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ICT and Initial Teacher Education: National Policies

Caroline Rizza

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ICT AND INITIAL TEACHER EDUCATION: NATIONAL POLICIES

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Caroline Rizza

Caroline Rizza at caroline.rizza@jrc.ec.europa.eu

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SUMMARY

This working paper aims to give an overview of the national policies that exist in the field of ICT and initial teacher education. Information on this topic was initially gathered *via* a survey, in the form of a country questionnaire, which was conducted as part of the analytical strand of the OECD study entitled "ICT and Initial Teacher Education".[1] All of this work has been carried out under the auspices of the *New Millennium Learners* project. Responses to the survey were received from the following countries: Austria, Australia, Belgium (Flanders), Chile, Denmark, Finland, Poland, Slovakia, Spain, and the United Kingdom. Some of the responses have been used in this report (see Appendix 1, "Country Questionnaire").

In addition, desk research was conducted for 31 OECD countries.[2] Special attention was given to the dates and to the last revisions of the documents in order to ensure the relevance of the information collected.[3] Official country reports, work plans, official texts (decrees, laws) and articles constitute the main material of this study. Multiple sources have been used: databases, official government websites, key stakeholders (see References). The review was completed in January 2009; therefore, reforms and updates of the policies implemented after January 2009 have not been taken into account.

On the basis of these documents, three categories are proposed for understanding the extent to which countries have addressed the issue of ICT and initial teacher education:

- Category 1: Lack of relevant information concerning ICT and initial teacher education.
- Category 2: Developing awareness of the stakes of ICT and initial teacher education.
- Category 3: Inclusion of ICT in initial teacher education at several levels.

The first part of this report presents a comparison of national policies by classifying each of them in one of these three categories. The second part of this report proposes a complementary analysis of these result by first discussing some limits to the initial broad classification of countries in these categories and then presenting key elements of comparison in order to estimate the level of coherence of these policies.

NOTES

[1] See *www.oecd.org/edu/nml/itt*.

[2] Australia, Austria, Belgium, Canada, Chile, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Italy, Japan, Korea, Luxembourg, Mexico, Netherlands, New Zealand, Norway, Poland, Portugal, Republic of Ireland, Slovakia, Spain, Sweden, Switzerland, Turkey, United Kingdom, and United States.

[3] Since this review was completed in January 2009, reforms and updates of the policies implemented after January 2009 are not taken into account.

RÉSUMÉ

Ce document de travail vise à donner un aperçu des politiques nationales qui existent dans le domaine des TIC et la formation initiale des enseignants. L'information sur ce sujet a été initialement recueillie sous la forme d'un questionnaire pays, via une enquête menée dans le cadre du projet d'étude analytique de l'OCDE : « Les TIC et la formation initiale des enseignants »[1]. La totalité de ce travail a été menée sous les auspices du projet Les Apprenants du Nouveau Millénaire. L'Autriche, l'Australie, la Belgique (Flandre), le Chili, le Danemark, la Finlande, la Pologne, la Slovaquie, l'Espagne et le Royaume-Uni ont participé à l'enquête. Certaines réponses ont été utilisées dans ce rapport (voir Annexe 1, « Questionnaire pays »).

De plus, une recherche documentaire a été réalisée pour 31 pays de l'OCDE[2] Les dates et les dernières révisions des documents étudiés ont fait l'objet d'une attention particulière afin de s'assurer de la pertinence des données collectées[3]. Rapports officiels de pays, plans de travail, textes officiels (décrets, lois) et articles constituent le matériel principal de cette étude. De multiples sources ont été utilisées : bases de données, sites web des gouvernements, parties prenantes (voir les références). L'examen s'est achevé en Janvier 2009 et, par conséquent, les réformes et les mises à jour des politiques mises en œuvre après Janvier 2009 n'ont pas été prises en compte.

Sur la base de ces documents, trois catégories sont proposées afin de comprendre les mesures prises par ces différents pays sur la question des TIC et la formation initiale des enseignants :

• Catégorie 1 : le manque d'informations pertinentes concernant les TIC et formation initiale des enseignants ;

• Catégorie 2 : développer la conscience sur l'enjeu des TIC et la formation initiale des enseignants ;

• Catégorie 3 : l'intégration des TIC dans la formation initiale des enseignants, à plusieurs niveaux

La première partie de ce rapport présente une comparaison des politiques nationales en classant chacune d'elles dans une de ces trois catégories. La deuxième partie de ce rapport propose une analyse complémentaire de ces résultats en discutant d'abord de certaines limites liées à la classification initiale des pays dans ces catégories et en présentant ensuite les principaux éléments de comparaison afin d'estimer le niveau de cohérence de ces politiques.

NOTES

[1] Voir *www.oecd.org/edu/nml/itt*.

[2] Australie, Autriche, Belgique, Canada, Chili, République Tchèque, Danemark, Finlande, France, Allemagne, Grèce, Hongrie, Islande, Italie, Japon, Corée, Luxembourg, Mexique, Pays-Bas, Nouvelle-Zélande, Norvège, Pologne, Portugal, République d'Irlande, Slovaquie, Spain, Suède, Suisse, Turquie, Royaume Uni, et États-Unis.

[3] Depuis que cette étude s'est achevée en janvier 2009, les réformes et mises à jour des politiques mises en œuvre après 2009 n'ont pas été prises en compte.

PART ONE: COMPARISON OF NATIONAL POLICIES

1. Category I: Lack of relevant information concerning ICT and initial teacher education

1.1 The first category comprises countries in which there is a lack of relevant information regarding the ways in which ICT is addressed in initial teacher education. This means that either no relevant information was found or the findings suggest that no specific policy in regard to ICT and initial teacher education has been formulated.

1.2 Included in the first case – no relevant information found – are Canada (all the provinces except Quebec) and Mexico. In the case of the latter, the Secretariat of Public Education has published a decree (17 January 2008) concerning education programmes. In this decree, the third objective concerns "the implementation and use of ICT in the educational system in order to support students' learning, to increase their skills and to facilitate their integration in the knowledge society". Despite this objective, however, no information directly linked with the field of ICT in initial teacher education was found.

1.3 In the second case, the findings suggest that no policy concerning ICT in initial teacher education exists. This is the case for the Czech Republic and Greece.

1.4 The report "Assessment Schemes for Teachers' ICT Competence – A Policy Analysis"[1] (Balanskat, 2005) published by the "Insight Observatory of New Technologies and Education" website underlines that the Czech Republic has developed its own national certification, but it is used only for in-service teacher education:

> The Czech Republic**,** Denmark, France, Hungary, Israel and Switzerland have developed their own national ICT certificates for teachers (either for initial or in-service training). (p. 6)
>
> More than half of the countries pointed only to training programmes for in-service teacher training (Catalonia, Germany, Czech Republic, Estonia, Hungary, Greece, Malta, Lithuania, Switzerland (trainers). (p. 21)

1.5 The country report dedicated to Greece (last updated and revised in October 2007)[2] explains that higher education institutions develop the university programmes and that there is no uniformity in the integration of ICT. The country report highlights the different measures taken to improve the in-service teacher ICT skills, but it does not approach the question of ICT in initial teacher education:

> Between 2000 and 2006, teacher training in ICT has been organised through the *Information Society Operational Programme*. To date, 92 000 teachers (76% in total) have been already familiarised with basic computer applications, while the rest of the teachers are currently attending such courses. Specially designed certification procedure for teachers' ICT skills has been planned through national examinations, while 56 000 teachers have been already certified. Continuous professional development of teachers on the exploitation of ICT in educational practice has been planned. (p. 9)

1.6 In this context, ICT in-service teacher education consists of six units: 1) basic concepts of informatics and the use of a PC; 2) word processing; 3) spreadsheets; 4) presentation software; 5) networks and communication; and 6) educational software. This training gives in-service teachers the opportunity to take examinations for a certification, but this is not compulsory:

However, certification is not compulsory for teachers, even if they have attended the first phase of in-service training on ICT. Teachers who have not attended the in-service course also have the right to sit the examinations for the ICT certificate. (p. 9)

1.7 Furthermore, examination of the *Information Society Operational Programme*[3] allows us to go further concerning the content of the measures and note the absence of a field as such identified as ICT and initial teacher education.

2. Category II: Developing awareness of the stakes of ICT and initial teacher education

2.1 In this category, two sets of countries have been identified. In the first set, ICT in initial teacher education forms part of a national work plan or action plan for the future. This is the case in Australia, Belgium (Flanders), Ireland, New Zealand, Portugal and the Slovak Republic. The second set identifies countries which have utilised the support of foundations to implement initiatives and actions in the field of ICT in initial teacher education. This is the case in the Netherlands and Sweden. The following table gives an overview of the content of these policies.

Table 1. Developing awareness of the issues surrounding ICT and initial teacher education: National plans and supports from foundations

	National work plans or action plans		Initiatives and actions supported by foundations	
Country	**Title**	**Content (main axes in the field of ICT in initial teacher education)**	**Foundation**	**Types of actions**
Australia	The Australian ICT in Education Committee's Work Plan, (2008).	Identification of the building educator's capabilities as priority areas for action.		
Belgium (Flanders)	The policy plan "Competencies for the Knowledge Society 2007-09" – Flemish Ministry of Education (2007).	The introduction of the new ICT curriculum: The teacher education system is expected to provide the labour market with teachers who have the necessary initial qualifications – in the case of ICT as well.		
Netherlands			The Kennisnet Foundation.	Supporting the implementation of ICT in education, *e.g.* the project "More Expertise Together".

Table 1. Developing awareness of the issues surrounding ICT and initial teacher education: National plans and supports from foundations cont'd.

	National work plans or action plans		Initiatives and actions supported by foundations	
Country	**Title**	**Content (main axes in the field of ICT in initial teacher education)**	**Foundation**	**Types of actions**
New Zealand	The "E-learning Action Plan for Schools for the Years 2006-2010: Enabling the 21st Century Learner", Ministry of Education (2006).	Supporting teachers' confidence and capability to effectively integrate e-learning into their professional practice by including ICT literacy skills and pedagogies in pre-service training programmes.		
Portugal	"Technological Plan for Education", Ministry of Education (2008)	Identification of three intervention areas: 1) training of teachers and non-teaching staff, 2) certification of students and teacher competencies and 3) use of ICT in teaching and learning processes		
	The Minister's strategy group "Investing Strategy in Information and Communication Technologies in Schools, *2008-2013"* (2008)	Identification of a need for an overall framework to bring together national schemes and programmes of teacher ICT education for both the initial and in-career stages.		
Ireland	National Development Plan: "Transforming Ireland, a Better Quality of Life for All, 2007-2013" (2007)	No specific action in the field of ICT in initial teacher education.		
Slovak Republic	"Strategy for ICT in Education", government resolution (2008).	Puts ICT competencies into requirements for teachers' professional competencies at all levels.		
Sweden	Proposal for a new teacher education programme – Ministry of Education and Research (Dec. 2008).	Suggestion of four perspectives to be part of all teacher education. One of these is "Information and Communication Technology as a Resource for Education".	The Knowledge Foundation	Programme to support the implementation of ICT in initial teacher education by forming a network to develop the digital competences of student teachers.

National work plans or action plans

Australia

2.2 Since January 2008, state and territory education authorities have agreed to a Digital Education Revolution Strategic Plan.[4] The DER Strategic Plan positions the DER as a national collaborative partnership for making the most of a "once-in-a-generation opportunity" and recognises that different partners will be at different stages and will have different priorities. It sets out a national vision for ICT in school education, identifies high-level goals, areas where change will be needed to achieve these goals and possible areas for investment, and provides a number of principles to guide the implementation of the DER. Four strands for change are identified: 1) leadership, 2) infrastructure, 3) learning resources and 4) teacher capability. It notes that the Plan will be revised by the end of June 2009 and that it may be appropriate at that time to consider annual implementation plans, which would detail the actions and commitments by DER partners.

2.3 The aim of the Digital Education Revolution initiative is to contribute sustainable and meaningful change to teaching and learning in Australian schools that will prepare students for further education and training, and that will enable them to live and work in a digital world. In this context, teachers are critical to student learning and are provided with significant ongoing support to ensure the success of the Digital Education Revolution initiative. Collaborative work is currently underway to make certain teachers continue to receive the necessary training and development to integrate ICT into their teaching practices. More precisely, the Australian government has identified "collaboration with states and territories and Deans of Education to ensure continuing and new teachers have access to training in the use of ICT that enables them to enrich student learning" as one of the six main constitutive elements of the DER.

2.4 The Australian ICT in Education Committee (AICTEC) constitutes a national forum for advice on issues relating to the educational use of ICT. The Ministerial Council on Education, Employment, Training and Youth Affairs (MCEETYA) endorsed it in 2001. AICTEC supports ongoing national collaboration across sectors and jurisdictions, as well as facilitating strategies and policy advice. Its main objective is to promote the development of educators' capabilities to introduce ICT into their teaching, learning and administrative practices.

2.5 The AICTEC's 2008 work plan had identified the improvement of educators' ICT skills as a priority. The 2009 work plan identifies "building educators' capabilities" as a priority area for action.

> Building educators' capabilities: The vision for the Australian education and training environment outlined in the Joint Ministerial Statement and the Digital Education Revolution requires educators who are competent and confident in integrating ICT into their teaching and learning practices. A cohesive approach to developing all educators' skills, knowledge, capabilities and confidence will ensure that students have a seamless experience of education and training that includes technologies. As such, the purpose is to support school communities to build sustainable strategies, utilising resources and pedagogical practices, to meet the demands of the Digital Education Revolution.
>
> AICTEC has a national strategic role in identifying cross-sectoral levers and opportunities for building educators' capabilities. In 2009 AICTEC's role in building educators' capabilities has broadened to include the requirements for the Digital Education Revolution. To this end, the Teaching for the Digital Age Advisory Group and its Reference Group have been established by AICTEC to provide advice on a co-ordinated and coherent approach to teacher professional development in the use of ICT in teaching and learning.

> Through the work of the Teaching for the Digital Age Advisory Group, AICTEC will develop strategies to support school communities move beyond a " business as usual" outlook by enabling change in school communities in four key professional learning areas – Transformation and Leadership; Support; Integration; and Sharing and Innovation.
>
> The Digital Education Revolution recognises the importance of a national approach to building the capabilities of educators for including technologies into teaching and learning. In addition, the importance of ensuring that pre-service teachers are appropriately prepared to enter technology-rich education and training environments will be promoted by AICTEC with the Deans of Education.[5]

2.6 Under the auspices of MCEETYA, the Australian ICT in Education Committee (AICTEC) is developing a "Digital Education Revolution Road Map" which will include a "Teaching in the Digital Age Work Plan". This Work Plan will focus on the teacher professional development required to integrate ICT into pedagogical practice to meet students' needs and harness the resources of the DER. The DER Strategic Plan and Road Map together provide the broader context within which the various Australian state and territory DER-related government initiatives are being implemented.

2.7 On a federal level, the government only makes recommendations in the field of education, leaving decisions to the state level. It will be shown below that in 1999, the report "Learning in an Online World: The School Education Plan for the Information Economy", published by the Commonwealth of Australia, outlined a range of objectives in the application of ICT in teaching and learning, and that different local initiatives of implementation of ICT competency frameworks exist. Since 2002, the development of an ICT competency framework for teachers has been proposed by the Commonwealth Department of Education, Science and Training.[6]

2.8 Finally, it is important to underline the upcoming changes presented in the answers to the country questionnaire. Indeed, Education Ministers, through MCEETYA, have agreed to develop a system for the national accreditation of teacher education courses. This system will build on the existing course accreditation processes operating in some states by establishing common accreditation processes and national graduate standards, specifying the knowledge and skills that graduates need, including knowledge and skills related to the use of ICT and other technologies in teaching.

Belgium (Flanders)

2.9 In March 2007 the Flemish Ministry of Employment, Education and Training published a policy plan entitled "Competences for the Knowledge Society, 2007-2009".[7] In this plan, the necessity to support teachers' ICT competences in the teaching context is underlined and priorities are defined:

> The introduction of the new ICT curriculum involves major changes to both integrated and specific teacher training. First of all the teacher training system is expected to provide the labour market with teachers who have the necessary initial qualifications – in the case of ICT as well**.** Consequently, all teacher training services have to pay attention to the ICT competence of its students so they can manage the final objectives themselves to a large degree. This is possible only if ICT is incorporated into the training curriculum itself to a large extent.
>
> However, teachers-to-be not only have to enjoy basic competences, they also have to deploy ICT in an educationally responsible way in the teaching process. On top of basic competences all teacher training has to continue fleshing out the teaching methodology for the use of ICT and feature it in the training to a sufficient extent.

> Teacher training also has to pay sufficient attention to the training of teacher trainers, who themselves have to be ICT competent and deploy ICT according to sound teaching principles.
>
> The new situation for the introduction of cross-curriculum final objectives and developmental objectives also means special attention has to be paid to the need for further training. Further training organisations are expected to include a high standard of opportunities in teaching the implementation of the new cross-curriculum final objectives and developmental objectives.
>
> Further training initiatives have to be co-ordinated more effectively and, in terms of content, cater for the specific needs and requirements of the educational establishments at all levels.
>
> A key word in the context of teaching staff training is "self-reliance". The idea cannot be to call upon the services of an ICT co-ordinator whenever a problem crops up, as the official cannot be on tap at all times. Self-reliance means the teachers themselves are capable of solving problems to do with the use of a computer. ("Competences for the Knowledge Society, 2007-2009", p. 25)

New Zealand

2.10 In 2006, the Ministry of Education of New Zealand published the "E-learning Action Plan for Schools for the Years 2006-2010". The topic of the report is "Enabling the 21st Century Learner".[8] Although this action plan is not directly linked to ICT in initial teacher education, 2 out of 24 pages are dedicated to "teacher capability", and the first outcome identified is "[t]o support teachers' confidence and capability to effectively integrate e-learning into their professional practice" through the following recommended action:

> Work with the New Zealand Teachers Council and teacher education providers to include ICT literacy skills and pedagogies in pre-service training programmes. ("E-learning Action Plan for Schools for the Years 2006-2010". (pp. 11-12)

Portugal

2.11 In order to ensure the technological modernisation of education, in 2008 the Portuguese Ministry of Education published "Technological Plan for Education".[9] According to the Ministry of Education's diagnostic study on technological modernisation of the educational system in Portugal:

> ICT ought to be totally and transversally integrated in teaching and learning methods. It means that we need to reinforce the IT infrastructure, in order to develop a coherent strategy to make IT educational contents available and to offer ICT training and certification for teachers. ("Technological Plan for Education", p. 4)

2.12 More precisely, the "Technological Plan for Education" is structured around three main axes: "technologies", "contents" and "training".

The "training" axis first identifies three inhibiting factors for the modernisation in competencies:

- the scarcity of ICT usage in teaching and learning methods;
- the training of teachers with little focus on the educational usage of ICT;
- the lack of certification and professional value mechanisms for ICT competencies for teachers and students. ("Technological Plan for Education", p. 37)

2.13 Secondly, it specifies three intervention areas in order to bring solutions to these inhibiting factors and to support the modernisation:

- training of teachers and non-teaching staff;
- certification of students and teacher competencies;
- use of ICT in teaching and learning processes. ("Technological Plan for Education", p. 37)

2.14 One of the key projects presented in the "training" axis is the "ICT Competencies Training and Certification" project. This project aims to "generalise ICT skills training and certification" and "to promote the use of ICT in teaching and management" (p. 38).

2.15 The main measures to support the project are:

- to create, starting in 2008, modular and progressive ICT training courses for teachers and non-teachers, incorporating the strong use of ICT in the classroom and in school administrative management; and
- to establish, beginning in 2008, a compulsory certification program for the agents of the educational community to master basic ICT tools and competencies in teaching and learning methods. ("Technological Plan for Education", p. 39)

2.16 The project sets the following targets: "40% of teachers certified in 2009 and 90% of teachers certified in 2010" ("Technological Plan for Education", p. 39). Moreover, it aims "to ensure that, by 2010, 90% of teachers have their ICT competencies certified". Despite these support measures and these quantitative objectives, the report does not propose specific interventions and measures concerning ICT in initial teacher education.

Ireland

2.17 The report of the Minister's strategy group of the Republic of Ireland, "Investing Effectively in Information and Communication Technology in Schools, 2008-2013"[10] presents the "current context of ICT in School" and gives information concerning ICT in initial teacher education:

> At the pre-service stage the approach to ICT integration varies in focus and priority. There are issues relating to resourcing and supporting initial ICT education between and among providers. The lack of a clear vision and co-ordination for ICT in learning and teaching has, in many cases, resulted in ICT being seen as an add-on to a pre-service program or as an optional tool or curriculum module rather than a core element of curriculum delivery. While these circumstances remain, progress will be much slower. ("Investing Effectively in Information and Communication Technology in Schools, 2008-2013", Part 2, p. 7)

2.18 The report further summarises:

> There is need for an overall framework to bring together national schemes and programs of teacher ICT education. This holds for both the initial and in-career stages. The development of this framework should be informed by good practice nationally and internationally. Teacher education and development are central to the more successful national ICT interventions in other settings across the EU. ("Investing Effectively in Information and Communication Technology in Schools, 2008-2013", Part 2, p. 7)

2.19 However, despite these proposals, it is necessary to highlight the absence of any reference to ICT in initial teacher education in the "National Development Plan 2007-2013: Transforming Ireland, a Better Quality of Life for All" (NDP 2007-2013).[11] Indeed, this plan presents the "Schools Modernisation and Development Programme" composed of three sub-programmes: the 1) schools infrastructure sub-programme, 2) the schools development sub-programme, and the 3) ICT in schools sub-programme. This question does not appear in the schools development sub-programme section ("Curriculum Reform and Professional Development"):

2.20 The need for a reformed model of professional development for teachers has been identified, which will:

- provide for regionalised access to a full spread of curriculum expertise for schools;
- provide for more intensive training, school focused where possible, to enhance pedagogical skills, classroom management, assessment and the ability to become reflective practitioners;
- provide a continuum from pre-service training through induction to continuing professional development, adapting and rebalancing training programmes as needed;
- and provide enhanced opportunities for accreditation, the development of mentor programmes and school focused supports.

2.21 The objective is to progressively increase strategic investment in curricular reform and professional development to enhance the quality and relevance of education to a level in keeping with best international practice on a phased basis. ("NDP, 2007-2013", pp. 198-199)

2.22 Initial training does not appear in the ICT in schools sub-programme either:

> In summary, this strategy will deal with: developing an e-Learning culture in schools that will ensure that ICT usage is embedded in teaching and learning across the curriculum; teacher professional development; the maintenance of a national broadband network for schools; the upgrading and renewal of hardware; and the provision of software and digital content for learning. The planned investment will also address maintenance and support requirements. ("NDP, 2007-2013", pp. 199-200)

Slovak Republic

2.23 Inclusion of the Slovak Republic in this category has to be considered as a particular case. Indeed, the information found comes from both a 2004 study entitled "Key Data on Information and Communication Technologies in Schools in Europe" (published by the Eurydice European Unit), and from the answers to the country questionnaire.

2.24 The first source does not allow us to classify this country:

> Institutions providing education for the future teachers in primary and secondary education are fully autonomous as regards the provision of ICT-related teaching. Not only are they free to decide whether to offer it and, if they do, to determine how much time should be devoted to such teaching … but they are equally free to specify its content. ("Key Data on Information and Communication Technologies in Schools in Europe", p. 45)

2.25 The second source only allows us to highlight that a government resolution, "Strategy for ICT in Education",[12] aims to promote ICT as a required professional competency of teachers at all levels in the Slovak Republic.

Initiatives and actions supported by foundations

2.26 This section concerns countries that have implemented initiatives and actions in the field of ICT and initial teacher education with the support of foundations. This is the case for the Netherlands and Sweden. For these two countries, the information has been collected in the country reports published on the website of the Observatory for New Technologies and Education.[13]

Netherlands

2.27 The Kennisnet Foundation is a public organisation that supports the implementation of ICT in education in the Netherlands and is funded by the Ministry of Education, Culture and Science (OCW). The Kennisnet Foundation aims to provide ICT services and to manage consumer interests. Kennisnet is demand-driven and continuously monitors specific needs in ICT and education. The mission of Kennisnet is "Learning to innovate with ICT and to innovate learning with ICT".[14]

2.28 The Netherlands' country report (last updated and last revised in October 2006) presents the initiatives introduced by the Kennisnet Foundation as a means to improve the low overall level of attention to ICT in initial teacher education. Among these initiatives, the programme *"Samen deskundiger"* ("More Expertise Together") sets out the following goals:

- strengthening the relation between the demand of schools and the support by teacher training institutes in the area of organisation and use of ICT in daily school practice;
- organising and arranging effective sustainable co-operative practice between schools and teacher training education;
- supporting the transfer of the added value of students that are becoming teachers in the primary school;
- supporting professional teacher education with public ICT products and services;
- developing a certified pedagogical standard for ICT use by pupils in accordance with the competences of students of teacher training institutes.[15]

Sweden

2.29 Sweden's report[16] (last updated and revised in November 2007) explains that ICT teacher education is implemented by each university, *i.e.* at the local level.

2.30 The Knowledge Foundation has started a programme in order to support the implementation of ICT in initial teacher education. More precisely, this programme aims to form a network to develop the digital competences of student teachers.[17]

2.31 Furthermore, in December 2008 the inquiry on new teacher education presented the report "Sustainable Teacher Education" (SOU 2008:109) to the Ministry of Education and Research. In the report, four overall perspectives are proposed for teacher education. One of these perspectives promotes information and communication technology as a resource for education.[18] The government is expected to submit a bill to the parliament proposing a new teacher education during 2009.

3. Category III: Inclusion of ICT in initial teacher education at several levels

3.1 In this category, several levels of integration of ICT in initial teacher education have been identified:

- Level 1: National policies make recommendations at the national level but do not require training;
- Level 2: National policies propose compulsory training and national accreditation standards for the programmes;
- Level 3: National policies implement competence frameworks;
- Level 4: National policies implement national certification of teachers.

3.2 Level 1 constitutes the most basic level of the integration of ICT in initial teacher education, while Levels 2, 3 and 4 propose stronger implementations that can be applied in a complementary way.

3.3 First, each level is presented successively. Note that it is possible for a country to meet several levels at the same time. Next, a country synthesis is proposed in order to highlight the coherence of the national policy in the field. Such coherence is built on the strength of the associations that exist between Levels 2, 3 and 4.

Level 1: National policies that make recommendations at the national level but do not require training

3.4 This first level of inclusion of ICT concerns five countries: Australia, Chile, Germany, Italy and Switzerland. The following table summarises the content of the recommendations and specifies whether a diploma related to the field of ICT uses in education exists. The case of each country is specifically described in the following paragraphs.

Australia

3.5 As has been underlined above, the first recommendations in Australia concerning ICT and initial teacher education date from 1999 with the report, "Learning in an Online World: The School Education Plan for the Information Economy", published by the Commonwealth of Australia. The project entitled "Raising the Standards: A Proposal for the Development of an ICT Competency Framework for Teachers" stems from this report. The final report for the "Raising the Standard" project outlined:

> …a range of objectives and associated strategies to achieve those objectives in the application of information and communications technology (ICT) in teaching and learning. One such strategy in the area of 'People' is the development of teacher ICT standards for the use of ICT in the curriculum and to incorporate those standards into human resource management within education authorities and schools. ("Raising The Standards: A Proposal for the Development of an ICT Competency Framework for Teachers" [2002], p. 3)

Table 2. Presentation per country of the content of national recommendations and possible diploma in the field of ICT uses in education

Country	Content of the national recommendations	Date of publication	Diploma in relation with the field "ICT uses in education"
Australia	Recommendations concern proposals for the development of a teacher ICT competency framework and related ICT standards.	1999 – "Learning in an Online World: The School Education Plan for the Information Economy" and 2002 – "Raising the Standards: A Proposal for the Development of an ICT Competency Framework for Teachers"	
Chile	Recommendations aim to implement pedagogical ICT standards in initial teacher education.	2006 – "Estándares en Tecnología de la Información y la Comunicación para la Formación Inicial Docente"[19]	no
Germany	Education in the teaching of ICT constitutes one of the core curriculum options. Institutions are obliged to offer the subject, but it is optional.	unknown	Master of Arts in "Media Education" – Pedagogical University in Weingarten
Italy	ICT training is recommended in initial teacher education but is not compulsory.	unknown	unknown
Switzerland	Recommendations concern initial and in-service teacher education in ICT use	2004 – The Swiss Conference of Cantonal Ministers of Education	unknown

3.6 This final report discusses the significant issues relevant to the development of a teacher ICT competency framework and makes recommendations relating to the framework. Some of them are directly linked with the topic of initial teacher education, under the heading "Standards for Different Groups of Educators", recommending that:

> … sets of ICT standards be developed for the following five groups of educators from the proposed ICT competency framework.
>
> - Pre-service/beginning teachers
> - Practicing teachers who are beginning users of ICT
> - Practicing teachers who are accomplished/highly accomplished users of ICT
> - School and educational leaders, teacher educators ("Raising the Standard", p. 5)

3.7 The answer formulated in response to the country questionnaire specifies that this proposal for the development of a teacher ICT competency framework and related ICT standards is part of a broader range of national and system-level initiatives and projects in ICT and education. It underlines other initiatives, which include the Quality Teacher Programme and the project entitled "Models of Teacher

Professional Development for the Integration of ICT in Classroom Practice". Moreover, for student teachers and beginning teachers, the focus has shifted away from concerns about access to technology and the acquisition of skills towards the lack of example given by many experienced classroom teachers.

3.8 The content of the recommendations concerning the national accreditation standards (level 2) and the competence frameworks (level 3) will be presented later.

Chile

3.9 In Chile, at the beginning of the decade, ICT was not included in official national plans that aimed to implement standards and recommendations in initial teacher education ("Teaching Standards for Initial Teacher Education"[20] [2000]; and "Framework for Quality Teaching"[21] [2003]). However, the national *Programa Inicia,* implemented by the Chilean Ministry of Education in 2008, proposes pedagogical standards for initial teacher education. This programme comprises three axes:

- Axis 1: Main orientations and standards for teacher education programmes, co-ordinated by the Ministry of education in relation with the teacher education institutions.
- Axis 2: Assessment of the knowledge and skills required for teaching.
- Axis 3: Support programme for the modernisation of teacher education institutions.

3.10 In the first axis, pedagogical standards are defined in order to create a set of skills and knowledge required to teach. On the basis of these standards, a general curriculum dedicated to the initial teacher education is suggested which would provide the fundamental knowledge and skills a new teacher is should acquire. In this axis, there is no explicit reference to ICT. However, "computational skills"[22] are part of the general skills to be evaluated in the second axis "assessment of the knowledge and skills required for teaching", from 2010.

Germany

3.11 Information concerning ICT in initial teacher education was not easily found for Germany. The report "Assessment Schemes for Teachers' ICT Competence – a Policy Analysis"[23] (May 2005) explains that:

> In a lot of cases information about initial teacher training could simply be not given, as they are mostly run by universities or teacher training institutes and ICT is integrated into the teaching curriculum to different extents … this is the case for Germany. (p. 21)

3.12 The "Key Data on Information and Communication Technologies in School in Europe" study (2004) further explains that:

> In Germany, education in the teaching of ICT is one of the core curriculum options.[24] Consequently, the institutions of teacher education concerned are obliged to offer the subject, but it is left to the trainees to decide whether or not to include it in their overall course of education. This applies to the initial education of primary and secondary school teachers. (p. 44)

3.13 However, the report "Assessment Schemes for Teachers' ICT Competence – A Policy Analysis"[25] (May 2005) does mention the existence of a specific diploma dedicated to the use of ICT in education. This is the case of the pedagogical university in Weingarten or "Fernuniversität Hagen" – Distance University Hagen, which:

> …offers a two-year study course to become a "Master of Arts in Media Education". The aim is to teach knowledge and skills that enable students to use and create traditional and new media in education. Training is also offered for organising project work and further training, design classroom modules as well as strategic concepts for ICT in education. (p. 46)

Italy

3.14 The country report[26] for Italy that is presented in the Insight database (last updated and revised in December 2007) states that:

> ICT training is recommended in initial teachers' training although it isn't compulsory. As far as in-service training goes, ICT skills and competencies are part of teachers' professional development. (p. 5)

Switzerland

3.15 The Insight database country report[27] for Switzerland (last updated and revised in October 2007) explains that in 2004:

> The Swiss Conference of Cantonal Ministers of Education (CDIP) agreed on recommendations concerning initial and ongoing training of teachers in ICT use. (p. 11)

3.16 These recommendations[28] list training objectives in five categories: 1) didactical and pedagogical competences; 2) use of software and standard technologies; 3) use of current communication and information tools; 4) knowledge and experience with on-line teaching and learning content; 5) mastering sociological, ethical, economic and legal issues of ICT use ("Recommendations Concerning Initial and Ongoing Training of Teachers in ICT Use", pp. 2-3).

3.17 However, although these recommendations are made at a federal level, the document specifies that the certification at the end of the training must be delivered by the local authority also responsible for the organisation of the training. Moreover, the country report concerning Switzerland notes that these recommendations are in no way constraining.

Level 2: National policies that propose national accreditation standards for the programmes and compulsory training

3.18 This section presents the contents of national policies that propose national accreditation standards for the programmes and compulsory training.[29] The following table offers an initial synthesis of the findings. The absence of information in a table cell only means that the information is missing.

3.19 The case of each country is clarified in the following paragraphs. The case of Denmark is described first. Indeed, Denmark has implemented the Pedagogical ICT Licence, originally offered to in-service teachers and then later adapted to pre-service teachers. This case is interesting because the Pedagogical ICT Licence has become an international standard for in-service training. And although the Pedagogical ICT Licence is not mandatory for initial teacher education in Denmark, Austria uses it for initial teacher education. In addition, the case of Australia must be considered. Indeed, there is no national accreditation of teacher education courses, though such accreditation is part of the recommendations published in December 2008 by the Department of Education, Employment and Workplace Relations.

Denmark

3.20 Denmark has implemented the Pedagogical ICT Licence dedicated to in-service training for teachers combining pedagogical knowledge of ICT integration with basic ICT skills training. Since 2004, the approach has also been implemented in initial teacher education and general upper secondary education with a formal assessment. This licence constitutes a national reference integrated in the curriculum of student teachers who graduate from teacher education colleges. Nevertheless, the Pedagogical ICT Licence is not mandatory. Leo Højsholt-Poulsen (2004)[30] gives the objective of the Pedagogical ICT Licence for student teachers. The students have to acquire:

> Insight into the impact of ICT on the role of teachers and students and on the pedagogical and organisational development of the school; Insight into the impact of ICT on the development of the subject; basic ICT skills; insight into and experience with team-based work in a net-based learning environment. (p. 2)

3.21 Acquisition of ICT competencies forms part of the teacher education college training regime and is also a focus of the practical training periods. Assessment is based on a personal digital portfolio dedicated to ICT skills. Leo Højsholt-Poulsen (2004) explains that:

> During the four years the student teacher produces a series of digital products that are related to school and education: an individual portfolio documenting student competencies and a logbook documenting reflections. Professors and an internal evaluator evaluate this portfolio/logbook. (p. 3)

3.22 With support from the European Commission, the Pedagogical ICT Licence has become an international standard for in-service teacher education. The course is named "EPICT", an acronym standing for "European Pedagogical ICT Licence" (2003).

3.23 The answer to the country questionnaire allows us to highlight the importance that the Danish Ministry of Education attaches to ICT in teacher education in recent years:

- In 2006, the Act on the professional bachelor training programme for primary and lower secondary school teachers includes references to the importance of ICT in teacher education.
- In March 2007, the Executive Order on the professional bachelor training programme for primary and lower secondary school teachers includes numerous and explicit references to the inclusion of ICT in various aspects of teacher education.
- Finally, in November 2007, the Danish Ministry of Education published recommendations to teacher education institutions on how to integrate ICT in teacher education through a specific guide written with the assistance of various experts.

Table 3. Synthesis of the content of the national policies proposing national accreditation standards for the programmes and compulsory training

Country	Specific programme/ standards	Date	Compulsory training modules	Possible specialisation	Compulsory application during the field placement
Australia	Project of system for the national accreditation of teacher education courses (common accreditation processes and national graduate standards).	2008	In many universities: general computer courses. University of Tasmania: unit on educational uses of ICT.		
Austria	Obligatory basic ICT competence standards by using the European Pedagogical ICT licence.	2007	X[37]		X
Belgium					
German-speaking Community			Only for primary school student teachers. The content is an integral part of the other subject.		
Flanders		2003-04 & 2006	X		
French Community		2000-01	X		
Denmark	Pedagogical ICT licence.	2004	Voluntary measure.		
Finland			X	ICT for Teaching.	
France	“The ICT Training and Support” programme with the certifications C2I and C2I level 2 teaching practices.	2004	Integration of ICT in each field supported by a competence framework.		
Hungary			ICT is included in the subject computer sciences.		
Iceland			X		
Japan		1990?	"Educational Media" (bachelor courses)		

Table 3. Synthesis of the content of the national policies proposing national accreditation standards for the programmes and compulsory training cont'd.

Country	Specific programme/ standards	Date	Compulsory training modules	Possible specialisation	Compulsory application during the field placement
Korea	*ICT Skill Standards for Teachers.*	2002-03	ICT skills, how to apply ICT in teaching and learning methods in specific subjects, and advanced use of ICT to develop teaching-learning methods, including knowledge of computers and networking.		
Luxembourg			X	X	X
Norway	*Strategy for Competence Development* programme and national framework for teacher education.	2005	Single institutions set the curricula on the basis of this national framework.		
Poland	The European Computer Driving Licence.	2004-07	X		
Spain	Co-existence of two systems.		X	X	X
Turkey		1998?	X		
United Kingdom	The professional standards for qualified teacher status.	2007	X		X
United States	The *National council for Accreditation of Teacher Education* unit standards (1) and the *International Society for Technology Education* standards (2).	(1) 2007 (2) 1991			

Austria

3.24 Throughout Austria the curricula for teacher education at *Pädagogische Hochschulen* include the use of ICT. This is carried out, on the one hand, in the form of education by traditional software programmes and, on the other hand, by the use of digital learning environments (eLearning platforms) and Web 2.0 software. The project "New Secondary Schools" promotes pedagogical concepts of self-directed learning. Initiatives by the Ministry of Education such as EPICT and ONLINE-PH support these measures. Furthermore, students' field placement in eLearning schools as an integral part of their teacher education supports the initiative.

3.25 The use of ICT as a support for teaching and learning varies according to university and academic field. Since Austrian universities are autonomous, they can self-determine and promote their research and study areas.

3.26 The "EPICT[1] – or something better" project implemented in Austria aims to establish in the medium-term obligatory basic competence standards in ICT for all teachers by using the European Pedagogical ICT Licence. The project of implementing the EPICT in the Austrian education system has been carried out since autumn 2007. The country report dedicated to Austria[2] (last updated and revised in August 2008) specifies that this implementation concerns both initial and continuing teacher education.

Australia

3.27 In December 2008, through the Ministerial Council on Education, Employment, Training and Youth Affairs, education ministers agreed to develop a system for the national accreditation of teacher education courses. This system will build on existing course accreditation processes operating in some states by establishing common accreditation processes and national graduate standards, and by specifying the knowledge and skills that graduates need, including ICT knowledge skills as well as other technology in teaching.

3.28 In some teacher education programmes, ICT experiences are integrated throughout the curriculum and are modelled extensively by lecturing staff. At the University of Tasmania, a unit on the educational uses of information technology is a feature of teaching degrees.

3.29 Furthermore, for students to make full use of ICT, teachers need to integrate the technology into their curriculum and instruction. Many universities have provided general computer courses to train pre-service teachers in the use of computer technology. For example, this is the case for the Faculty of Education of the University of Wollongong.

Belgium

i) Flanders

3.30 As discussed above, in March 2007 the Flemish Ministry of Employment, Education and Training adopted the "Competencies for the Knowledge Society Policy Plan",[3] which defines priorities to support the acquisition of ICT skills by teachers. A year earlier (December 2006), a new decree on teacher education introduced several actions to raise the techno-pedagogical competency of student teachers, including:

- adding ICT to the new basic competencies of teachers; and
- re-organising the curriculum by diminishing the number of subjects and increasing the time dedicated to the acquisition of ICT skills.

3.31 Two decrees preceded this measure: the "Structure of Higher Education" decree (April 2003) and the "Flexibilization of Higher Education" decree (March 2004). The implementation of these decrees provided an opportunity to promote educational innovation on an establishment-wide basis. Starting in 2002, the establishments earmarked additional resources to provide support to items such as educational innovation and quality promotion. They redesigned the curricula in terms of content, education and learning systems, educational learning approach, and vision. They also developed new study and learning material, new types of tests and examinations and new systems of student supervision, including the creation of electronic learning environments and learning material geared toward full and part-time distance learning. All establishments were required to establish an educational developmental plan.

ii) French community

3.32 The information related to the French community of Belgium is collected from the country report[4] (last updated and revised in 2003). The French community of Belgium has adopted and implemented a policy concerning ICT in initial teacher education. Indeed, the country report underlines that:

> Initial teacher training (primary teacher and lower secondary teacher) comprises training modules in the pedagogical use of ICT during the three years of training: a technical module of 15 hours during the first year, and a module concentrating on pedagogical use of ICT for 30 hours during the two following years.
>
> In addition, two decrees (December 2000 and February 2001) organising the initial training of primary teachers, lower secondary teachers and upper secondary teachers mentions the following as being an integral part of training: the critical use and implementation of media and ICT for pedagogical purposes.
>
> Two new decrees organising vocational training for primary and secondary teaching (July 2002) plan the continuing education of teachers for ICT. These training sessions may be organised at school level, at teaching network level or at inter-network level. Unless there is a special dispensation, inter-network training will be organised by the new vocational training institute established by the aforementioned decree. (p. 9)

iii) German-speaking community

3.33 The "Key Data on Information and Communication Technologies in School in Europe" study (2004) specifies that courses in ICT are compulsory in initial teacher education for primary schools, but their content is an integral part of other subjects. Initial teacher education for lower and upper secondary level is provided outside the German-speaking community with most teachers trained in the French community of Belgium (p 49).

Finland

3.34 The country report dedicated to Finland (last updated and revised in February 2005) attests that there exists a compulsory course on ICT (4ECTS in general studies) in the initial teacher education programme and that it is also possible to follow a specialisation in "ICT for Teaching". More precisely, on the basis of the answers to the country questionnaire, the situation in this country can be described in detail.

3.35 In Finland, political decision-making is not supposed to have a direct influence on teacher education policies since teacher education has been supported by universities. Indeed, universities have a high degree of autonomy. However, there have been several national policy papers on strategic information

society issues. Universities are encouraged to do their best to align their goal setting in research and development work as well as in curricula with national policies. Prior to 2007, the Ministry of Education had specially allocated funds that universities could use for professional development ICT courses. But after 2007, these funds were merged into general university budgets to emphasise the principle of university autonomy. The Ministry of Education runs yearly budget negotiations with each university and is able to give feedback if some national policies are not honoured. Each university is supposed to formulate strategies of their own in harmony with the national strategies. ICT strategies of all Finnish universities have been made available at *www.virtuaaliyliopisto.fi/strategiapalvelu/pankki/index.html* and, even though they have not been necessarily updated recently, they do have continuously obvious effects on the planning of curricula. Additionally, teacher education schools attached to universities have worked together to formulate their own strategies which were published in the first half of 2009.

3.36 Finally, the main content of the national ICT strategy documents is the following:

- In 1986, the Committee Computer in Education appointed by the National Board of General Education and the National Board of Vocational Education established ICT as a school subject and introduced basic ICT skills as a requirement for all advanced ICT courses for teachers.

- In 2000, the second plan, "Strategy for Education Training and Research in the Information Society (SETRIS): A National Strategy for 2000-04", published by the Ministry of Education in Finland, establishes that all teachers at all levels should have at least ICT competences. These competences are both technical and pedagogical.

- In 2004, the "Information Society Programme for Education and Research, 2004-06", published by the Ministry of Education, highlights the necessity to make sure that student teachers acquire knowledge and skills in order to use ICT as well as digital learning material or services at school.

- In 2006, the "Information Society Programme, 2007-15", published by the Prime Minister's office, specifies that teachers should have outstanding information society skills. Furthermore, ICT has to be a part of a multiform teaching at all levels of education.

France

3.37 As explained by the country report dedicated to France[5] (last updated and revised in June 2005), ICT is part of all initial teacher education and forms one-third of all in-service training. Concerning the organisation and responsibility of the implementation of the initial teacher education:

> The government is responsible for organising teacher training and support for schools – middle and secondary schools are public organisations with a board of governors, and primary schools are local establishments. In addition, ethical considerations of increased ICT use in schools have to be considered. The IUFM (Institut Universitaire de Formation des Maîtres – Academic Institute for Teacher Training), which provides both initial and continuous training, and the CRDP (Regional Centre for Educational Documentation) are the government-owned corporations in charge of this. (p. 9)

3.38 The "ICT Training and Support"[6] programme initiated by the Ministry of National Education, Higher Education and Research targets the entire educational community: management staff, teaching staff, trainers as well as administrative, technical and research personnel. More precisely, in the field of initial teacher education, it aims to promote an ICT certificate in teacher education institutions: the C2i Level 2. Catrin, Devauchelle and Fauvet (2007)[7] give a precise description of these new teacher

education curricula and competence framework introduced in France 2004. The chronology of this reform in process and the content of the associated competence frameworks are presented here.

3.39 The B2i programme[8] ("Brevet informatique et internet") and, later, the C2i programme ("Certificat informatique et internet") have been created in order to promote a coherent and global plan ranging from primary school to higher education: these reforms have introduced a certification measuring the capability of learners (pupils, students) and teachers to use ICT. The B2i reform does not consider ICT as a specific subject which needs technological training. It tries to support an integration of ICT in each field by proposing a competence framework with a new evaluation methodology.

3.40 First created for primary and secondary school, the B2i programme underlined the necessity of implementing a global and coherent device dedicated to both learners and teachers from the same point of view. Consequently, the "C2i First Level", dedicated to bachelor students, and the C2I2E called "C2i – Teaching Practices" have been implemented. "C2i First Level" and "C2i – Teaching Practices" are required to enter IUFM and to obtain the professional certification.

3.41 The "C2i – Teaching Practices" programme has been tested since 2004. It has been integrated into initial teacher education since 2006. Catrin *et al.* (2007) observe a diversity of the devices and solutions implemented between 2004 and 2007. They also point to the competences defined in the "C2i – Teaching Practices" answer to the new agenda concerning the initial teacher education.[9] More precisely, the most important principle of the "C2i – Teaching Practices" programme is its integration into teachers' professional practices: most of the framework's competences are based on practices developed in schools and pedagogical teams.

Hungary

3.42 The case of Hungary is described both in the report "Assessment Schemes for Teachers' ICT Competence – A Policy Analysis"[10] (May 2005) and in the country report[11] (last updated in October 2005 and revised in May 2006). According to the report "Assessment Schemes for Teachers' ICT Competence – A Policy Analysis"[12] (May 2005), several curricula exist to become a teacher (depending on education level and specialisation in a given subject or a range of subjects). Moreover, in certain initial teacher education curricula, ICT has been included as a compulsory subject. The country report dedicated to Hungary specifies that ICT is included in initial teacher education as a subject called Computer Sciences.

Iceland

3.43 In Iceland, the Iceland University of Education and the University of Akureyri promote two concurrent models of initial teacher education. Each individual institution determines the structure and the curricula of the courses. The "Education System of Iceland"[13] report (2007/2008) specifies that:

> Teachers trained in the concurrent model at the Iceland University of Education and the University of Akureyri are trained as semi-specialists and have permission to teach all subjects in compulsory education. Teachers trained in the consecutive model at the University of Iceland are specialists with permission to teach their specific subject at lower-secondary and upper secondary level. (p. 1)
>
> A general programme (concurrent model) which leads to a B.Ed. degree for teacher trainees who intend to teach at the compulsory level (primary and lower secondary level) takes three years, 90 credits (180 ECTS). Subjects within the teacher training programme at the Iceland University of Education are divided into three groups: pedagogy, didactics, and electives. (p. 1)

3.44 The report also highlights that ICT subjects are compulsory in initial teacher education:

> The aim of the course is both to enlarge the personal knowledge that the teacher trainees have of ICT and to focus on particular teaching applications. A two-credit (4 ECTS) course in ICT is compulsory as well as a 10 credit (20 ECTS) course in ICT in the core curriculum. (p. 1)

Japan

3.45 According to the Education Certification Law of Japan (1990) for pre-service training, all new teachers are required to take a course on Educational Methodology and Technology. This course aims to develop pre-service teacher skills in the use of ICT. The faculties of education are in charge of the implementation of pre-service and in-service teacher education programmes. These programmes aim to "teach" teachers about the effective implementation of ICT in schools. "Educational Media" is the topic of a bachelor course.

3.46 In his article entitled "ICT Use in Education and Teacher Training in Japan" (2003),[14] Tokuji Hayashi (from the Faculty of Education, Yamaguchi University) testifies:

> We have in-service and pre-service teacher training programmes in the Faculty of Education at Yamaguchi University. Co-operation with the other universities and boards of education is essential to implement effective training of ICT for in-service teachers. As for ICT equipment and instruments for the training, we have video conference systems with ISDN or satellite, CD or web-based materials, computers, electronic boards, and so on. To pre-service teachers, we teach educational methods and skills using ICT in a lecture for bachelor's and master's course students. (p. 2)

Korea

3.47 The UNESCO survey report[15] entitled "Pre-service Teacher Training on ICT Use in Education: Republic of Korea" (2006), gives contextual elements of the introduction of ICT in initial teacher education in South Korea. According to this report, ICT pre-service teacher education began in the mid-1990s at elementary and secondary school teacher education institutions and gained more interest due to governmental support at the national level. Indeed, in May 2002, the Ministry of Education and Human Resources Development established the "ICT Use in School Education Plan". This plan constitutes the basis of the implementation of The Teachers Information Literacy Accreditation by the central and local governments. The central government also provided funding to elementary teacher education colleges to set up multimedia labs.

3.48 In Korea, there is no national certification or quality management for pre-service teacher education programmes in ICT. Nevertheless, in 2002-03 the central government developed and disseminated the "ICT Skill Standards for Teachers" adopted for both pre- and in-service training of teachers. This measure is applied to the teacher competency test in ICT and pre-service programme. Furthermore, regional governments run a recruiting system for teachers that takes ICT literacy or computer-related certificates into account.

3.49 The UNESCO survey report also describes the content of the curriculum in the area of ICT for elementary and secondary schoolteacher education, which is composed of three parts: "cultural subjects", "basic courses" and "advanced courses":

> Cultural subjects focus on ICT skills such a how to use office software and multimedia tools. Basic courses focus on how to apply ICT into teaching-learning methods in specific subjects. (…) Advanced courses focus on advanced uses of ICT to develop teaching-learning methods including knowledge of computers and networking. (p. 2)

3.50 The UNESCO survey report adds that the number of ICT-applied courses differs among universities.

Luxembourg

3.51 In Luxembourg, ICT initial teacher education is compulsory and is implemented through three components:

- Compulsory training modules
- Specialisation
- Compulsory application during field placement

3.52 The country report dedicated to Luxembourg[16] (last updated and revised in September 2003) specifies the content and the format of ICT initial teacher education:

- In the first year of the training, the preschooler and primary student teachers have to follow a compulsory initiation to ICT (60 hours) in order to acquire technical skills.
- In the second year of the training, student teachers have to take a course (60 hours) on the pedagogical implications of ICT. At the same time, they become familiar with new technological aspects of ICT.
- Student teachers can also choose ICT as a specialisation: in this case, they have to write a study report concerning ICT in education.
- Finally, student teachers at the secondary and technical school levels must use ICT during their field placement. This is compulsory and integrated in the curriculum.

Norway

3.53 According to the country report[17] dedicated to Norway (last updated October 2007 and last revised July 2008), ICT is part of both initial and in-service education for teachers:

> All student teachers must complete activities in their course of study which give them abilities and experience in the development and use of ICT in teaching as well as a tool for open and flexible study method. (p. 6)

3.54 Nevertheless, the midway report "Programme for Digital Literacy, 2004-2008"[18] highlights that there is insufficient documentation about teacher education institutions regarding digital competence. The country report adds that in a context of reform, the government has implemented the "Strategy for Competence Development: Competence Development Strategy in Basic Education, 2005-2008"[19] programme, which aims to support competence building for teachers, principals and school administrators.

3.55 A national framework for teacher education exists. It states that teachers shall be able to use and evaluate ICT in education. Curricula for teacher education are set by local institutions on the basis of this national framework. Nevertheless, there is no national assessment/accreditation for teachers' ICT skills.

Poland

3.56 The country report dedicated to Poland[20] (last updated and revised in September 2003) explains that universities in Poland are autonomous and make their own decisions regarding curricula. They can also decide individually on strategies for teacher education. The report specifies that despite this autonomy, their programmes integrate ICT.

3.57 Furthermore, an Order of the Minister of Education and Sport on standards for initial teacher education (dated from September 2004) states that initial teacher education, at all levels, must contain ICT training in terms of both technological knowledge and application in the process of teaching.

3.58 Since December 2007, the curriculum for each level of teacher education, regardless of the specialisation, includes courses on ICT application, such as information technologies, computation programmes, presentations, databases and others, required for receiving the European Computer Driving Licence (by Order of the Minister of Science and Higher Education on standards for all levels of teachers training).

Spain

3.59 Due to the process of adaptation to the European Higher Education Area (EHEA) initiated with the Bologna Declaration,[21] the creation of a new legal framework in Spanish tertiary education has been encouraged. This new legal framework is stimulating several changes and initiated several measures aimed at improving teachers' professional situation. More precisely, special attention is being paid to initial training, among other aspects.

3.60 According to the new organisation of the university education system, the degrees required to accede to teaching practice at compulsory school levels within the Spanish education system are:

- Bachelor's degree, in order to teach at pre-primary and primary education levels. Future teachers at these levels must acquire four-year bachelor's degrees, which mean a one-year extension in teacher education.

- Bachelor's degree, in order to teach at secondary education levels, as well as the pedagogical and didactic training required by the government to enter secondary education teaching bodies.

3.61 At the moment, according to the new organisation of the official university education system, a greater autonomy has been given to universities by promoting greater curricular diversification and allowing them to propose innovative actions. However, Spanish universities must draw up the programmes for initial teacher education in accordance with the guidelines set by the Spanish Government.

3.62 The verification requirements of official university degrees that qualify teachers at the pre-primary and primary education levels (Bachelor), as well as the secondary education level (Master), make up the training aims for qualifying future teachers at the levels of compulsory education. These aims are specified in skills, which are grouped in three modules: Generic, Specific and Practical training in schools. Training on the educational use of ICT is covered by these skills:

- To know the educational implications of ICT, particularly that of television in early childhood (of concern to the pre-primary education teacher).

- To know and put into practice ICT. To selectively distinguish audio-visual information that contributes to learning, civic training and cultural enrichment (of concern to the primary education teacher).

- To search for, obtain, process and communicate information (either oral, printed, audio-visual, digital or multimedia), transform it into knowledge, and put it into practice in teaching and in the learning processes of the subjects corresponding to the relevant specialisation (of concern to the secondary education teachers).

3.63 Nevertheless, implementing the new organisation of university education is still in progress, which is why the former ICT approach on initial teacher education is still in force. In this approach, ICT training for teachers in compulsory education depends on the education levels for which teachers are trained. In the case of pre-primary and primary training, ICT training is compulsory. Therefore, all the different specialisations in this degree have a common course subject, called "Use of ICT in Education" (40 hours). In the case of future secondary education teachers, legislative documents, which regulate pedagogical and didactic training programmes, include contents that are (or might be) related to ICT:

- The Pedagogical Aptitude Course contains a subject called Technology and Educational Innovation Systems.

- The Pedagogical Qualification Course contains a reference, among the specific subject contents, to the use of didactic resources in the teaching practice.

Turkey

3.64 In the article "Information and Communication Technologies in Initial Teacher Education: What Can Turkey Learn from a Range of International Perspectives?" Taner Altun (2007)[22] gives an overview of the policy in the field of ICT in initial teacher education in Turkey. The author explains that in 1998, with the Higher Education Council's attempt to restructure education faculties, the teacher education curriculum was revised, and a new department was created in education faculties. In the new programmes, courses on ICT and its uses in teaching and learning are provided to improve the quality of teachers.

3.65 For instance, the Computer and Instructional Technology Teacher education Department aims to provide information technology co-ordinators for schools, and ICT literate teachers for all state schools. Similarly, in other programmes, two ICT courses are included. The contents of those courses are the following:

- "Computer": Basic keyboard skills, word processing, graphic, spreadsheets, working with database programmes, basic programming applications, software reviewing and evaluation, working with computers in the classroom.

- "Instructional Technologies and Material Development": Characteristics of various instructional technologies, the place of instructional technologies and their use in the teaching process, development of teacher materials (*e.g.* spreadsheets, transparencies, slides, video, computer-based materials) and evaluation of various types of teaching materials through instructional technologies.

The United Kingdom

3.66 In all, the "Professional Standards for Qualified Teacher Status"[23] (2008) counts 33 competences, of which four relate directly to ICT:

- Know how to use skills in literacy, numeracy and ICT to support their teaching and wider professional activities.

- Design opportunities for learners to develop their literacy, numeracy and ICT skills.

- Teach lessons and sequences of lessons across the age and ability range for which student teachers are trained and in which they use a range of teaching strategies and resources, including e-learning, taking practical account of diversity and promoting equality and inclusion.

- All student teachers are expected to be able to use ICT effectively in their subject teaching, and to be able to use ICT in their general professional duties. The online basic skills test for ICT covers the core skills that teachers need to fulfil their wider professional role in schools rather than the subject knowledge required for teaching. The test requires them to demonstrate the ability to make changes to slides in presentation software using a web browser, to use email and various functions within email, to use a text editor and email, to update a spreadsheet and to download resources from the internet and register for a newsletter. All trainee teachers are required to pass this online test in ICT competence before they can be awarded Qualified Teacher Status.

3.67 This most recent version of the competence specifications for qualified teacher status, introduced in September 2007, represents a shift away from earlier attempts to spell out in extensive detail every aspect of ICT competence which trainee teachers would be required to possess before being licensed to teach. The "Initial Teacher Training National Curriculum in the Use of ICT in Subject Teaching" which was introduced in teacher education institutes in 1998 in England consisted of over a hundred statements of competence in ICT, and extended to 17 pages of print, but it was found to be overly bureaucratic and difficult to assess in practice, hence the move to a more succinct formulation of the ICT competences which trainee teachers are required to possess (country report[24] dedicated to England, last updated and revised in October 2007).

3.68 In Northern Ireland (country report[25] dedicated to Northern Ireland, last updated and revised in November 2004), all students and staff in the five initial teacher education institutions are provided with C2k[26] software; further, network systems identical to those in schools are provided. Competence in the use of ICT in the classroom is one of the many competences that must be demonstrated by student teachers during their periods of school experience. As a result of these measures, all teachers reached a basic minimum competence to use ICT in their teaching by March 2003. At all stages of teacher education, teachers are required to use ICT to enhance children's learning.

The United States

3.69 In the United States specific educational policies are developed by each state. However, there is a federal mandate – the No Child Left Behind Act – which requires that all 8th graders be technology literate.

3.70 In terms of teacher preparation, most states use the National Council for Accreditation of Teacher Education (NCATE) as their accrediting body. NCATE acknowledges a commitment to preparing teacher candidates who know how to use educational technology to help all students learn. Assessments for

Standard 1, which refers to candidates' knowledge, skills and dispositions, address requirements for technology use:

> 1b. Pedagogical Content Knowledge for Teacher Candidates: Teacher candidates understand the relationship of content and content-specific pedagogy delineated in professional, state and institutional standards. They have a broad knowledge of instructional strategies that draws upon content and pedagogical knowledge and skills delineated in professional, state and institutional standards to help all students learn. They facilitate student learning of the content through presentation of the content in clear and meaningful ways and through the integration of technology. Candidates in advanced programmes for teachers demonstrate an in-depth understanding of the content of their field and of the theories related to pedagogy and learning. They are able to select and use a broad range of instructional strategies and technologies that promote student learning and are able to clearly explain the choices they make in their practice...[27]

3.71 In February 2008, NCATE published a new version of the professional standards for accreditation of teacher preparation institutions.[28] For secondary computer science initial endorsements, most teacher education programmes choose to use the 2002 International Society for Technology in Education (ISTE) standards approved by NCATE.[29]

Level 3: National policies that implement competence frameworks

3.72 This is the case in Australia, Quebec in Canada, Chile, France, Norway and the United Kingdom. In Australia, the national ICT Competency Framework has been proposed. Nevertheless, there do exist local initiatives that have been implemented, and these are presented below. Wherever possible, the content of the competence frameworks is presented in the following paragraphs.

Australia

3.73 As explained above, the proposal for the development of a teacher ICT Competency Framework and related ICT standards is part of a broader range of national and system-level initiatives and projects in ICT and education. The final report on this project, entitled "Raising the Standards: a Proposal for the Development of an ICT Competency Framework for Teachers" (Commonwealth Department of Education, Science and Training, 2002), examines the salient issues involved in the development of a teacher ICT competency framework, and it also makes recommendations and proposes a structure for the framework. Further, it explores the ICT standards that could be developed from such a framework.

3.74 This report identifies five groups of educators:

- pre-service/beginning teachers;
- practicing teachers who are beginning users of ICT;
- practicing teachers who are accomplished/highly accomplished users of ICT;
- school and educational leaders;
- teacher educators.

3.75 The report also specifies four stages of ICT development: 1) minimum; 2) developmental; 3) innovator; and 4) leader, emphasising that these are stages are not necessarily experienced in succession

but that there are "many pathways to competence". The competence framework is based on the following table (p. 21):

Dimensions of ICT uses	Stages of ICT development	Target groups
ICT as a tool for use across the curriculum or in separate subjects where the emphasis is on the development of ICT-related skills, knowledge, processes and attitudes.	Minimum	Underpins all teaching practice
ICT as a tool for learning to enhance students' learning outcomes with the existing curriculum and existing learning processes.	Developmental	For beginning teachers and practicing teachers beginning to use ICT
ICT as an integral component of broader curricular reforms that change not only how students learn but what they learn.	Innovator	For practicing teachers who are accomplished/highly accomplished users of ICT
ICT as an integral component of the reforms that alter the organisation and structure of schooling itself.	Leader	For school and educational leaders and for teacher educators

3.76 The report makes the following recommendation:

> That the ICT standards developed for each of the five groups of educators emphasise the specific relevant dimension(s) of ICT use in the above table and at the same time be cognizant of all four dimensions. (p. 21)

3.77 Furthermore, the report recommends that any ICT standards developed from the framework be derived from the relevant non-ICT specific generic competencies. These ICT standards are:

- ICT skills, knowledge, processes and attitudes;
- a deep understanding of their subject and of curriculum planning and development;
- implementation of the curriculum through effective classroom/learning environment planning and management, and effective pedagogy;
- student monitoring, assessment and reporting;
- administrative competencies including decision making and planning.

- Finally, this report highlights local initiatives of implementation of ICT competence frameworks:

- in Western Australia, the Competency Framework for Teacher (Education Department of Western Australia, 2001) used by Murdoch University;[30]

- in Queensland, the Minimum Standards for Teachers Learning Technology (Education Queensland, 1998);

- in Victoria, the Learning Technology Teacher Capabilities (Department of Education of Victoria, 1998);[31]

- in Tasmania, The Educational Computing Units (2001).

Canada (Quebec)

3.78 In 1997, the Ministry of Education of Quebec (MEQ) initiated Plan of Action entitled "Information and Communication Technologies in Education" in order to contribute to better preparing student teachers to integrate ICT in their teaching. One of the main observations contained in the Plan was that universities only considered technological training as a specialisation and failed to see it as a pedagogical tool.

3.79 In 2001, the Ministry of Education of Quebec published a text entitled "Teacher Training Orientations: Professional Competences" that is considered to be the official reference concerning teacher education in Quebec. It presents the twelve professional competences that student teachers are supposed to have acquired by the end of their initial training. One of these competencies is specifically geared to the pedagogical use of ICT by teachers: "Integrate ICT in order to prepare, to control teaching-learning activities, and administrate teaching and professional development". This competence is implemented through six components:

- to exert a critical and subtle way of thinking as well as considering ICT's advantages and disadvantages;

- to evaluate ICT's didactical potential to acquire competences;

- to communicate with multimedia tools;

- to use ICT for research, interpretation and communication of information as well as for the resolution of problems;

- to use ICT in order to constitute exchanges and a continuous training network;

- to help pupils take possession of ICT, use them for their learning, evaluate their uses and judge collected information in a critical way.

3.80 By their contents, these texts mark the transition from computer science teaching per se to a transversal integration of ICT in university. Karsenti, Raby and Villeneuve (2008)[32] show that, in universities that have removed ICT lessons, the lack of teaching concerning the pedagogical integration of ICT has a negative impact on uses of ICT by student teachers in their classrooms.

Chile

3.81 In 2006, the Chilean Ministry of Education implemented "ICT Standards for Initial Teacher Education". These standards – based on the standards proposed by the governmental institution ENLACES – concern instrumental, pedagogical, ethical and legal aspects as well as questions of professional development. They constitute the basis of the "ICT Competence Framework for the Teacher Education and Profession" implemented in 2007 by the Chilean Ministry of Education and ENLACES.

3.82 Five functional dimensions compose this competence framework: a pedagogical dimension, a technical dimension, an ethical dimension, a legal dimension, a managerial dimension and a professional development dimension. The competence framework aims to support the creation and the implementation of an ICT curriculum in initial teacher education.

France

3.83 The "C2i – Teaching Practices" has been tested since 2004. It has been integrated into initial teacher education since 2006. Catrin, Devauchelle and Fauvet (2007) observe a diversity of the devices and solutions implemented between 2004 and 2007. They also underline that the competences defined into the "C2i – Teaching Practices" answer to the new agenda concerning the initial teacher education[33]. More precisely, the most important principle of the "C2i – Teaching Practices" programme is its integration into teachers' professional practices: the majority of the competences in the framework are based on the practices developed in schools and pedagogical teams.

3.84 The national competence framework "C2i – Teaching Practices" brings attention to general competences linked to teaching practices and required competences to integrate ICT in teaching practices. These competences are divided according to the following fields:

- control of the professional and digital environment;
- acquisition of competences required for lifelong learning;
- professional responsibility in the educational system;
- working across the net by using collaborative tools;
- creation and preparation of teaching contents and learning situations;
- pedagogical implementation;
- implementation of evaluation methodologies.

3.85 The national competence framework "C2i Level 1" (IT and Internet Certificate), first describes general and transversal competences pointed by the certification and, secondly, defines specific and instrumental knowledge linked to them. These general and transversal competences are divided according to the following fields:

- to take into account the evolutionary characteristics of ICT;
- to integrate the ethical dimension and the respect of deontology;
- to become comfortable with one's own working environment;

- to search for information;
- to save, secure and back-up data locally or on the network;
- to create documents targeted for printing;
- to present one's work in class or online;
- to exchange and communicate online;
- to conduct collaborative projects online.

3.86 The "C2i – Teaching Practices" programme was piloted during the year 2004-05.[34] Since the year 2005-06, the programme was supposed to be rolled out.[35] The Official Bulletin n° 33 of 14 September 2006 specifies that:

> [S]tarting from year 2006-07, all the student teachers of the IUFM are required to enter into the training and competences certification process of the "C2i – Teaching Practices" programme. The IUFM [*Instituts Universitaires de Formation des Maîtres*] have to create the conditions of success in order for the highest number of student teachers to be certified.

The United Kingdom

3.87 As discussed above, the United Kingdom has implemented the standards outlined in "Professional Standards for Teachers: Qualified Teacher Status" (2007), which includes 33 competences, four of which relate to ICT:

- Have passed the professional skills tests in numeracy, literacy and information and communication technology (ICT).
- Know how to use skills in literacy, numeracy and ICT to support their teaching and wider professional activities.
- Design opportunities for learners to develop their literacy, numeracy and ICT skills.
- Teach lessons and sequences of lessons across the age and ability range for which they are trained and in which they use a range of teaching strategies and resources, including e-learning, taking practical account of diversity and promoting equality and inclusion.

Level 4: National policies that implement national certification of teachers

3.88 Only France and the United Kingdom deliver national certification to teachers at the end of initial training. It is interesting to note that these two countries have also implemented national accreditation standards and competence frameworks.

PART TWO: COMPLEMENTARY ANALYSIS

4. Discussion: Comparing policies

4.1 Despite the difficulties in comparing national policies due to the difference in the level of information found, the following section attempts to examine the policies discussed above in a comparative perspective.

4.2 Before doing so, in order to understand and comment on the apparent lack of national policy making in the field of ICT in initial teacher education, certain elements of the educational context for certain countries have to be specified. In some of the OECD countries presented above, the national level of administration does not have the authority to take decisions in the field of education. Among them, we have identified two types of countries:[36]

- Countries that have a federal organisation and for which educational policy making depends on the local level: this is the case of Australia, Austria, Belgium, Canada, Germany, Mexico, Switzerland and the United States.

- Countries that are not federations but in which the local levels are competent in educational policy making due to a certain level of decentralisation: this is the case in Spain and the United Kingdom.

4.3 Consequently, in the case of the federations, the study and the comparison of the regulations in the field of ICT and initial teacher education should take into consideration the local/regional level (*e.g.* Belgium, p. 21; Canada, p. 34). Furthermore, it should be noted that a federal organisation does not necessarily mean that the federal-level authorities cannot make recommendations for educational policies (*e.g.* Austria, p. 21; Switzerland, p. 17; the United States, p. 31). For example, in Switzerland, the Swiss Conference of Cantonal Ministers of Education made recommendations for initial and in-service teacher education in 1984.

4.4 In order to give a picture of the state of the national policies in the field of ICT and initial teacher education and to support the comparison between these policies, a classification of these national policies into three categories was proposed in this paper, and, more precisely, several levels of integration of ICT in initial teacher education in Category 3 ("Inclusion of ICT in initial teacher education at several levels") were identified. The content of the national policies has also been presented in different tables in order to highlight the possible key points of comparison implemented in each category.

4.5 This section aims to develop these different elements of comparison (categories, levels, and key points presented in the tables) in order to highlight some initial perspectives. The analysis focuses on Category 3, in which countries have implemented policies in the field of ICT in initial teacher education through several levels. The following table aims to give a complete overview of the national policies developed or implemented in these countries.

Table 4. Presentation of the national policies according to the different levels of implementation of ICT in initial teacher education

Country	Level 1 National recommendations but no required training	Level 2 Compulsory training and national accreditation standards for the programmes	Level 3 Competence frameworks	Level 4 National certification
Australia	X	X (local initiatives and federal proposal)	X (local initiatives and federal proposal)	
Austria		X		
Belgium		X		
German-speaking Community		X		
Flanders		X		
French community		X		
Canada (Quebec)			X	
Chile	X		X	
Denmark		A voluntary measure		
Finland		X		
France		X	X	X
Germany	X			
Hungary		X		
Iceland		X		
Italy	X			
Japan		X		
Korea		X	X	
Luxembourg		X		
Norway		X	X	
Poland		X		
Spain		X		
Switzerland	X			
Turkey		X		
United Kingdom		X	X	X
United States		X		

4.6 This table allows us to highlight the coherence of a country's national policy by observing relationships between different levels. Level 1 constitutes the most basic level of implementation of ICT in initial teacher education, while Levels 2, 3 and 4 propose stronger implementations that can be applied in a complementary way. Indeed, except for Australia and Chile, the countries which appear in Level 1 are not part of the following levels.

4.7 It appears that Levels 2, 3 and 4 are complementary. Indeed, their analysis highlights the degree of coherence of a national policy along a continuum from the existence of a compulsory training in ICT to the delivery of a national certification at the end of the initial education:

- France and the United Kingdom have implemented policies that include compulsory training, national accreditation standards for the programmes, a national framework and national certifications.

- Norway does not deliver a national certification at the end of teacher education but does propose compulsory training, national accreditation standards for the programmes and a national framework of competences.

- The rest of the countries propose only compulsory training and national accreditation standards for the programmes.

4.8 The majority of countries are in this last category. Table 3 presented a synthesis of the contents of these national policies proposing national accreditation standards for the programmes and compulsory training through four key points of comparison:

- the existence of a specific programme or standards;

- the existence of compulsory training modules;

- the possibility of specialisation;

- compulsory application during the field placement.

4.9 The comparison of the national policies belonging at Level 2 is possible through these four key points:

- The training institutions of Luxembourg and Spain are required to propose compulsory training modules, possible specialisation and to require student teachers to apply their competences during field placement;

- Austria, Denmark and the United Kingdom propose specific programmes or standards and compulsory training modules as well as compulsory application during field placement;

- Belgium (the three communities) Hungary, Iceland, Japan and Turkey only propose compulsory training modules;

- The United States only propose standards;

- France, Korea and Poland propose both specific programmes or standards and compulsory training modules.

5. Conclusions

5.1 This report belongs to the analytical part of the OECD survey on ICT in initial teacher education in OECD countries.[37] It aimed to present a picture of the existing national policies regarding ICT in initial teacher education in these countries. Based on this picture, elements of these policies have been compared and discussed. These elements should help us to better understand and explain the empirical material of the survey[38] as well as to suggest answers to the following research questions: How is policy evaluated? Are policies evaluated regularly and systematically? Are there relevant incentives? What are the means available for policy implementation? What is the role of school or college leadership in the process? Preliminary findings of the survey have already been presented, in particular, with regard to the policy field and related research questions (Ananiadou and Rizza, 2010).

5.2 First, the OECD survey has shed light on three policy issues that have not been well addressed thus far. To begin with, for a number of contextual and policy reasons, some governments have been

focusing more on in-service, rather than initial, teacher education. While in the short run this may have been a good choice, in the long run, initial teacher education has been ill-served and subjected only rarely to national scrutiny. In addition, teacher education institutions and programmes are quite often part of the university sector. This is a major improvement in comparison to the previous situation in which teacher education was part of secondary education. However, inclusion in the university sector has turned out to be problematic in countries that have not developed competence standards for teacher qualification: teacher education institutions and programmes may have evolved without regularly engaging in a dialogue with the public authorities responsible for providing education. In this respect, the issue of technology use can be seen as an indication of the inherent difficulties of this dialogue.

5.3 Although many of the participating countries have undergone major curriculum reforms recently so as to incorporate not only digital competencies but, more broadly, the wider set of 21st century skills, there is sometimes a mismatch between curricular reforms and what is going on in initial teacher education. Government requirements regarding curriculum reform implementation have not always been complemented by dialogue and collaboration with teacher education institutions (although, of course, there are exceptions, *e.g.* Finland).

5.4 Teacher competencies are not always well-defined and, even when they are, it is often the case that they do not endorse a clear vision of what teaching and learning in a knowledge society should be and what supporting role technology can play. For instance, some countries have introduced different systems of measuring teacher digital competencies, be it on a compulsory basis (France, England) or voluntarily (Denmark), but the efficiency of these measures seems to be under scrutiny.

5.5 Secondly, the existence of strong ICT policies and strategies at national level have definitely acted as drivers in some cases, such as in England, where belief in the role of new technologies in education and considerable investment in this area has been strong. It is important, however, when developing national policies to ensure that stakeholders at all levels are involved, particularly in countries with long traditions of stakeholder involvement and negotiation, such as the Nordic countries. Developing such policies in a bottom-up way has the advantage of rendering them more credible among the stakeholders that are ultimately responsible for implementing them in practice.

5.6 From a policy perspective this means providing incentives for development that are not too prescriptive so that individual trainers, for example, can use them according to their needs and interests. One example of such an initiative was the development grants awarded by the Teacher Development Agency in the United Kingdom, which provided funding to trainers for development in the area of ICT without specifying the exact content.

5.7 The integration of teacher education institutions in the higher education sector in Finland meant the fostering of a research and innovation culture. This had a positive impact on the development of new tools and resources for use in teaching and teacher education as it encouraged staff, such as teacher trainers, to become more active in researching the field.

5.8 Finally, key messages have been formulated when it comes to implementing national policy regarding ICT in initial teacher education. At the policy level, it is important that teachers and trainers are provided with incentives for development that are flexible and not too prescriptive. The existence of strong ICT national policies and strategies has been an important driver in some cases, particularly when developed bottom-up. It is also important to ensure policy coherence regarding ICT in areas such as curriculum development, teacher competences, and assessment frameworks and practices.

NOTES

[1] See *www.eun.org/insight-pdf/special_reports/PIC_Report_Assessment%20schemes_insightn.pdf*.

[2] Insight website: *http://insight.eun.org/ww/en/pub/insight/misc/country_report.cfm*, country reports – Greece.

[3] Official Greek Portal for Information Society: *www.infosoc.gr/infosoc/en-UK/epktp/* – Information Society Programme.

[4] The Australian Department of Education, Employment and Workplace Relations website: *www.deewr.gov.au/Schooling/DigitalEducationRevolution/Pages/default.aspx*.

[5] AICTEC website: *www.aictec.edu.au/aictec/go/home/priorities/pid/87*.

[6] Commonwealth Department of Education, Science and Training website: *www.dest.gov.au/sectors/school_education/publications_resources/profiles/raising_standards_ict_competency_framework.htm.*

[7] Flemish Ministry of Employment, Education and training: *www.scribd.com/doc/7382723/Competencies-for-the-Knowledge-Society.*

[8] New Zealand Ministry of education website: *www.minedu.govt.nz/educationSectors/Schools/Initiatives/ICTInSchools/ICTInitiativesAndPrograms/EnablingThe21tCenturyLearner.aspx*.

[9] See *http://resources.eun.org/insight/PTE_english%20version.pdf*.

[10] See *www.education.ie/servlet/blobservlet/ministers_strategy_group_report.pdf*.

[11] See *www.ndp.ie/documents/NDP2007-2013/NDP_Main_Ch09.pdf*.

[12] See *www.rokovania.sk/appl/material.nsf/UznesenieDatum?OpenView&20-02-2008*.

[13] See *http://insight.eun.org/ww/en/pub/insight/index.htm*.

[14] Kennisnet website: *http://corporate.kennisnet.nl/international*.

[15] Insight website: *http://insight.eun.org/ww/en/pub/insight/misc/country_report.cfm*, country reports – Netherlands.

[16] Insight website: *http://insight.eun.org/ww/en/pub/insight/misc/country_report.cfm*, country reports – Sweden.

[17] Knowledge Foundation website: *www.kks.se/templates/StandardPage.aspx?id=14362*.

[18] Utbildningsdepartementet (2008), En hållbar lärarutbildning, SOU 2008:109, Utbildningsdepartementet (Ministry of Education and Research, Sweden), Stockholm.

[19] "ICT Standards for Initial Teacher Education".

[20] "Estándares de desempaño par la formación inicial docente" – 2000.

[21] "Marco para la buena enseñanza" – 2003.

[22] "Habilidades informáticas"

[23] See *www.eun.org/insight-pdf/special_reports/PIC_Report_Assessment%20schemes_insightn.pdf*.

[24] "The term "core curriculum option" refers to one of a range of subjects offered by institutions of teacher education from which trainees have to select a limited number in order to cover part of their compulsory minimum curriculum. As used here, the term also implies that all institutions are obliged to include ICT in this range of subjects" (p.43).

[25] See *www.eun.org/insight-pdf/special_reports/PIC_Report_Assessment%20schemes_insightn.pdf*.

[26] Insight website: *http://insight.eun.org/ww/en/pub/insight/misc/country_report.cfm* country reports – Italy.

[27] Insight website: http://insight.eun.org/ww/en/pub/insight/misc/country_report.cfm, country reports – Switzerland

[28] The Swiss Conference of Cantonal Ministers of Education website: http://www.edk.ch/dyn/11704.php

[29] Except the specific case of Denmark.

[30] Leo Højsholt-Poulsen (2004), *The pedagogical ICT licence in teachers' in service and pre-service training, www.epict.org/presentations/files/The%20Pedagogical%20ICT%20Licence%20v6u.pdf*.

[37] *In this table, an X means the existence of a compulsory module, possible specialisation or compulsory application during the field placement.*

[1] European Pedagogical ICT Licence.

[2] Insight website: *http://insight.eun.org/ww/en/pub/insight/misc/country_report.cfm*, country reports – Austria.

[3] *www.scribd.com/doc/7382723/Competencies-for-the-Knowledge-Society*.

[4] Insight website: *http://insight.eun.org/ww/en/pub/insight/misc/country_report.cfm*, country reports – Belgium (French Community).

[5] Insight website: *http://insight.eun.org/ww/en/pub/insight/misc/country_report.cfm*, country reports – France.

[6] "Internet for everyone: ICT at scholl and in society" programme, November 2004, Educnet website: *www.educnet.education.fr/chrgt/internetforeveryone.pdf*.

[7] Catrin, François, Devauchelle, Bruno, and Fauvet, Olivier (2007), Un dispositif de formation ouverte et à distance pour le C2I ® niveau 2 « enseignant ». Les dossiers du CEPEC, Lyon, 77.

[8] Created in November 2000, the B2I programme is now integrated in the "Brevet des Colleges" exam and takes part of the "socle commun des connaissances et des compétences" defined by the French National Ministry in 2005. Furthermore, it might be integrated to the "baccalauréat" exam in the future.

[9] Published in January 2007.

[10] *www.eun.org/insight-pdf/special_reports/PIC_Report_Assessment%20schemes_insightn.pdf*.

[11] Insight website: *http://insight.eun.org/ww/en/pub/insight/misc/country_report.cfm*, country reports – Hungary.

[12] *www.eun.org/insight-pdf/special_reports/PIC_Report_Assessment%20schemes_insightn.pdf*.

[13] Eurybase: *http://eacea.ec.europa.eu/ressources/eurydice/eurybase/pdf/section/IC_EN_C8_1_6_2.pdf*.

[14] UNESCO website: *www2.unescobkk.org/education/ict/v2_2/info.asp?id=14298*.

[15] UNESCO website: www.unescobkk.org/fileadmin/user_upload/ict/Misc/TT_Korea.pdf.

[16] Insight website: *http://insight.eun.org/ww/en/pub/insight/misc/country_report.cfm*, country reports – Luxembourg.

[17] Insight website: *http://insight.eun.org/ww/en/pub/insight/misc/country_report.cfm*, country reports – Norway.

[18] Programme for Digital Literacy website: *www.ub.uib.no/prosj/DK/english.htm*.

[19] Norwegian Ministry of Education and Research : *www.regjeringen.no/en/dep/kd/Documents/Reports-and-actionplans/Actionplans/2005/competence-development-strategy-in-basic.html?id=496901*.

[20] Insight website: *http://insight.eun.org/ww/en/pub/insight/misc/country_report.cfm*, country reports – Poland.

[21] The European Ministers of Education met in 1999 in the city of Bologne and decided to create, before 2010, a European Higher Education Area, which should be both competitive and attractive. For this purpose, it was agreed to set up procedures in the following three areas: curricular adaptations, technological adaptations and financial reforms.

[22] *www.tused.org/internet/tufed/arsiv/v4/i2/metin/tusedv4i2s4.pdf* .

[23] *www.tda.gov.uk/upload/resources/pdf/p/professional_standards_2008.pdf*.

[24] Insight website: *http://insight.eun.org/ww/en/pub/insight/misc/country_report.cfm*, country reports – England.

[25] Insight website: *http://insight.eun.org/ww/en/pub/insight/misc/country_report.cfm*, country reports – Northern Ireland.

[26] The Government is committed to using public/private partnerships to improve the provision of information and communications technology in schools, colleges and universities. C2k is a Public-Private Partnerships project.

[27] From NCATE website: *www.ncate.org/public/unitStandardsRubrics.asp?ch=4#concept*.

[28] From NCATE website: *www.ncate.org/public/standards.asp*.

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APPENDIX 1:

COUNTRY QUESTIONNAIRE[1]

The purpose of this questionnaire is to collect essential background information for the CERI project New Millennium Learners' study "ICT in Initial Teacher Training". It mainly covers policy context and national initiatives regarding ICT in initial teacher training. This information will be used to develop a comparative country overview and a synthesis report.

Objectives

The objective of this questionnaire is to find out what are the national frameworks and requirements regarding the use of technology in initial teacher training. We seek information on **specific policy initiatives and projects/programmes** in your country within this field. They should include initiatives and projects/programmes at the national or regional[2] level (not initiatives at individual teacher training institutes).

Guidelines for completion of the questionnaire

Scope of the questionnaire

The country questionnaire pertains to teacher training for compulsory school, *e.g.* primary and lower secondary. The main focus will be on formal learning.[3] However, where informal or non-formal examples[4] are relevant, please include them. The outcomes of particular interest relate to how student teachers are trained or given the experience of how to integrate technology in learning environments.

Data/information source

References to data and/or information source should be reported in the column titled "Source" in each table. References include books, journal articles, policy briefs, government acts, legislation, newspapers and URL links.

Definitions of terms

The following concepts have been used:

- *ICT*: Contemporary information and communication technology, *e.g.* computers and different kinds of software, mobile phones, digital cameras, Learning Management Systems, etc.

- *Techno-pedagogical competence*: Competence to use technology for pedagogical reasons, competence to integrate technology in teaching.

- *Student teacher*: Person studying to become a teacher and without certificate, pre-service teacher.

- *Teacher trainer*: A person teaching students to become teachers at a teacher training institute or university teacher educator.

- *Mentor teachers*: Those mentoring student teachers during field placements.

- *Field placements*: Where the student teachers do their practical work in classrooms, both for short periods during courses and for longer periods, before earning their degree as long as they do not work independently.

Responsibility

National or regional co-ordinators are encouraged to nominate one person who will be responsible for gathering the necessary information from multiple sources. This person will liaise with relevant officials, statisticians and researchers in order to identify as detailed information as possible. This person is expected to liaise with CERI after the collection of this questionnaire should CERI (or the researcher that CERI appoints) wish to follow-up on particular evidence or reference presented in this questionnaire.

The questionnaire

Policy statements and interventions related to ICT in initial teacher education provide information on the extent to which a government puts weight on ICT as important for future teachers. The main focus will be on statements and schemes at the national and regional level, but countries (corresponding) are welcome to also include those at the local and/or community level if considered appropriate.

Policy statements

Please include any relevant government **policy statements** that would pertain to the role of ICT/technology. They would include white papers, frameworks and statements of intent at the national and state level.

ICT Policy statements	Issuing institution	Date	Source

Upcoming changes

Please inform about any known upcoming changes.

Future changes in ICT Policy statements	Issuing institution	Date	Source

Interventions

Please list any relevant educational **policy interventions**[5] that would have the goal of raising the techno-pedagogical competency for student teachers.[6] They should include initiatives and programmes at the national and regional level.

Techno-pedagogical interventions	Issuing institution	Date	Source

Future interventions

Please list planned future interventions.

Techno-pedagogical interventions in the future	Issuing institution	Year	Source

NOTES TO APPENDIX 1

1 28 November 2008 version.

2 Independent regions in countries in this respect (*e.g.* England, Scotland etc.) are henceforth referred to as regions.

3 Formal learning refers to learning through a programme of instruction in an educational institution, adult training centre or in the workplace.

4 Non-formal learning refers to learning through a program but it is not usually evaluated and does not lead to certification. Informal learning includes both intentional (*e.g.* participation in short lectures or reading books or journals) and non-intentional (*e.g.* occurring by chance or as a by-product of everyday activities) learning.

5 They include policy initiatives and specific programmes.

6 This could also include initiatives with an indirect aim to raise the student-teachers' techno-pedagogical competence, such as programmes for teacher trainers or mentor teachers.

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