement on common ICT literacy targets and implement country-wide ICT literacy monitoring (MCEETYA, 1999). Therefore, the Australian experience is an interesting example for countries and international organizations that wish to reduce "digital divides" and reach agreement on a definition for ICT literacy.

This paper reviews and investigates present notions of ICT literacy in different segments (i.e., general and educational) and levels (i.e., federal and regional) of policymaking in Australia. The focus is on the enhancement of students' ICT literacy in K-12 schools. Present definitions and descriptions of ICT literacy, which are presented in general Federal strategic documents and educational policy papers as well as in similar documents of individual states and territories are analysed. Relations between intended policies for ICT literacy enhancement (i.e., strategic goals) and implemented policies (i.e., ICT-related curricula, standards and assessment) are also examined.

The main principles and methods of educational policy comparative analysis and documentary analysis (May, 1997; Tilly, 1984) are applied in this research. Different theories of literacy (Lonsdale and McCurry, 2004), ICT literacy (Martin, 2000; Williams, 2003) and ICT implementation into education (Anderson and Weert, 2002; Law et al., 2000; OECD, 2001) are employed in the theoretical framework. Key Australian policy documents (strategic frameworks, action plans, etc) and official educational papers (curricula, standards, etc) are investigated. Australian notions of ICT literacy at two levels (intended and implemented) and from three theoretical perspectives (ICT policy, literacy policy, and teaching and learning) are analysed.

The paper is structured into six sections. The first section presents the theoretical framework and discusses the three main theoretical perspectives used for the analysis of ICT literacy. The second section provides basic information about Australia and its school system. The next two sections look at the intended dimension of ICT literacy. One investigates the conceptual understanding of ICT literacy in Federal policies; another analyses and compares the concepts of ICT literacy in the policies of Australian states and territories. The fifth section looks at the implemented dimension and examines how the enhancement of ICT literacy is introduced into regional curricula, standards and assessment procedures. The last section summarizes the main findings and presents conclusions.

1. Theoretical Framework: Levels and Perspectives of ICT Literacy Analysis

1.1. *Intended and Implemented ICT Literacy*

Theoretical models applied in studies on ICT use in education traditionally distinguish three dimensions of analysis: (1) intended; (2) implemented and (3) achieved (Law et al., 2000). The intended dimension refers to the goals or objectives of ICT use in education. It is generally defined in terms of achievement targets and strategic directions outlined in policy documents at a national, regional or school level. The implemented dimension refers to the educational processes happening at the school and/or classroom levels. It is usually described in terms of the learning opportunities offered to students and depends on curricula, educational standards, assessment and other structural arrangements of schooling. The achieved dimension refers to the learning outcomes students have achieved as a result of their learning experiences.

This paper studies anticipated notional aspects of ICT literacy rather than results attained by students. Therefore, the notion of ICT literacy will be investigated from only the first two perspectives – intended and implemented. From the intended perspective, ICT literacy will be considered as a part of policy for ICT introduction into education and as a part of general literacy policy (Fig. 1). From the implemented perspective, ICT literacy will be investigated as a set of factors that characterize the teaching and learning of ICT literacy. The intended aspects of ICT literacy (i.e., achievement targets and strategic directions) are usually defined in general ICT and educational strategies (at both national and regional levels), whereas the implemented aspects are usually described in ICT-related curricula, outcome statements, assessment procedures and other curricula support documents (at a regional level).

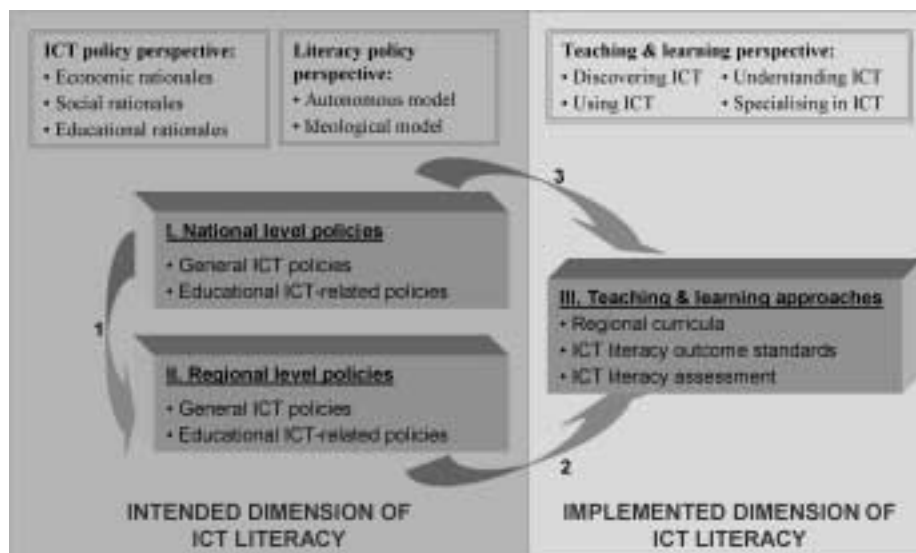


Fig. 1. Theoretical framework for the analysis of notions of ICT literacy.

The different dimensions of analysis and levels of decision-making and implementation together constitute three core interrelated components of the analytical framework employed here (Fig. 1). Taken together, these components describe comprehensively the notion of ICT literacy in a national school system. Simultaneously, they reveal links and inconsistencies between the initial national goals of ICT literacy development and actual teaching and learning practices of ICT-related capacities at a school.

The achieved dimension is omitted in this analysis for practical reasons. Research has shown that the investigation of the notion of ICT literacy in this dimension concerns a range of cognitive and non-cognitive learning outcomes, including: (1) skills and knowledge that are directly related to ICT; (2) specific learning outcomes related to other curriculum areas; (3) higher-order thinking and meta-cognitive skills; (4) workplace competences, such as capacity to work in teams; (5) social behaviours, such as cooperation and social acceptance of others and (6) affective development, such as self-esteem, motivation and a sense of purpose (Cuttance and Stokes, 2000). Research methodologies that can be employed for an analysis of the achieved dimension of ICT literacy vary from historic research (Selfe and Hawisher, 2002) and other qualitative investigations (Talja, 2005) to a range of quantitative techniques for measuring psychological characteristics (e.g., self-efficacy, anxiety) (Hagan et al., 2003; Marakas et al., 1998) and behavioural aspects (e.g., computer coping strategies) (Ropp, 1999), learning experiences, academic achievements and other learning outcomes (Meredyth et al., 1999). However, research methodologies that can be applied on a national scale are limited to the combination of several quantitative techniques: (1) self-reporting and self-evaluation; (2) teacher assessment; (3) psychometrical tests and (4) performance assessment (Cuttance and Stokes, 2000). Therefore, the notion of ICT literacy at the achieved level can be understood from the data collected during various national surveys. In Australia, the last such study was conducted more than five years ago (Meredyth et al., 1999).² The lack of current data does not allow an investigation of the notion of ICT literacy in the achieved dimension.

1.2. *ICT Literacy as a Component of ICT Policy*

The concept of ICT literacy is tightly linked with general motives for inclusion of ICT into education. Much of the existing literature on ICT policies group the main rationales for ICT introduction into education into three broad categories: (1) economic; (2) educational and (3) social (Kearns, 2002; Markauskaite and Dagiene, 2004; OECD, 2001).

The economic rationale recognises the increasingly dominant place of ICT in the current and future economy. It focuses on the need the national economy has for a workforce with appropriate ICT skills. This rationale includes various categories of people in all areas of employment: specialists in the ICT industry; professionals with a high level of ICT competence in other ICT-intensive areas of the economy; and the remainder of the workforce. Current and future employees in each of these vocational categories should develop the level of ICT literacy necessary to perform their job tasks.

²Whereas, a new national sample assessment will be conducted only in 2005–2006 (ACER, 2005).

The social rationale recognises the increasing importance of ICT in our private, social, political and cultural life. ICT literacy has become an essential life skill and human right. This rationale focuses on the needs of each individual to have the ICT-related knowledge and capacities required to participate fully and responsibly in society. For this reason, ICT literacy includes not only familiarity with ICT tools and services, but also an understanding of the ICT-related public issues that allow individuals to make informed judgements (e.g., copyright, electronic media, security, data privacy) as well as many non-cognitive capacities (e.g., willingness to use ICT, capability to collaborate).

The educational rationale recognises the present and future roles of ICT in learning and teaching. It covers the potential of ICT to change different aspects of education: to improve traditional learning and teaching; to change present learning and teaching practices; to enhance students' information skills, higher-order thinking, meta-cognition, communication, collaboration, and other generic capabilities; to create opportunities to access education and extend education throughout one's lifetime. The educational rationale focuses on the need for each citizen to become a powerful lifelong e-learner. Here ICT literacy is a set of capacities that enable a student to use ICT for various learning activities. This ranges from the simple ability to use ICT as a tool or medium for learning to the ICT-related metacognitive capacities and positive dispositions required for lifelong learning.

While there is some overlap between all three rationales (OECD, 2001), nevertheless different motives for ICT integration emphasise different ICT-related capabilities (Table 1). This consequently influences implemented ICT literacy policies, as different methods of ICT literacy enhancement are effective for the achievement of different aims.

Table 1

The main rationales for ICT introduction and their implications on the aims of ICT literacy (Markauskaite and Dagiene, 2004)

Rationales for ICT inclusion into education			
	Economic	Social	Educational
The main aims of ICT literacy	<ul style="list-style-type: none"> • Development of skilled workforce for ICT industry • Development of professionals with extensive ICT proficiency for ICT-intensive domains in the economy • Development of ICT literate general workforce for all other domains in the economy 	<ul style="list-style-type: none"> • Learning to apply ICT in everyday life • Learning to use commercial e-services • Learning to use social and public e-services • Development of capacities to be involved in on-line public policy and democracy processes • Development of capacities to participate in cultural and community life 	<ul style="list-style-type: none"> • Learning to apply ICT tools for traditional learning • Learning to use ICT for the achievement of new educational goals • Enhancement of new personal and interpersonal capacities (critical thinking, collaboration skills, etc) • Development of abilities to access and use new education services • Enhancement of lifelong learning capacities

1.3. *ICT Literacy as a Component of Literacy Policy*

The notion of ICT literacy can be studied in the context of various schools of thought concerning general literacy (Williams, 2003). As M. Lonsdale and D. McCurry (2004) argue, the most explicit and comprehensive theoretical framework for the investigation of literacies is B. V. Street's binary taxonomy, which differentiates various conceptual and practical aspects of literacy enhancement into two models: (1) autonomous and (2) ideological (Street, 1984 cit. in Lonsdale and McCurry, 2004).

The autonomous model conceptualises literacy primarily as an individual attribute and intellectual ability. Here, literacy includes a standard uniform set of abilities. Thus, the level of literacy could easily be measured by standard tests. The learning of literacy is separated from the context in which it will be used and underpinned by dominant ideologies. The main purpose is to develop human capital, which will enhance the economic productivity of a nation.

The ideological model conceptualises literacy as a social practice that is multi-faceted and learner-centred. It includes a diverse range of knowledge, skills and understandings, which are specific for each individual. There is no universal definition of literacy here and consequently its assessment is based on ethnographic approaches. Literacy is underpinned by critical thinking and the ability to challenge dominant ideologies. All literacy practices are integrated within the social context. The objectives of literacy are holistic. They are not limited to individual and/or vocational outcomes, and they include the building of capacity for communities.

For the classification of ICT literacy concepts a majority of scholars use more detailed taxonomies (Anderson and Weert, 2002; Martin, 2000; Williams, 2003). Nevertheless, parallelism between taxonomies specifically tailored to ICT literacy and general models of literacy exists. Thus, the same autonomous vs. ideological thinking could be adapted for the classification of conceptual approaches to ICT literacy. Table 2 summarizes the main features of these two ICT literacy models.

1.4. *Teaching and Learning of ICT Literacy*

The infusion of ICT into education is a long-lasting and complex process. Research reveals that the evolution of ICT at a school has certain clearly distinguishable regularities (Apple Computer Inc, 1995). As a rule, initially ICT is introduced as a separate curriculum area, later ICT is being applied for other curricula and new learning purposes, while finally it becomes invisibly infused into all aspects of education. The understanding of ICT literacy and approaches to its teaching and learning progress together with the evolution of ICT at a school. J. Anderson's and T. Weert's (2002) model of ICT development clearly reflects this relationship. The model consists of two parallel axes: (1) approaches to teaching and learning with and through ICT and (2) stages of ICT development in a school (Fig. 2).

Axis one describes four approaches to ICT-related teaching and learning: (1) discovering ICT tools – when ICT skills are taught as a separate subject; (2) learning how to

Table 2

The main aspects of the autonomous and ideological models of ICT literacy

Attributes of ICT	Autonomous model	Ideological model
1. Objective of ICT literacy	• ICT-skilled workforce	• Cohesive and inclusive “knowledge society”
2. Structure of ICT capacities	• ICT-related technical knowledge and skills	• Integrated problem-solving and ICT capabilities, metacognitive capacities and non-cognitive attributes (e.g., self-management, effectiveness in teamwork)
3. Standards of ICT literacy	• Uniform set of knowledge and skills	• Tailored to individual needs and contexts (e.g., different for various groups of society)
4. Structure of ICT curriculum	• The same for all	• Flexible, structured into stand-alone identifiable units, easily customized to individual needs
5. Learning methods of ICT literacy	• Separate key learning area	• Integrated with other literacies (cross-curricular learning)
6. Teacher’s and student’s role	• Teacher-lead and teacher-centred learning	• Self-managed student-centred ICT literacy enhancement (e.g., supported by MLE*, other technical and human self-managed learning scaffolders)
7. Learning setting	• Computer lab-based learning	• Multiple learning settings and environments
8. Assessment of ICT literacy	• Based on psychometric approaches (e.g., multiple-choice tests)	• Based on ethnographic approaches (e.g., e-portfolio, progress tracking using MLE*)

* MLE – Managed Learning Environment.

use ICT tools – when the development of ICT skills is integrated into separate subjects; (3) understanding how and when to use ICT tools to achieve particular purposes – when ICT is embedded across curricula; and (4) specializing in the use of ICT tools – when ICT is learned in specialized subjects or professional courses. These approaches are parallel to another axis, which describes the four stages of ICT development in a school: (1) emerging; (2) applying; (3) infusing and (4) transforming. Each stage is characterized by eight indicators. Some of these indicators describe background aspects of ICT literacy enhancement, such as ICT facilities and resources, staff development and the role of the community. Whereas others – namely pedagogy, curriculum and assessment – directly characterize approaches to the teaching and learning of ICT literacy. Therefore, the gen-

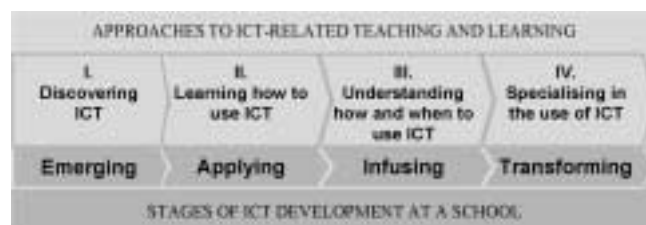


Fig. 2. Relationship between ICT development at a school and approaches to ICT-related teaching and learning. Based on J. Anderson’s and T. Weert’s (2002).

eral model of ICT development at a school can be adapted and applied for the analysis of the notion of ICT literacy from the implemented perspective. Table 3 summarizes the main features of implemented ICT literacy at various stages of development.

In summary, it should be noted that some indicators (e.g., learning methods, assess-

Table 3

Progress in implementing ICT at a school and indicators that describe ICT literacy. Based on J. Anderson's and T. Weert's (2002)

		Indicators of ICT development in a school		
		Learning and teaching pedagogy	Understanding of curriculum	Assessment
Stages of ICT development and approaches to ICT-related teaching and learning	Emerging Discovering ICT tools	Teacher-centred pedagogy. Focus on knowledge and skills of ICT.	Students' ICT literacy is developed during special ICT lessons. Target: to teach students to understand and use hardware and software.	ICT capabilities are assessed separately from students' capacities in other domains. Assessment is a responsibility of the ICT subject teacher. Mainly knowledge and technical skills are measured. Multiple-choice questions and other standard test techniques are used.
	Applying Learning how to use ICT	Teacher-centred pedagogy. Focus on fundamental knowledge and skills to apply ICT in discrete areas.	ICT is applied within discrete subjects in artificial isolated subject contexts.	Assessment focuses on skills and abilities to perform tasks. ICT literacy is assessed separately and as a part of other subjects. Assessment is a responsibility of isolated teachers.
	Infusing Understanding how and when to use ICT to achieve particular purposes	Student-centred pedagogy. Focus on collaboration and communication, use of different information sources and application of ICT for various standard purposes.	Curriculum is organized on a problem-based authentic basis. ICT and different subjects are integrated. ICT (and ICT literacy) is a tool used for accomplishment of various authentic tasks. Projects and other resource-based learning methods are dominant.	Evaluation is integrated and moderated across subject areas. Assessment focuses on attainments in subject domains. Portfolios and multiple media are used to demonstrate attainments. ICT literacy includes technical, cognitive, social and ethical aspects. Evaluation is the responsibility of the student.
	Transforming Specializing in the use of ICT tools	Student-centred pedagogy. Focus on active experimental learning, critical thinking and decision-making capabilities. ICT is applied for individualization of learning and a range of other purposes.	Curriculum is tailored to each student's individual needs. Blended learning environments and learning management systems are used in the teaching and learning process. ICT literacy is enhanced and applied while accomplishing various learning tasks.	Continuous holistic evaluation. Learner oriented, open-ended, project-based, peer-mediated evaluation approaches are used. ICT literacy is a part of multiliteracy. Various communities are involved in the assessment.

ment) that describe intended and implemented ICT literacy are similar (see Table 2 and Table 3). This indicates that intended and implemented dimensions are underpinned by the same ideological assumptions and are interrelated. Thus, the transition in the implementation of ICT literacy from discovering ICT tools to other approaches is inseparable from the conceptual shift in thinking about literacy from the autonomous to ideological model.

2. Overview of the Australian Education

Australia is a large sparsely populated multicultural country. It belongs to the group of countries with the most developed world economies. Australians and the Australian industry are heavy users of information technologies. According to well-known Economist Intelligence Unit ranks, Australia is the twelfth out of sixty-four countries in terms of “e-readiness” (EIU, 2004).

Australia has a well-developed education system with high rates of school enrolment and completion. In total, there are more than 9.6 thousand schools and about 3.3 million full-time school students. Almost 70% of them attend governmental schools, with the remaining 30% in Catholic schools or other non-governmental independent training institutions (ABS, 2005).³

The governing system in Australia operates on two levels – the Federal and the state or territory. The Commonwealth of Australia is comprised of six states and two territories – New South Wales (NSW), Queensland, South Australia (SA), Tasmania, Victoria, the Australian Capital Territory (ACT) and the Northern Territory (NT). The regions differ from each other in their geographic, demographic and socio-economic conditions. For instance, a small hi-tech oriented Victoria accounts for about 25% of the Australian population and produces the largest number of ICT-skilled workers in Australia, whereas the large, almost uninhabited and socially disadvantaged Northern Territory has only about 1% of the population and has various difficulties related to the inclusion of indigenous children into compulsory education (ABS, 2005; Multimedia Victoria, 2004).

Each state and territory has its own independent educational system and exercises almost full control of school education. States’ responsibilities include the organization of curricula, course accreditation, students’ assessment and certification. The Federal government undertakes some responsibility for policy coordination, which includes the development of national strategies and programs and the implementation of joint policy initiatives.

The school systems that have emerged in Australian states and territories share some similarities, but also have many differences. The general structure of education is quite similar across the states and territories: one preparatory year; six or seven years of primary schooling; three or four years of lower secondary education and two years of upper secondary (post-compulsory) education. In the primary grades, students usually study similar programs. In later grades, they take a core group of compulsory subjects and choose

³A majority of registered non-governmental schools use the same curricula as schools in the governmental sector.

others from a range of optional courses. Students are given the most options in upper secondary school. Those who are planning to continue to higher education undertake special, usually more theoretical, tertiary entrance programmes. Other students can select courses from a wide range of different programs, including Vocational Education and Training (VET) courses, part-time apprenticeship or traineeship programmes and other vocational training opportunities.⁴ All educational systems have different assessment policies and use different methods for monitoring and evaluating students' achievements, such as external examination, moderated school-based assessment and non-moderated assessment (MCEETYA, 2002).

3. Notions of ICT Literacy in Australia

3.1. ICT Literacy in Federal ICT Policies

The enhancement of ICT literacy has been a priority of Federal Australian ICT policies since the announcement of the first *Commonwealth Strategic Framework for the Information Economy* (Australian Government, 1998). Education was one of the ten strategic priorities in this framework with the broad objective: "to deliver the education and skills Australians need to participate in the information economy". However in general, the first national ICT strategy concentrated mainly on economic benefits of the information age (e.g., development of ICT industry, e-commerce, e-services), thus the primary focus of various consequently elaborated ICT literacy policies was the development of an ICT-skilled workforce.

In July 2004, a new *Strategic Framework for the Information Economy 2004–2006* was released (Australian Government, 2004). This framework provides a much broader definition of the information economy: "An information economy is one where information, knowledge and education are major inputs to business and social activity" (Australian Government, 2004, p. 2). Education and particularly ICT-related competencies have an important place in the new Federal policy. The concept of ICT literacy employed here mainly concerns two aspects. First, basic ICT skills are increasingly being recognized as an essential "third life skill". Thus, minimal ICT capabilities are as important, from a social perspective, as traditional literacy and numeracy.⁵ Second, ICT has become a common medium for communication and enhancement of knowledge and skills. Therefore, ICT literacy is essential, from an educational perspective, as a precondition for lifelong learning. The framework also stresses the importance of broader competencies for today's Australians, in particular two new ICT-related capacities: (1) problem-solving capabilities and (2) cross-disciplinary management skills.

⁴In contrast to many other countries, VET in schools is quite common in Australia. Various VET programs are offered in about 95% of schools, and VET training involves about 44% of an upper secondary cohort (MCEETYA, 2003). Typically, vocational programs offered at a school form part of the school curricula (i.e., contribute to Senior Secondary School Certificate and/or tertiary entrance scores) and also lead to various levels of industry recognized vocational qualifications (Certificate I–IV).

⁵This aspect in Australian policy particularly concerns indigenous, rural, older and other typically disadvantaged groups of people.

Another more detail vision about ICT literacy is presented in the Commonwealth strategic Framework for the ICT Industry (Australian Government, 2003). The focus of this framework is on the development of “a skills capability base”. This “base” covers three types of skills: (1) those needed by the ICT industry to develop and maintain leading ICT applications; (2) those needed more generally by other ICT-related sectors to create thriving ICT-related businesses and (3) those needed by the general community to participate effectively in the information economy. The document points out changes in the demand for ICT skills after the worldwide downturn of the ICT industry. These changes include a decreasing need for formal technical ICT skills and a likely increase in demand for high-level skills and skills crossing boundaries between ICT and other disciplines. The Framework uses the term “information technology fluency” to describe these new skills. The concept merges three kinds of capacities: (1) proficiency in contemporary applications; (2) understanding of ICT concepts and (3) higher-level capabilities.⁶

In summary, the new Commonwealth frameworks reveal a clear shift in the Federal ICT policies from economic objectives to a broader vision, which includes social, economic and educational benefits. The focus of ICT literacy has shifted from only technical ICT knowledge and functional competencies to cognitive abilities, particularly problem-solving and management capacities, and interdisciplinary competencies. However, the Commonwealth vision is still dominated by economic objectives. The development of human capital – both producers and users of information economy products – remains the most important objective of ICT literacy enhancement.

3.2. *ICT Literacy in Federal Educational Policies*

Australian Federal educational vision, outlined in the Adelaide Declaration (MCEETYA, 1999), proposes the following goal for students’ ICT literacy: “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”. This goal is one of eight overarching cross-curricular learning targets. Several other overarching learning goals are concerned with the enhancement of other generic ICT literacy-related capabilities, such as: “the capacity for, and skills in, analysis and problem solving and the ability to communicate ideas and information, to plan and organise activities, and to collaborate with others” and “positive attitudes towards, vocational education and training, further education, employment and life-long learning” (MCEETYA, 1999). Additionally, in the Declaration, Technology is one of eight key learning areas in which students are expected to attain high standards. Students’ attainments in ICT are also one of the six priority areas chosen for joint national reporting of educational outcomes.

Several other statements in the Adelaide Declaration indirectly define a background for ICT literacy enhancement. First, the Australian educational vision focuses on cross-curricular targets and the integration of students’ understandings in different key learning

⁶This concept of “information technology fluency” was originally coined in the United States (NRC, 1999) and was designed for the higher education sector.

areas (Languages, Technology, etc). Second, it aims to improve links between compulsory education and future pathways (develop students' enterprise skills, extend access to VET programs, etc). Third, it seeks to create equal access opportunities to high quality education for all Australian students (irrespective to socio-economic and cultural background, location, disability, etc).

A more precise Federal vision for ICT literacy in Australian education was presented in Joint Ministers' Statements (MCEETYA, 2000, 2005) and an Action Plan for the integration of ICT into all education and training sectors (i.e., school, vocational and higher education) (DETYA, 2000a).⁷ The main goal is to: "transform education and training, and lay a foundation for our future economic and social prosperity" (MCEETYA, 2005). Therefore, the notion of ICT literacy in the educational sector is underpinned by all – economic, social and educational rationales. Nevertheless, quite obvious favour is given to the economic objective: "A workforce with access to individualised and flexible, quality training through new technologies will address Australia's need for competent workers who learn throughout life"(MCEETYA, 2005).

However, other Commonwealth educational initiatives assign to the school sector a specific role in the development of the information economy: "...the [schools] sector lays the foundation for lifelong learning." Thus, the school sector component of the Action Plan (DETYA, 2000b) focuses equally on two economic and educational objectives. Accordingly, the plan proposes two goals for students' ICT literacy. First, "All students will have access to educational programs that provide a technology-rich experience and environment for developing required skills and attitudes for lifelong learning". Second, "All students will leave school with the employment related skills needed in the information economy and an increased percentage will commence pathways to employment in the ICT industries" (DETYA, 2000b, p. 5).

In summary, the present Federal vision for ICT literacy development in schools is an integrated outcome of the earlier Federal ICT (Australian Government, 1998) and educational policies (MCEETYA, 1999). On the one hand, the action plan for ICT in school education quite strongly focuses on the economic rationales of ICT literacy and emphasises the importance of technical ICT-related skills (DETYA, 2000b). On the other hand, the implementation of the action plan is based on a much broader notion of ICT literacy. According to the annual Ministerial Council report: "...the ICT skills and knowledge relevant to the modern knowledge society include not only the functional skills necessary to operate and use current technology, but also the deeper knowledge and application skills required for analysis and interpretation" (MCEETYA, 2001). In general, the proposed measures in the plan for the school sector focus on integrating and infusing the enhancement of ICT literacy into a broader context. They are based on the values that are typical to the ideological model of literacy, such as active citizenship, school partnership with business, relationship with community and special attention to educationally disadvantaged students (DETYA, 2000b).

⁷This Action Plan (DETYA, 2000a) supplements the earlier Joint Ministers' Statement (MCEETYA, 2000). A new Action Plan "Building a knowledge culture: An education and Training Plan for the Information Economy, 2005–2007", which accompanies the new Statement (MCEETYA, 2005) is expected to be realised later in 2005.

4. Notions of ICT Literacy in Australian States and Territories

4.1. *ICT Literacy in Regional ICT Policies*

In response to Commonwealth initiatives, a majority of states and territories have translated Federal policies for the development of the information economy and education into regional policies. However, comparing the conceptual approaches to ICT literacy in different regions is quite complicated. Some states and territories launched their strategic directions more than five years ago, while others announced or updated their policies only recently. In general, the structure and comprehensiveness of ICT-related policymaking are quite different in various regions. For instance, in the ACT, NT and Tasmania, all issues related to the information economy and society are included into general regional strategies for economic development (ACT Government, 2003; DED, 2000; NT Government, 2002). All other states and territories have separate strategies to address ICT-related issues. NSW, Queensland, Victoria and WA, furthermore, have special plans just for the development of ICT skills (DET, 2001; NSW Government, 2001; Queensland Government, 2000; Victoria State Government, 2000).

The conceptualisations of ICT literacy in state and territory policies possess some similarities, but also have many differences. Table 4 gives a summary of the main statements, related to ICT literacy, in the strategic documents of Australian states and territories. All states and territories focus on an economic objective – to supply the regional economy with an appropriately skilled workforce. Some of the states (NSW, SA, Victoria, WA) adopt the Commonwealth approach and divide workforce skill needs in relation to ICT literacy into three clusters: (1) the specialist technical skills needed by the information industries; (2) the advanced skills needed in other ICT-intensive industries and (3) the basic skills needed by all community to participate in the society. The capabilities that are necessary in each cluster differ in the degree of difficulty, but usually include just technical ICT-related skills (e.g., “from simply reading an e-mail to creating and maintaining complex computing and communications services” (NSW Government, 2001, p. 15)). A few states and territories adopt a more generic approach to ICT literacy. For instance, Queensland explicitly indicates the importance of business and content understandings, the ACT – innovativeness and creativity, WA and Victoria – lifelong learning capacities.

In summary, present regional ICT literacy policies are primarily founded on economic objectives and the notion of ICT literacy as a technical skill. Only a few states and territories conceptualise ICT literacy as a broader cognitive, interdisciplinary and/or social capacity.

4.2. *ICT Literacy in Regional Educational Policies*

Educational policymaking about ICT literacy varies considerably between Australian educational systems. The majority of regions (the ACT, Queensland, Tasmania, Victoria, WA) have separate strategic documents for education development and/or ICT implementation into education; and the enhancement of school students' ICT literacy is an

Table 4

Summary of the main ICT literacy statements in general ICT and educational policies of Australian states and territories

State/ Territory	Statements related to ICT literacy in general ICT policies	Statements related to ICT literacy in education policies
The ACT	<ul style="list-style-type: none"> • “A dynamic, innovative economy needs to be underpinned by an education system that develops the capacity of students for innovative and creative use of ICT” (ACT Government, 2003) • “Develop the personal skills valued by employers” • “Build the links between school and industry” • “All students have a strong grounding in ICT” 	<ul style="list-style-type: none"> • “To develop students with the skills, knowledge, and understanding to use learning technologies confidently and competently to contribute to their life-long learning in a knowledge-based society” (ACT Government, 2004, p. 7) • “To expand students’ access to ICT competencies in schools” (p. 24)
NSW	<ul style="list-style-type: none"> • “Skilled community where everyone can access and take advantage of new technologies” (NSW Government, 2001, p. 7) • “Highly skilled workforce capable of exploiting new technologies” (p. 7) • “Strong base of specialist and technical IT skills to develop products and services” (p. 7) 	<ul style="list-style-type: none"> • “Students and teachers need to learn, teach, work and live in environments using computers” (NSW Government, 2001, p. 25) • “Ensure that all students are skilled to use ICT upon graduation” (p. 23) • “Increase opportunities for students at schools to undertake IT placements in IT areas of business” (p. 23)
Queensland	<ul style="list-style-type: none"> • “A highly skilled workforce” (Queensland Government, 1999) • “IT&T skills are “not just technical – also business, content and technical skills” (p. 3) 	<ul style="list-style-type: none"> • “Building the new skills needed for work and a social life in the information age, providing a foundation for life-long learning in formal and informal settings, problem solving and critical thinking and developing the flexibility to manage change” (Queensland Government, 2002, p. 13)
SA	<ul style="list-style-type: none"> • “The primary resource of the Information Economy is people – people with skills and knowledge.” (SA Government, 2002, p. 27). This includes: (1) “knowledge workers”, (2) “the “in-person” service providers”; (3) “production workforce” 	<ul style="list-style-type: none"> • “IT literacy” is becoming the ‘4th R’” (SA Government, 2002, p. 44) • “Equipping students for lifelong learning, through effective use of information technology and online services” (p. 44) • “Help young South Australians recognize information industries not only as a career option, but also as a business and entrepreneurial future” (p. 9)

To be continued

Continuation of Table 4

State/ Territory	Statements related to ICT literacy in general ICT policies	Statements related to ICT literacy in education policies
Tasmania	<ul style="list-style-type: none"> • “A vibrant and appropriate IT Skills Base underpins the growth of the Tasmanian IT industry and other industries which rely on it” (DED, 2000, p. 2) 	<ul style="list-style-type: none"> • “Enable all students to leave school with the skills needed to participate fully in a knowledge society, become confident, skilled and critical in their use of these technologies and be able to interpret information from a myriad of sources” (DE, 2002, p. 4) • “Opportunities for students to gain both generic and specialist ICT skills within the school environment” (p. 6) • “Pathways from school to further education in ICT and career within ICT industries” (p. 6)
The NT	<ul style="list-style-type: none"> • “Improve education outcomes for indigenous students” (NT Government, 2002) • “Improve literacy and numeracy outcomes for all education sectors, bringing them up to national standards” • “Develop ICT education and training capability at all levels to ensure appropriate skills and expertise are available to meet business needs” 	<ul style="list-style-type: none"> • “Ensure the education system promotes innovation, specifically with respect to students’ ability to solve problems” (NT Government, 2002) • “Increase the number of Northern Territory students who undertake TAFE and VET studies”
Victoria	<ul style="list-style-type: none"> • “Information literacy is a fundamental skill for the knowledge economy” (DEET, 2002, p. 3) • To develop ICT skills which are: “. . . fundamental to the capacity of individuals to undertake lifelong learning.” (p. 15). This includes: (1) “ICT literacy and fluency for all Victorians”; (2) “core generic and technical ICT skills”; (3) “specialists ICT skills” 	<ul style="list-style-type: none"> • “All students should gain basic ICT fluency skills through the effective integration of eLearning throughout all areas of the curriculum” (DET, 2002a, p. 5) • “At the same time, schools need to recognise the importance of providing programs that specifically provide students with additional ICT skills that prepare them for tertiary study, vocational training programs or career pathways in the ICT sector” (p. 5)
WA	<ul style="list-style-type: none"> • “To have the best trained most employable people in the world” (DET, 2001). This includes: (1) the community; (2) ICT industries; (3) the general workforce • “. . . development of lifelong learning culture” 	<ul style="list-style-type: none"> • “Students will be technology-smart and the use of technology will be an integral part of the teaching and learning program” (DET, 2003, p. 5) • “New blends of skills and knowledge to achieve their potential in their personal and working life”

integral part of these strategies (ACT Government, 2004; DE, 2002; DET, 2002a, 2003; Queensland Government, 2002). Several states and territories incorporate various issues related to school students' ICT literacy into broader regional policies, such as general ICT skills action plans (NSW), information economy policy frameworks (SA) or general economy development strategies (the NT) (NSW Government, 2001; NT Government, 2002; SA Government, 2002). Moreover, almost all regions have more than one strategic document and/or program that concern various ideological aspects of ICT literacy development in the school sector.

Conceptual approaches to ICT literacy in state and territory school sectors include some variations, but also share many similarities (see Table 4). In general, all regional policies focus on three targets for students' ICT literacy enhancement: (1) the provision of basic functional ICT skills; (2) the development of broader ICT-related cognitive capabilities and other attributes, such as critical thinking and lifelong learning capacities; and (3) the expansion of ICT competencies related to students' future careers. However, the emphasis afforded to these different targets is not the same in every educational system. For instance, NSW explicitly gives priority to the development of technical ICT competencies, skill-based computer literacy assessment and vocational objectives (NSW Government, 2001). WA, in contrast, focuses on information literacy and problem-solving capacities as well as ICT use for other learning objectives (DET, 2003). The ACT is concerned with three aspects of ICT literacy – information technology capabilities, information literacy and social issues related ICT use (ACT Government, 2004). The NT gives the most attention to other learning objectives that can be achieved through the use of ICT as a tool rather than the development of ICT-related capabilities (DEET, 2004; NT Government, 2002).

Therefore, within Australian regions, the thinking about ICT literacy in the educational sector is quite different from the thinking about ICT literacy in the general ICT policies. The school sector policies are underpinned not just by economic objectives, but also by educational and social rationales. Consequently, the notion of ICT literacy includes not only technical ICT competencies, but also a range of cognitive capabilities and non-cognitive attributes.

Nevertheless, subordination to general ICT policies by school sector policies is remarkable in almost all states and territories. For example, in NSW, the general ICT skills policy is underpinned by vocational goals and promotes competence-based certification using International Computer Driving Licence (ICDL) standards (NSW Government, 2001). In a similar way, NSW policy for the school sector gives the most attention to the development of students' technical ICT competencies and employs test-based assessment of students' computer skills (BS, 2004; DET, 2004a). In WA a general strategy for the development of ICT skills is based on a lifelong learning culture (DET, 2001). A similar approach to ICT literacy, as an integral part of teaching and learning, forms a foundation of the governmental policy for ICT in schools (DET, 2003). In the NT, social issues and provision of access to educational opportunities are the main objectives of regional development (NT Government, 2002). Consequently NT programs for ICT in education focus on the use of ICT for teaching literacy, numeracy and other key learning goals, rather than just the enhancement of students' ICT capabilities (DEET, 2004).

5. Implementation of ICT Literacy in Australian Curricula

After the announcement of the Adelaide Declaration (MCEETYA, 1999), all regions aligned their educational systems to Commonwealth objectives and published new curricula frameworks and student outcome statements. These new documents have different structures and layouts, but share many fundamental similarities. Concerning the enhancement of students' ICT literacy, all educational systems apply three common curricular approaches: (1) they include ICT-related topics into compulsory curricula; (2) they infuse learning targets related to ICT literacy across curricula and (3) they introduce specialized ICT-related courses. The primary objective of the first two approaches to ICT literacy enhancement is to develop students' general ICT-related capabilities. The main objective of the third approach is to enhance students' capabilities to apply ICT in selected professional areas.

In the first approach, some basic ICT-related topics are introduced into curricula content and the teaching methodologies of different key learning areas. In all educational systems, a substantial amount of ICT-related topics are covered in the Technology learning area. The delivery of Technology courses, as a rule, is also based on the standard steps involved in the problem-solving process (investigation, designing, production, communication, evaluation, etc). In this way, learning technical ICT knowledge and skills is explicitly integrated with the development of problem-solving capabilities. Various ICT-related topics and learning activities are scattered throughout the K-12 curricula, but typically the basic ICT topics are covered already in primary (K-6) grades.

In the second approach, ICT-related technical, information and other general cognitive capacities are overarching cross-curricular learning goals – usually called “essential learnings”. State and territory curricula accountability frameworks include explicit outcome statements for each “essential learning.” Moreover, currently almost all educational systems are changing students' outcome assessment and reporting. Instead of assessing students' achievements against standards in separate key learning areas, they are going to access students' progress against overarching learning statements. Thus, students' ICT-related capabilities developed across curricula will be consolidated and assessed collectively against specified outcome statements related to ICT literacy.

In the third approach, all Australian educational systems offer a number of special ICT programs.⁸ In post-compulsory (11–12) school years, Australian students have the opportunity to progress into many specialized areas of ICT use, such as a General Information Technology (IT) courses, Advanced Software Applications, Network Administration, Design and Graphics Communication, Office Administration, Broadcasting and Multimedia. All educational systems offer a range of options: school-based courses, VET at school programs, part-time apprenticeships, etc. The actual arrangements of special ICT programs vary from one region to another. Commonly, all school-based courses give a certain credit to a school graduation certificate and/or university admission ranking. Almost all VET, apprenticeship and other traineeship programs both: (1) provide certification,

⁸Specialized courses are common only in upper secondary school curricula. Separate (optional) ICT courses are introduced in lower (7–10) grades in only NSW and Queensland.

which lead to different industry recognized qualifications, and (2) contribute to school graduation. The main difference between educational systems is that some regions (the ACT, NSW, Tasmania) offer specializations just in professional IT and Computer Design fields, whereas others (Queensland, SA, Victoria, WA) provide many cross-disciplinary industrial specializations (e.g., Business and Computing, Film and Television).

The majority of systems give preference to integrated ICT literacy learning in compulsory years of schooling and specialized learning in post-compulsory years. Problems surround both the specialized and integrated approaches. The biggest issue with specialized ICT curricula is that ICT-related courses involve only a fraction of the student cohort in post-compulsory education. There is no evidence that those students who select non-ICT pathways are also enhancing their ICT literacy (Cuttance and Stokes, 2000). The biggest issues with integrated learning approaches to ICT literacy are: (1) how educational systems can shift from the traditional discipline focus to “essential learnings” and (2) how to ensure that during integrated cross-curricular learning activities students achieve expected ICT literacy outcomes (Cuttance and Stokes, 2000). States and territories address these issues in different ways.

To support the migration from course-based to cross-curricular integrated approaches to ICT literacy enhancement, almost all states and territories have published a number of special support papers. Typically, these documents explain in a condensed manner how teaching and learning experiences designed to enhance ICT literacy should be incorporated into curricula. Nevertheless, support papers differ considerably among the educational systems. Variations concern not only functional features of support documents (e.g., degree of comprehensiveness), but also ideological aspects (e.g., emphasis on technical vs. more general ICT literacy). For instance, NSW focuses just on technical ICT capacities and provides merely the lists of functional computer skills (e.g., basic operations, word processing) that should be developed as students use ICT in various subjects (BS, 2001; DET, 2002c). In contrast, some states and territories (the ACT, Tasmania), provide comprehensive general guidelines about ICT use across curricula (including a description of main terms, learning and teaching methods, evaluation, expected learning outcomes), but give little information about ICT use in each individual key learning area and do not describe in detail ICT-related learning outcomes (DET, 1997, 2004b). Other states (SA, Victoria, WA) mix both approaches, and initially provide broader visions and guidelines about the use of ICT across curricula, then give detailed matrixes that link students' expected outcomes in key learning areas with functional ICT competencies or overarching learning achievements (Curriculum Council, 1998; DECS, 2005; DETE, 2001; VCAA, 2002).

To ensure that students develop appropriate levels of ICT literacy during integrated learning activities, the educational systems apply different methods of assessment and monitoring. In the majority of regions, the evaluation of students' ICT-related capabilities is based on standard annual assessment, conducted by teachers, against learning standards in the Technology key learning area. A number of states (e.g., Queensland, SA, Tasmania) are planning to introduce assessment against “essential learnings”. Several educational systems (the ACT, NSW, SA) are introducing special procedures for ICT

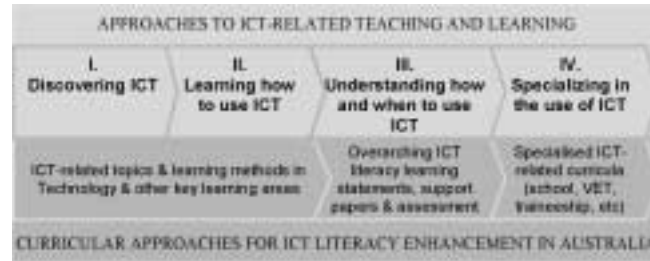


Fig. 3. Theoretical approaches to ICT-related teaching and learning and curricular approaches to ICT literacy development in Australia.

literacy assessment and/or certification in grades 6 and/or 10. The approaches and assessment processes are different in each region. For instance, NSW implements compulsory test-based computer skills assessment in grades 6 and 10 (BS, 2001; DET, 2002c). SA and the ACT apply more holistic procedures, and assess students' ICT-related achievements against specified standards across-curriculum throughout year 10.⁹ The assessment criteria in SA and the ACT are conceptually different – SA uses industry-accredited IT Certificate I standards (DETE, 2001), whereas the ACT applies more generic criteria, which are based on requirements implied in school curricula documents (DET, 2002b).

In summary, at the implemented level, ICT literacy has a multi-faceted place in the curricula of all Australian states and territories. When the main curricular approaches applied for ICT literacy enhancement in the Australian educational systems are compared with teaching and learning approaches in the taxonomy of a school development (Anderson and Weert, 2002), it is evident that all four possible theoretical approaches are embedded into regional curricula (Fig. 3). Moreover, students' ICT literacy is enhanced gradually. K-6 curricula focus largely on discovering and learning how to use ICT tools. Later 7–10 curricula involve more self-regulated cross-curricular activities that require an understanding of when to use ICT. While upper secondary curricula include mostly specialized ICT courses. However, the balance among different approaches is not the same in various educational systems.

There is almost a direct relationship between the intended and implemented notions of ICT literacy in all educational systems of Australia. This is particularly evident in those states and territories that are implementing special assessment of students' ICT literacy. For instance, NSW policy for ICT in schools gives a lot of attention to technical competencies. Similarly, NSW's curricula support papers primarily focus on the development of students' functional ICT skills and the assessment of students' computer skills is based on psychometric test-based methods (BS, 2004; DET, 2004a). In contrast, the ACT plan for schools covers a versatile range of technical and non-cognitive capacities (ACT Government, 2004). The assessment of ICT literacy is also based on holistic criteria and ethnographic methods (DET, 2002b). SA ICT policy for schools is quite holistic, but has

⁹Students' ICT-related achievements are evaluated by different teachers and results recorded into special databases.

a clear vocational focus. Implemented assessment procedures, while holistic in approach, are based on industry-recognized standards (DETE, 2001).

6. Discussion and Conclusions

This analysis has shown that there is obvious tension among the economic, social and educational priorities of ICT literacy enhancement in all segments of Australian policy-making and implementation.

From the intended perspective, for many years, economic objectives of ICT literacy development have dominated general Commonwealth ICT strategies. Although recently Federal ICT policies have shifted to a broader vision, a strong emphasis on economic objectives and individual ICT-related skills remains. Meanwhile, Commonwealth strategies for ICT in schools seek to respond to the information economy's need for skills, while also acknowledging social and educational importance of ICT literacy. They are based on a more holistic vision, and the notion of ICT literacy covers a range of cognitive and non-cognitive capacities. The proposed actions for students' ICT literacy development in the Federal school strategies are underpinned by a more contextualised ideological model of literacy.

The approaches to ICT literacy in the ICT strategies of Australian states and territories vary. The majority of regions accentuate economic objectives. Only a few states (the ACT, Victoria, WA) have taken a broader perspective and, alongside economic objectives, assert the public and lifelong learning value of ICT literacy.

The thinking about ICT literacy in regional school policies is quite similar to the Commonwealth school policy approach. All educational systems seek to achieve the harmony between the industry advocated skills-based vision and their own values, which are based on the ideological model of literacy. However, the influence of general regional ICT strategies on the conceptual approaches in the school sector is noteworthy. Those states and territories that have taken a broader general approach to the role of ICT capacities in their societies, as a rule, also have a more holistic approach to ICT literacy in the school sector.

From the implementation perspective, all Australian states and territories apply similar curricular methods for enhancing students' ICT literacy and combine three teaching and learning approaches: inclusion of ICT-related topics into various subjects; infusion of ICT across-curricula; and specialization in ICT use. However, there is strong relationship between the intended and implemented aspects of ICT literacy in all educational systems. As a result, the priority given to each approach is quite different in various Australian regions.

Therefore, the notion of ICT literacy is not the same in all segments of Australian policymaking and implementation. The discontinuities are the most apparent in two places: (1) between the Federal and regional levels in the intended dimension and (2) between the intended and implemented dimensions at the regional level. Therefore, some discrepancies in the understanding of ICT literacy occur during the translation of Federal ICT

and educational objectives into the objectives of regional policies (see arrow 1 in Fig. 1). Additional divergences take place during the translation of the regional ICT and educational policies into the implemented curricula, standards, assessment and other practical arrangements (see arrow 2 in Fig. 1). Moreover, some differences in the notion of ICT literacy exist even within the same dimension. For example, in the implemented dimension, ICT literacy outcome statements and curricular approaches are very similar in all states and territories. However, syllabi, ICT literacy support papers, assessment and monitoring procedures are quite different.

Overall, this review reveals several interesting phenomena. First, there is obvious hierarchical dependence between various levels and aspects of ICT literacy policymaking and implementation (Fig 4). That is, general ICT and educational policies influence policy for ICT in education. ICT in education policy influences curricula and outcome standards, etc. Second, there is a clear tendency for differences in the notion of ICT literacy to increase with each new step of policymaking and implementation. For instance, at the intended level, national goals have a strong impact on the goals of regional policies, while local characteristics have less influence. As we move to other levels of policy implementation, the impact of national policies diminishes, whereas the importance of local policies and arrangements increases. While finally in the implemented dimension, ICT literacy support papers and assessment procedures in essence reflect a local rather than a national understanding of ICT literacy.

Some interstate differences are quite understandable given that the teaching and learning of ICT literacy must be aligned to the specific social and economic conditions in each individual state or territory. However, students' learning experiences and outputs are closely associated to the implemented teaching and learning practices, particularly assessment (OECD, 2001). Therefore, the effect of the common Federal goals on the notion of ICT literacy could be even weaker in the achieved dimension, and students' ICT literacy could be quite different in various Australian states and territories.

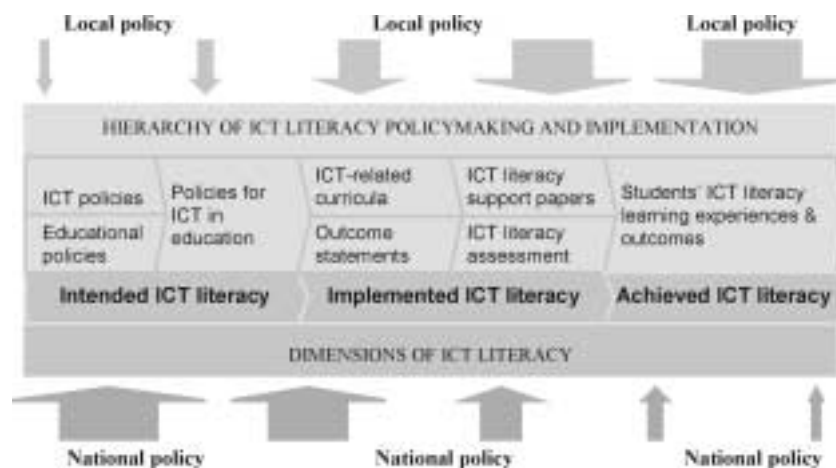


Fig. 4. Hierarchy of ICT literacy policymaking and the impact of national and local policies.

This implicates that in order to achieve greater consistency in ICT literacy outputs national policies should not be limited to the intended dimension, but should also include various aspects of the implemented dimension, such as countrywide outcome statements, common ICT literacy assessment arrangements, etc (see arrow 3 in Fig. 1).

In summary, the differences and similarities in the understanding of ICT literacy among various segments of policymaking and implementation show that the formation of the ICT literacy notion in the school sector is a complex phenomenon. This process is influenced by many factors. At the intended level, it is as strongly affected by thinking about ICT literacy outside the educational system as it is influenced by values and beliefs within the educational sector. At the implemented level, it is strongly influenced by various local factors and even context-specific implementation routines (such as support documents, assessment arrangements). Therefore, while ideological principles have a critical role in the notion of ICT literacy, they are not the single determinants that finally decide what kind of ICT-related understandings and capacities students will develop. Various pragmatic aspects of the implementation have an equally important role.

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L. Markauskaitė is a postdoctoral fellow at the University of Sydney (Australia), the Center for Research on Computer Supported Learning and Cognition (CoCo). She received a PhD in informatics in 2000. Her major research interests are development of ICT literacy, blended learning environments, qualitative and quantitative research methods and national policies for ICT introduction into education.

IKT raštingumo sampratos Australijos bendrojo lavinimo švietimo sistemoje

Lina MARKAUSKAITĖ

Suteikti visiems bendrojo lavinimo mokyklų moksleiviams visavertį IKT raštingumą yra vienas iš pagrindinių švietimo uždavinių daugelyje pasaulio šalių. Tačiau nėra visuotinai sutarta, kas IKT raštingumas ir kaip jis turėtų būti ugdomas. Straipsnis analizuoja IKT raštingumo sampratą Australijos Federalinėje bei atskirų regionų IKT ir švietimo politikoje. Analizė apima du IKT diegimo švietime lygius: numatytąjį ir įgyvendinamą. Jie nagrinėjami trijų teorijų plotmėje: 1) IKT integravimo į švietimą; 2) raštingumo ir 3) IKT panaudojimo mokymui bei mokymuisi. Taikomi lyginamosios ir dokumentų analizės metodai. Numatyta lygmenyje analizuojamos ir lyginamos IKT raštingumo sampratos pateiktos federaliniuose bei regioniniuose strateginiuose dokumentuose. Įgyvendinamame lygmenyje nagrinėjamos Australijos valstijų ir teritorijų bendrosios ugdymo programos išsilavinimo standartai bei vertinimo procedūros.

Analizė atskleidžia daug panašumų ir skirtumų. Federalinėje ir daugumos regionų IKT politikose dominuoja ekonominiai motyvai ir siauru autonominiu raštingumo modeliu pagrįsta IKT raštingumo samprata. Švietimo politikose vyrauja ne tik ekonominiai, bet ir švietimo motyvai bei holistišku ideologiniu raštingumo modeliu grindžiama IKT raštingumo samprata. IKT raštingumo samprata numatyta ir įgyvendinama IKT politikos lygmenyje taip pat ne visada sutampa. Numatyta lygmenyje koncepciniai požiūriai į IKT raštingumą labai panašūs visose Australijos valstijose ir teritorijose, tačiau įgyvendinamame lygmenyje jie skiriasi.