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Digital Competence in Practice: An Analysis of Frameworks

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Preface

With the 2006 European Recommendation on Key Competences,¹ Digital Competence has been acknowledged as one of the 8 key competences for Lifelong Learning by the European Union. Digital Competence can be broadly defined as the confident, critical and creative use of ICT to achieve goals related to work, employability, learning, leisure, inclusion and/or participation in society. Digital Competence is a transversal key competence which enables acquiring other key competences (e.g. language, mathematics, learning to learn, cultural awareness). It is related to many of the so-called 21st Century skills which should be acquired by all citizens, to ensure their active participation in society and the economy.

This report is part of a project on Digital Competence (DIGCOMP), launched by JRC-IPTS IS Unit² under an Administrative Agreement for DG Education and Culture with an objective to contribute to better understand and develop Digital Competence in Europe. The project is being carried out between January 2011 and December 2012.³ The objectives of the project are:

- *To identify* the key components of Digital Competence in terms of the knowledge, skills and attitudes needed to be digitally competent;
- *To develop* Digital Competence descriptors that will feed a conceptual framework/guidelines that can be validated at European level, taking into account relevant frameworks currently available;
- *To propose* a roadmap for the possible use and revision of a Digital Competence framework and descriptors of Digital Competence for all levels of learners.

The project aims to achieve these objectives in collaboration and interaction with stakeholders at European level.

This report contributes to the second work package of the project, by mapping and analyzing case studies where Digital Competence is being developed, acquired, and assessed or certified.

Yves Punie,
Head of Research ICT for Learning and Inclusion

¹ [Official Journal L 394 of 30.12.2006](#)

² The Institute for Prospective Technological Studies (IPTS) is one of the seven research institutes that make up the European Commission's Joint Research Centre.

³ For more information, see: <http://is.jrc.ec.europa.eu/pages/EAP/DIGCOMP.html>

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Executive summary

This reports aims to identify, select and analyse current frameworks for the development of Digital Competence of every citizen. Its objective is to understand how Digital Competence is currently conceived and implemented in fifteen (15) cases, drawn from school curricula, implementation initiatives, certification schemes and academic papers. It develops a proposal for a common understanding of Digital Competence and identifies the sub-competences that compose it.

Digital Competence as a human right

Digital Competence is both a requirement and a right of citizens, if they are to be functional in today's society. However, it has been shown that citizens are not necessarily keeping up with the evolving needs derived from rapid technological change and uptake.

The concept of Digital Competence is a multi-faceted moving target, covering many areas and literacies and rapidly evolving as new technologies appear. Digital Competence is at the convergence of multiple fields. Being digitally competent today implies the ability to understand media (as most media have been/are being digitalized), to search for information and be critical about what is retrieved (given the wide uptake of the Internet) and to be able to communicate with others using a variety of digital tools and applications (mobile, internet). All these abilities belong to different disciplines: media studies, information sciences, and communication theories. Analysing the repertoire of competences related to digital literacy requires an understanding of all these underlying conceptualisations. Moreover, other additional aspects have emerged as new requisites for being functional in a digital environment, such as for example the ability to peruse hyperlinked texts.

From concept development to learning outcomes

This report analyses fifteen frameworks for the development of Digital Competence. In the cases that are reported here, the term "framework" has been understood in its wider meaning: any organised conceptualisation or structured set of intertwined competences which aim to enhance the digital literacy of a specific target group. Hence, the collection includes a variety of cases, such as school curricula, certification schemes, digital literacy initiatives, and academic papers.

The analysis of the good practices presented in this report has highlighted several dimensions, namely: definition of Digital Competence, competence areas and levels.

An encompassing definition of Digital Competence

Two thirds of the selected frameworks propose a definition of Digital Competence. These have been merged and adjusted to create an encompassing definition:

Digital Competence is the set of knowledge, skills, attitudes (thus including abilities, strategies, values and awareness) that are required when using ICT and digital media to perform tasks; solve problems; communicate; manage information; collaborate; create and share content; and build knowledge effectively, efficiently, appropriately, critically,

creatively, autonomously, flexibly, ethically, reflectively for work, leisure, participation, learning, socialising, consuming, and empowerment.

The majority of frameworks are based on skills development and on the ability to use a specific set of tools and/or applications. As the above definition highlights, skills are only part of the learning domains that are included in Digital Competence; and the ability to use specific tools or applications is just one of the several competence areas that need to be developed by users in order to function in a digital environment.

Competence areas

The ability to use a specific set of applications or tools is the main focus of the majority of the frameworks collected here. However, we argue that the need for Digital Competence covers much more than technical skills. We therefore propose that the 7 areas depicted below should be taken into account as this approach is more adapted to current needs.



This list summarises the competence areas that are developed in the selected frameworks, together with the competence areas established in the above definition. In the selected frameworks, very often the majority of these competence areas are already foreseen, although the focus remains on technical operations. We suggest a balanced approach, where each of these competence areas is equally developed.

It should, however, be said that the identification and description of competence areas is a first step towards the development of learning objectives. As the analysis in this report shows, different frameworks do not necessarily translate the same competence area into the same learning outcomes. As a matter of fact, a huge difference can be seen between cognitive approaches and application-oriented frameworks. Several frameworks of the latter type tend to apply operational skills to each area. We therefore suggest that, apart from the competence area "technical operations", competences should not be centred on a tool-oriented perspective only.

Levels

An analysis of the levels proposed highlights three main criteria for defining the levels of a competence: 1. age of target group; 2. width or depth of the application-related content; 3.

cognitive complexity. These three criteria should be taken into account when detailing the levels of the Digital Competence framework that is going to be developed as the end result of the DIGCOMP project (see Preface). Moreover, we suggest that levels should be differentiated according to competence areas, in order to allow learners to work at different levels for each competence area according to their needs.

Selected frameworks

The selected frameworks are summarised in the table below.

Name	Target group	Brief summary
ACTIC	All citizens above 16	ACTIC stands for "acreditación de competencias en tecnologías de la información y la comunicación" (Certification of ICT competences). This initiative is being carried out in Catalonia and is targeted at all citizens above the age of 16. Digital literacy is considered to be the safe and critical use of Information Society Technologies for work, leisure and communication.
BECTA's review of Digital Literacy	Children up to 16 years old	This review provides a model for teachers and learners of primary and secondary schools. It is based on the understanding that digital literacy is composed of digital skills and critical thinking skills. It is composed of a review of the literature and support material for teachers and learners.
CML MediaLit Kit	Adult	The CML (Centre for Media Literacy) provides the MediaLit Kit and establishes a basic framework featuring five core concepts and five key questions of media literacy. The framework aims to enable learners to deconstruct, construct and participate with media. It is seen as a reference for teachers, media librarians, curriculum developers, and researchers.
DCA	Secondary school students	The DCA (Digital Competence Assessment) framework is part of a wider project on "Internet and Schools: Problems of Accessibility, Equality Policies, and Information Management". The framework proposes a definition and conceptualisation of Digital Competence which is linked to a series of tests, generally aimed at secondary school students (15-16 years old).
DigEuLit	All citizens	This project was set up by the EC eLearning initiative and led by the University of Glasgow to develop a general framework for Digital Competence. The main output of the project was a series of publications on a conceptual framework for the development of Digital literacy, which is seen as the convergence of several literacies.

ECDL	All citizens	ECDL is one of the leading authorities of computer skills certification programmes. It is a not-for-profit organisation providing about ten certification programmes ranging from entry-level for beginners to advanced level to professional programmes. The main focus of the most widespread programmes (ECDL/ICDL) is on the development of skills and knowledge necessary to use word processing, database, spreadsheet, and presentation applications.
eLSe-Academy	Elderly	The eLSe-Academy - eLearning for Seniors Academy - focuses on increasing the social participation, empowerment and inclusion of European senior citizens in the knowledge and information society with a special focus on reducing the isolation of those who are vulnerable. eLSe aims to develop and test an eLearning environment specifically devoted and pedagogically adapted to the needs of older learners.
eSafety Kit	6 to 12 year old children	More than a framework, this tool is a kit prepared for children and their families to raise awareness on safety issues on the Internet and to support an efficient but secure use of technologies. The aim of the kit is to spark inter-generational discussions between parents/carers and children on the above issues.
Eshet-Alkalai's conceptual framework	All citizens	This paper by Eshet-Alkalai reports on the different aspects of digital literacy and on the multiple literacies that are needed for people to be functional in a digital era. It proposes a conceptual framework to clarify the skills pertinent to digital literacy.
IC3 Internet and Computer Core Certification	All citizens	IC ³ certifies critical entry-level skills needed to effectively use the latest computer and Internet technology to achieve business objectives, expand productivity, improve profitability, and provide a competitive edge.
iSkills	Adults	The iSkills assessment framework claims to be the only Information and Communication Technology (ICT) literacy test that assesses critical thinking and problem-solving skills in a digital environment. The framework is based on the recognition that both cognitive and technical skills are necessary for people to be functional in a digital society.
NCCA ICT framework for schools in Ireland	Primary and lower secondary schools	This framework is a guide that helps teachers embed ICT as a cross-curricular component for all subjects. It supports a vision of digital literacy as the ability to create, communicate and collaborate to organise and produce information; to understand and apply knowledge of the functions of ICT; to use ICT for thinking and learning; and to develop a critical appreciation of the role of ICT in society.

Pedagogic ICT licence	Teachers	The Pedagogical ICT Licence offers current and prospective teachers the opportunity to upgrade their ICT skills and to integrate ICT and media as a natural part of learning in school subjects. This certificate is obtained by successfully completing assignments in four basic modules and four elective modules. The aim is to use ICT and media for teaching and learning purposes.
Information literacy project – Scotland	Secondary schools	This framework has been developed in Scotland in order to promote the understanding and development of information literacy in all education sectors. A pilot was conducted with secondary schools, in which information literacy was defined in terms of statements of skills, knowledge and understanding.
UNESCO ICT Competency Framework for Teachers	Teachers	This framework aims to define various ICT competency skills for teachers in order to enable them to integrate technologies in their teaching and to develop their skills in pedagogy, collaboration, and school innovation using ICT. It consists of a policy framework, a set of competency standards and implementation guidelines. The standards include training in ICT skills as part of a comprehensive approach to education reform.

As this report is one of the building blocks of the DIGCOMP project, and not its final output, the reader is encouraged to follow the progress and results of the project on the project website: <http://is.jrc.ec.europa.eu/pages/EAP/DIGCOMP.html>

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1 Introduction

The notion of *literacy* implies basic skills and knowledge and is traditionally associated with books and printed matter. The current upsurge of technologies, however, is changing the meaning of the term. The ability to read and write in today's society includes decoding and encoding digital texts. The rapid diffusion and domestication of technology (Silverstone & Hirsch, 1992) is transforming literacy into a 'deictic' concept (Leu, 2000): rapidly and continuously changing in meaning as new technologies appear and new practices evolve. Today, it is argued, we read, write, listen, and communicate differently than we did 500 years ago (Coiro, Knobel, Lankshear, & Leu, 2008).

It is not unreasonable, in our so called e-permeated society (Martin & Grudziecki, 2006), to think of digital literacy as a basic skill needed to function in society (Gilster, 1997), as an essential requirement for life (Bawden, 2008), or even as a survival skill (Eshet-Alkalai, 2004). Notwithstanding this central role, literature and surveys warn against the inadequate digital literacy levels of both the younger (Newman, 2008) and the older population.

At the same time, the concept of digital literacy – or competence, as we prefer to name it here – is a multi-faceted moving target. It is interpreted in various ways in policy documents; academic literature; and teaching/learning and certification practices. The numerous readings of the concept produce a jargon jungle not easy to breach. Just within the European Commission, initiatives and Communications refer to Digital Literacy, Digital Competence, eLiteracy, e-Skills, eCompetence, use of IST underpinned by basic skills in ICT, basic ICT skills, basic computer skills, ICT user skills. Academic papers add to this already long list of terms with 'technology literacy' (Amiel, 2004), 'new literacies' (Coiro, et al., 2008), or 'multimodality' (Kress, 2010); and underline how digital literacy is intertwined with media and information literacy (Andretta, 2007; Bawden, 2001; Buckingham, 2003; Hartley, McWilliam, Burgess, & Banks, 2008; Horton, 1983; Knobel & Lankshear, 2010; Livingstone, 2003).

A thorough understanding of the meaning of Digital Competence and its underlying sub-competences will certainly clarify the existing needs of all citizens and recognize where action has to be taken to increase competence levels.

1.1 Digital Competence as a key competence

In 2006 the European Parliament and the Council (2006) published a recommendation identifying eight Key Competences for Lifelong Learning: Communication in the Mother Tongue; Communication in Foreign Languages; Mathematical Competence and Basic Competences in Science and Technology; Digital Competence; Learning to Learn; Social and Civic Competences; Entrepreneurship; and Cultural Awareness and Expression. Four years afterwards, the value of this recommendation is recognised in the Europe 2020 Strategy (European Commission, 2010b).

The 2006 recommendation already points to Digital Competence as a fundamental basic skill. Digital Competence is there defined as follows:

"Digital Competence involves the confident and critical use of Information Society Technology (IST) for work, leisure and communication. It is underpinned by basic skills in ICT: the use of computers to retrieve, assess, store, produce, present and exchange information, and to communicate and participate in collaborative networks via the Internet." (European Parliament and the Council, 2006).

The recommendation provides explanation on the essential knowledge, skills and attitudes needed to be digitally competent. The foreseen **knowledge** includes the understanding of the functioning of main computer applications; of the risks of the internet and online communication; of the role of technologies in supporting creativity and innovation; of the validity and reliability of online information; of the legal and ethic principles behind the use of collaborative tools.

The needed **skills** are seen as the ability to manage information; the capacity to distinguish the virtual from the real world and to see the connections between these two domains; the ability to use Internet-based services and to use technologies to support critical thinking, creativity and innovation.

In terms of **attitudes**, the recommendation gauges as essential that citizens are critical and reflective towards information, that they are responsible users and interested in engaging in online communities and networks.

The definition and the explanation of competences components provided in the recommendation provides an exhaustive vision of Digital Competence, where it is evident that operational skills are a small fraction of the knowledge needed today when using digital tools. From the recommendation, management of information and ability to use the internet are seen as very relevant fields. Moreover, critical thinking, creativity and innovation are repeatedly mentioned as essential aspects of Digital Competence.

The DIGCOMP project will develop a conceptual framework and descriptors that will detail the above definition and KAS (Knowledge, Attitudes and Skills) specifications.

1.2 Objectives of the DIGCOMP study and of the report

This report is part of a study on Digital Competence (DIGCOMP),⁴ launched by JRC-IPTS under an Administrative Agreement with DG Education and Culture. It aims to develop a common language and conceptual framework for Digital Competence and to define it in terms of Digital Competence descriptors. The objectives of the study are to:

- *identify* the key components of Digital Competence in terms of the knowledge, skills and attitudes needed to be digitally competent;
- *develop* Digital Competence descriptors that will feed a conceptual framework/guidelines that can be validated at European level, taking into account relevant frameworks currently available;
- *propose* a roadmap for the possible use and revision of a Digital Competence framework and descriptors of Digital Competence for all levels of learners.

⁴ <http://is.jrc.ec.europa.eu/pages/EAP/DIGCOMP.html>

The outcome of the project will be a consolidated proposal for a Digital Competence conceptual framework, with specific descriptors of Digital Competence. The general aim of the project is to explore the bigger picture of digital literacy/competence. The final output will be a conceptual framework that pulls specific components together on agreed descriptors. These descriptors will specify general knowledge, skills and attitudes needed by all citizens today and in the future to be digitally competent. In doing so, the descriptors will not refer to a specific target group but will be applicable to all categories of citizens. The descriptors could be later applied and further refined or specified for different target groups or categories of learners.⁵

The phases of the study are depicted in Figure 1. The project comprises:

1. a conceptual mapping of Digital Competence, where the main concepts related to the term are discussed and refined (Ala-Mutka, 2011);
2. the present case studies collection, where several current Digital Competence frameworks and initiatives are collected and analysed;
3. an online consultation with stakeholders, where experts' opinions on the basic components of Digital Competence are collected and structured;
4. an expert workshop to refine the first input of the online consultation and to validate the preliminary approach;
5. a draft proposal for a conceptual framework, where the previous points are merged and elaborated;
6. a multi-stakeholders' consultation, where consensus is reached and a conceptual framework is detailed;
7. a subsequent final proposal, taking into account the feedback received from stakeholders.



Figure 1: Phases of the DIGCOMP study

The DIGCOMP project started in December 2010 and is planned to be completed by December 2012.

This report contributes to the second work package of the project. The aim of the case study collection is to identify and analyse examples where Digital Competence is fostered,

⁵ Learner is here understood in a lifelong learning perspective. It is therefore used as a synonym for citizen.

developed, taught, learnt, assessed or certified. The current report provides an overview on 15 frameworks where Digital Competence is developed. This analysis will allow understanding which competences/sub-competences are currently taken into account.. The cases will serve as building blocks to populate and enrich the theoretical framework. In the collection of the cases that are reported here, the term "framework" has been understood as an organised conceptualisation of the competences and sub-competences related to Digital Competence.

1.3 Report structure

The content of the report in the following chapters is structured as follows: after this first introductory chapter, Chapter 2 briefly reports on the main concepts of Digital Competence as they are currently discussed in academic literature. Chapter 3 reports the methodology for the collection and analysis of the cases. Chapter 4 summarises the main features of the selected frameworks. Chapter 5 compares how the different cases envisage and define Digital Competence; map competences; and foresee proficiency levels. Chapter 6 offers some concluding remarks. Chapter 7 – the annex – provides fact sheets for each case, highlighting their main features and listing the competences and levels that have been foreseen by their developers.

2 Understanding Digital Competence

According to NCCA (2004), there are three main frequently cited arguments for promoting the inclusion of ICT in education. The first relates to the unproven potential benefits of ICT for teaching and learning, including gains in students' achievement and motivation. The second argument acknowledges the pervasiveness of technologies, which leads to the subsequent need to acquire Digital Competence to be functional in our knowledge society (Eshet-Alkalai, 2004). As a consequence, the third argument warns against the dangers of the current digital divide that needs to be tackled to allow all citizens to benefit from being active in the digital domain. The term digital divide came into use in the 90's to allude to the differences in access to ICT and the Internet (Irving, Klegar-Levy, Everette, Reynolds, & Lader, 1999) As argued by Molnar already in 2003, new types of digital divide have emerged that go beyond access (Molnár, 2003). In this line, Livingstone & Helsper built a taxonomy of uses defining gradations of digital inclusion as a ladder of participation (Livingstone & Helsper, 2007). In their paper, instead of proposing a new binary divide – as it was the case for the "Falling through the Net" report (McConnaughey & Lader, 1998), which splits haves and have-nots – Livingstone & Helsper propose a continuum of use, which spreads from the non-use of internet to low and more frequent use. After a focus on first access, and then use, a third subsequent perspective of the digital divide moved towards competence. Erstad argues that digital inclusion depends more on knowledge and skills than on access and use (Erstad, 2010b).

In a similar vein, digital 'rhetoric' discourses claim the necessity to develop digital literacy for full participation in life (Sefton-Green, Nixon, & Erstad, 2009), while policy documents often emphasise the need to invest in digital skills enhancement for economic growth and competitiveness (European Commission, 2010b; Hartley, Montgomery, & Brennan, 2002). Computer-related proficiency, according to yet another digital rhetoric strand, is the key to employability and improved life chances (Sefton-Green, et al., 2009). According to Magyar, Digital literacy should be acknowledged and guaranteed as a Human Right.⁶ In the last decade competences related to the use of ICTs and technologies have started to be understood as "life skills", comparable to literacy and numeracy, therefore becoming "both a requirement and a right" (OECD, 2001).

Ten years after this statement, are citizens ready to face digital competence requirements? Apparently not. Eurostat data show that there are several categories with low digital skills – in terms of computer skills and internet skills; namely: the elderly, the inactive, and the low educated (European Union, 2010). Even the youngest generations, albeit being known as 'digital natives' (Prensky, 2001), are not necessarily scoring high in terms of Digital Competence in international tests. Students did not perform well in Pisa 2009 online reading: only 8% of respondents were considered as having high competence, showing the ability to use the internet in an efficient way, valuing the credibility and usefulness of information (Martin, 2006). A recent policy brief reporting data for the UK claims that in Britain media literacy levels – highly related to digital literacy – are currently stalling, and

⁶ See: <http://www.prometheanplanet.com/documents/uk-us/pdf/professional-development/education-fast-forward/report-on-the-first-debate-of-education-fast-forward-by-merlin-john.pdf>

government is called upon to take measure against this lack of progress (Livingstone & Wang, 2011).

2.1 Digital literacy at the convergence of multiple literacies

ICT usage is becoming more extensive across society: more people are using technologies around the world, for more time and for different purposes. The extensiveness of use is moreover derived by the digitalisation of society in general, as many of the activities we undertake have a digital component. Exposure to digital tools embraces the domains of work, learning, leisure, participation, socialisation, and consumerism. As society is becoming digitalized, the knowledge, attitudes and skills (KAS) that are needed to be digitally competent are becoming manifold: being digitally literate today is not restrained to the understanding of hardware and software devices. For this reason, Digital Competence is currently being defined by several authors as closely related to other types of literacy (Bawden, 2001; Eshet-Alkalai, 2004; Sefton-Green, et al., 2009). The concepts of Digital Competence and related literacies have been reviewed in the first word package of this study (Ala-Mutka, 2011) and are synthesised in the following diagram:

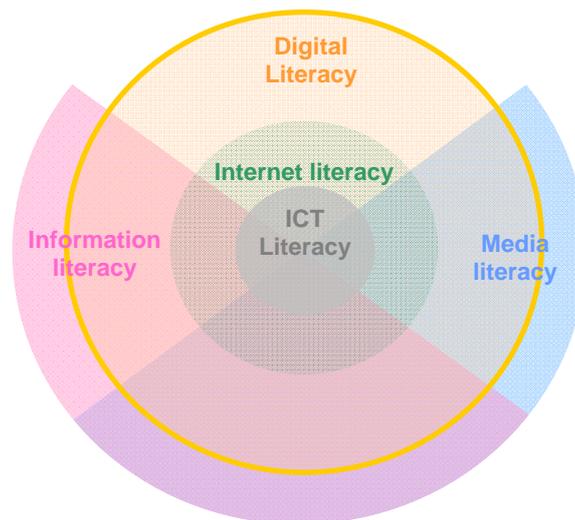


Figure 2: Digital literacy and other related literacies.
Source: IPTS (Ala-Mutka, 2011)

The diagram shows that Internet literacy, ICT literacy, media literacy and information literacy are partially overlapping with what we call here digital literacy. All the above-mentioned literacies contain a digital component and, in return, digital literacy is enriched by the new means and tools derived from technological surge and convergence. At the beginning, digital literacy was mainly understood as the ability to use a computer and to write in programming languages, and computer sciences were its theoretical background. Nowadays being digitally literate implies the ability to understand media (as most medium have been/are being digitalized), to search and being critical about retrievable information (with the widespread of the Internet) and to be able to communicate with others through a variety of digital tools and applications (mobile, internet). All these abilities belong to different disciplines: media studies; information sciences; communication theories. Analysing the repertoire of

competences related to digital literacy requires an understanding of all these underlying aspects, which will be here briefly accounted for.

ICT literacy is understood in the above diagram as computer literacy and refers to the ability to use computers and related technologies, from end-users to ICT professionals.⁷ It is generally understood as the knowledge and skills needed to effectively use hardware and software components. Simonson, Maurer, Montag-Torardi & Whitaker (1987) define computer literacy as “an understanding of computer characteristics, capabilities and applications, as well as an ability to implement this knowledge in the skilful and productive use of computer applications”. The different definitions of ICT literacy developed in the 80's are all along the same lines and have survived unaltered for over twenty years (Oliver & Towers, 2000; Reed, Doty, & May, 2005). ICT literacy is still mainly based on the development of operational and technical skills and knowledge.

Internet literacy refers to the proficient use of the internet. As Van Deursen (2010) points out, the expression Internet literacy refers to a specific tool or medium. In this sense, it could be perceived as a subset of ICT literacy. In the above diagram it is depicted as wider than ICT literacy as it is assumed that an internet user will need to be able to have a basic understanding of computer functioning, as well as being able to understand information, media, and to communicate through the Internet. For Hofstetter & Sine (1998), Internet literacy relates to connectivity, security, communication and web page development. As it might be noted, Internet literacy is quickly evolving, as nowadays web page development is not as central as would be the competences to understand and manage web 2.0 tools. Furthermore, the Internet is now also accessible via mobile phones and television sets, thus from a variety of tools.

Media literacy is the ability to analyse media messages and the media environment (Christ & Potter, 1998). It involves the consumption and creation of media products coming or retrieved from television, radio, newspapers, films and the internet. Media education is typically concerned with a critical evaluation of what we read, hear and see through the media, with the analyses of audiences and the construction of media messages, and the understanding of the purpose of these messages (Buckingham, 2003). Its closeness with semiotics and social studies kept media literacy away from the more technical, tool-related ICT literacy, so much so that university courses and school curricula still keep a distinctive split between these two disciplines (Sefton-Green, et al., 2009). Media literacy involves a set of competences that relate to communication and critical thinking. The communication component of media literacy is central in the definition of the influential Ofcom,⁸ from which it seems that internet literacy is a subset of media literacy. Ofcom defines media literacy as ‘the ability to access, understand and create communications in a variety of contexts’ (Ofcom, 2006). The meaning of media literacy is in fact evolving from the understanding of print, radio and television messages to encompass new media, including the internet (Livingstone, 2003).

⁷ The conceptual framework to be developed in the DIGCOMP project is not going to take into account the needs of ICT professionals. A framework for ICT professionals has been recently developed, see www.ecompetences.eu.

⁸ Ofcom is the UK communication regulator.

Information literacy, although having many similarities with media literacy, and being now extremely relevant for internet use, builds upon the tradition of librarians and started as the ability to retrieve information, to access it and understand it. The American Library Association (1989) defines information literacy as 'the ability to recognise when information is needed and the ability to locate, evaluate, and use the needed information effectively'. From an elitist competence, only relevant to a small number of intellectuals, it is gaining nowadays central stage, as information literacy encompasses many of the skills and competences "needed to live, work and learn in the information society" (NCCA, 2004). It involves the capacity to recognize why and how we need information. It builds on cognitive sciences and relies on higher order thinking skills, including critical thinking.

2.2 Digital literacy as new literacy?

The above definitions of the different literacies and the digital 'rhetorics' outlined at the beginning of this chapter highlight how discourses around digital literacy range from the "tautological to the idealistic", to put it as Livingstone (2003), from defining a literacy as the ability to use a specific set of tools, applications, media (e.g. internet literacy as the ability to use the internet) to the understanding of digital literacy as an unavoidable requirement (OECD, 2001) for life-fulfilment. The literacy domains sketched out above are converging in what we have called so far digital literacy. We argue that being digitally literate today involves the knowledge, attitudes and skills needed for operating technologies, using the internet, understanding the media and managing information. The convergence of literacies into the digital is however more than the sum of its single elements. In other words, it is not enough to state that digital literacy involves all the skills and competences that are required for internet literacy, ICT literacy, information literacy and media literacy. There are other components that come into the picture of digital literacy.

Livingstone (2003) states that literacy is not user dependent but tools dependent – or, it can be argued, application dependent, or object dependent. Reading a printed newspaper or an online one is not the same experience and requires a different set of skills, as for instance the ability to move through hyperlinked texts. The upsurge of new tools will constantly require a reshaping of users-competences, as new literacies are deitic – which is to say they change regularly (Leu, 2000). Eshet-Alkalai (2004) claims that the visual stimuli brought about by the Internet require the ability to understand and make sense of images and videos, and to browse through a high amount of visually appealing materials. This is what he calls visual literacy, which can actually be interpreted in two ways: on the one hand, a different way of reading a text; on the other, a new reading experience involving the understanding of videos, icons and so forth. Online text perusal requires a more dynamic approach (OECD, 2010) and offers an augmented reading experience. The general use of computer or smart-phones, moreover, being done through icon-based command, requires higher cognitive mediation (Eshet-Alkalai, 2004), as symbolic utterances refers to a system of signs which might not be familiar to everyone, and as it is underpinned by the ability to read images as texts. As pointed out by Gee, Hull, & Lankshear (1996), "reading is always reading *something* with *understanding*. [T]his something that one reads with understanding is always a text of a *certain type* which is read in a *certain way*." A different text requires a different reading strategy, a specific way to decode and encode it. This has always been valid for all literary "genres" or communication types, and it is a basic principle of information and media literacy theories. The new, added dimension that is acquired though the digital is that

the decoding and encoding units of meaning is made of a mixture of letters, sounds, videos, images that are organised in a not necessarily linear way.

Moreover, as Kress (2010) argues, changes in forms and functions of the text – intended here as comprehensive of visual and audio texts – make the reader become a designer of the reading experience. Hypertexts and multimodal texts allow and require an engagement from the reader in terms of choices – which threads or links to follow, which modes of reading to select. As such, technologies encourage a new type of reading. New approaches to a text. New reactions. For instance, there is a convergence between the reader and the writer, as the decoding and encoding processes are made at faster speed and texts – blogs, newspapers articles, Wikipedia entries – allow and encourage the reader to become an author. Besides, writing is becoming part of the everyday life of the everyday person (Rainie, Purcell, & Smith, 2011), as many of us write emails, send sms, and participate to social networks. In a way, these new practices – including the 'hyper-intensity' of text or Facebook messaging – can be seen as a triumph of the domestication of technologies and its appropriation by the user (Silverstone, 2006).

2.3 A step towards competence

Discourses about literacy tend to focus around the decoding and encoding argument, which is to say around reading and writing, even if in a 'multimodal' perspective (Kress, 2010). We prefer here to refer to Digital Competence, understanding it as the set of knowledge, skills and attitudes needed today to be functional in a digital environment. Therefore, beside the changes in the reading and writing dimensions, we can argue that Digital Competence requires a new set of skills, knowledge and attitudes, which are going to be outlined throughout this report. At present, the focus of Digital Competence is mainly on knowledge and skills, and attitudes seem to play a much secondary role. Moving towards competence instead of literacies requires taking into account attitudes, which are often left aside in certification and assessment discourses, but which are so intertwined with knowledge and skills to be often difficult to isolate. Competence acquisition in a digital era may be defined as a mindset, enabling the user to adapt to new requirements set by the evolving technologies (Coiro, et al., 2008). In addition, being "fluent" or "native-like" with technologies only happens, according to Gee, Hull, & Lankshear (1996), when acquisition is embedded in a social practice, which entails certain ways of *talking* about the tools, of holding *certain beliefs and values* about them, and *socially interact* over them in certain ways. In other words, technologies need to be appropriated by users. Appropriation entails a specific way to act and interact with technologies (and therefore it requires specific attitudes), of understanding them (and therefore holding specific knowledge), of being able to use them (and therefore having specific skills).

The focus on literacy and its subsequent encoding/decoding components could derive from earlier needs in the use of computers. The interaction with technologies used to be carried out through text-based commands, which were complex instructions requiring memorisation and professional knowledge and skills (Eshet-Alkalai, 2004). Computers then became more intuitive to operate thanks to graphical-user interface (GUI), and are becoming now even more intuitive with the move to a natural-user interface (NUI). As such, the shift to more natural and intuitive interfaces is a first step towards the integration of technologies in everyday life (Punie, 2005). This shift does not mean that in the future there will be no need

for learning how to use technology, as ease of use still requires a series of skills on how to use tools, and a body of knowledge related to these tools. However, the move from a professional tool into an everyday appliance requires even more than before the understanding of the possibilities, consequences, and affordances endowed by the medium. As technologies evolve, so do the competences that are needed to use them. And as uses evolve, so do behaviours of users. Gillen and Barton (2010), for example, see the current blurring of engineering and consumers, as the creation of applications for Facebook, iPhones and the like is now made more reachable for non-professional as well as for professionals.

3 Collection of cases and methodology

This report gathers and analyses case on Digital Competence. The current literature and discussion on Digital Competence summarized in the previous chapter has been the theoretical framework on which the cases reported here have been searched for. The selection of the frameworks that are presented in this report aims to provide a selective but wide picture of what is available today and on how competences are translated and conceptualized. This chapter summarizes the methodology behind the case studies collection.

3.1 Searching for and selecting frameworks

A first methodological step in this instance involved linking the theoretical understanding of Digital Competence to other related literacies which arose from a review and mapping of policy and academic literature in the field (Ala-Mutka, 2011). As outlined above, Digital Competence is often understood as a multi-faceted competence. The conceptualisation of Digital Competence in terms of multiple literacies (media literacy, information literacy, internet literacy and ICT literacy as the main literacies related to Digital Competence) has been used as a basis for searching for frameworks, in order to cover different aspects of Digital Competence. The initial searches gave way to a body of cases which were first categorised according to the specific literacies they were explicitly fostering. In several cases, however, frameworks belonged to more than one literacy domain, or to overlapping areas of two different literacies.

Although comprehensive evidence and examples of digital literacy initiatives have been collected, a second step in the selection was aimed at reducing the body of cases under what constituted a framework. In the collection of the cases that are reported here, the term "framework" has been understood in its wider meaning: any organised conceptualisation of the competences and sub-competences related to digital literacy. According to CEDEFOP (2008), a qualification framework is an instrument for the development and classification of qualifications (e.g. at national or sectoral level) according to a set of criteria (e.g. using descriptors) applicable to specified levels of learning outcomes. Along the same lines, we understand here as Digital Competence framework an instrument for the development or assessment of Digital Competence according to a set of criteria, which establishes descriptors of intertwined competences aimed at enhancing the digital literacy of a specific target group. Therefore, alongside curricula and structured courses, we selected initiatives intended to tackle digital literacy and also articles or reports which propose a systematisation or interpretation to shape the digital literacy landscape. Although initially it seemed relevant to include current indicators and survey data on digital and related competences, the data collection processes seemed at a second look to either be more focussed on use rather than competences, or inserted in a more complex framework. For instance, the OECD PIAAC survey has questions related to ICT skills, but in the questionnaire items on these skills are intertwined with questions on literacy and numeracy.

The case studies presented here have been identified and collected in the following ways:

- Previous work on the topic carried out in the Institute (IPTS), in particular the mapping of Digital Competence (Ala-Mutka, 2011);
- Suggestions from colleagues (mainly from IPTS and DG EAC);

- Google searches of concepts related to Digital Competence (digital competence; digital competence framework; digital literacy; digital literacy framework; information literacy frameworks; internet literacy frameworks; media literacy frameworks; ICT literacy frameworks and related terms);
- Searches for the expression "digital competence" and related terms in academic publication databases (ISI web of Knowledge; ERIC; Scope);
- Searching and browsing of curricula documents in EU countries where the language was known by the author (primary, secondary);
- Review of projects/reports of international organizations (UNESCO, OECD);
- Review of projects/reports from organisations which are active in ICT and learning studies (Becta; Futurelab; OFCOM);
- Review of EU reports and initiatives related to Digital Competence.

The main limitation of this searching approach can be identified in the language used (mainly English), as frameworks and initiatives in other languages are unlikely to appear. Moreover, the identification of cases to be included in this collection depended on the visibility of the initiative. Yet another limitation consists in the terminology, as the terms "competence" and "literacy" are used with different meaning in different contexts. The word "literacy", in particular, is not effortless to translate to other languages and comes with a series of connotations whose discussion is not the purpose of this report.

This search gave body to a dataset collecting over a hundred frameworks and initiatives, among which fifteen (15) frameworks were selected for full reporting, according to the following criteria: fair distribution of target groups that the frameworks are addressed to; fair geographical distribution; representation of a plurality of perspectives on digital literacy/competence; representation of a plurality of initiative types (from school curricula, to academic papers, to certification bodies).

3.2 Reporting on frameworks

The selected frameworks are different in nature. To overcome diversity, each framework was reported upon by compiling a fact sheet (see Chapter 7). For every framework, a common grid was used. This reporting grid provides synthetic but comprehensive information on several dimensions of the cases (see Annex). It was not always possible nor intended to complete all fields for all frameworks.

The fields of the reporting structure are as follows:

- Name of the framework or initiative;
- Institution or provider of the course (in the case of an academic article: author/s of the paper);
- Brief outline (summarising the salient points of the framework/initiative);
- Webpage;
- Reference (listing references to paper, books, articles, reports that present the framework or initiative or which came out of the reported project);
- Type of initiative (specifying the nature of the case, i.e. if the case is a project, a digital literacy initiative, a school curriculum, an academic paper, etc.);

- Objective of the case;
- Context of the framework or initiative (institutional frame the framework/initiative belongs to or funding body);
- Literacy focus and approaches (type of literacy it develops, e.g. media literacy, ICT literacy);
- Vision (explicit understanding of Digital Competence and its aims, definition of Digital Competence or related competences);
- Target group (group/s that the framework or initiative is intended for);
- Structure of the case study (listing the phases in a project);
- Material (available material or supporting documents for disseminating/explaining the framework/initiative);
- Methods (methodology foreseen for the implementation of the framework/initiative);
- Tools (available material for the implementation of the framework);
- Implementation level (statement of the implementation of a framework and its level; e.g. compulsory school, primary/secondary, etc.);
- Width of implementation (regional, national, international);
- Competence components (summary of the competences and sub-competences envisaged by the framework/initiative);
- Levels (description of the envisaged proficiency levels);
- Assessment of competences (if and how competences are measured or assessed);
- Further information (notes on the relevant aspects that have not been covered in the previous fields);
- Diagram (a graph or figure visualising the main points of the framework).

Fact sheets were subsequently submitted to case owners for approval and amended according to the feedback received.

The reporting grid gives a general outline of the framework. In some cases, the reader is referred to the webpage or to some external document to gather further information on the case. As for the average of three pages per case, it was decided to insert the cases fact sheets in an annex at the end of the document and to have a short description of the cases in text (see following chapter).

3.3 Analysing the selected frameworks

The reporting of the selected frameworks gave rise to a number of critical questions. These questions examine the conceptualizations and operationalisations of the notion of Digital Competence and other related competences. Hence:

- What vision of Digital Competence arises from the selected frameworks?
How is Digital Competence defined or understood?
- What are the main competences that are developed in the selected frameworks?
Are the vision and the competences developed coherent within each framework?

- What levels of Digital Competence are envisaged?
- Are there substantial differences between frameworks?
What are the main similarities between the selected frameworks?

The answers to these questions constitute the main aim and body of the current report.

4 Short overview of selected cases

This chapter briefly introduces the frameworks that have been collected. A summary of the main characteristics of all initiatives is provided for the reader to understand the typology of frameworks that have been selected and analysed. For every framework, we briefly highlight the main objective and purpose and the target group it is address to. The reader is referred to the annex for a wider overview of the selected frameworks.

4.1 ACTIC

ACTIC stands for "acreditación de competencias en tecnologías de la información y la comunicación" (Certification of ICT competences). This initiative is being carried out in Catalonia and is targeted at all citizens above the age of 16. It is based on a three-level model, although level 3 was not yet implemented at the time of writing. Digital literacy is considered to be the safe and critical use of Information Society Technologies for work, leisure and communication.

Target group: all citizens over 16.

4.2 BECTA's review of Digital Literacy in 0-16 years olds

This review provides a model for teachers and learners of primary and secondary schools. It is based on the understanding that digital literacy is composed of digital skills and critical thinking skills. It is composed of a review of the literature and support material for teachers and learners.

Target group: children up to 16 years old.

4.3 CML framework

The CML (Centre for Media Literacy) provides the MediaLit Kit and establishes a basic framework featuring five core concepts and five key questions of media literacy. The framework aims to enable learners to deconstruct, construct and participate with media. It is seen as a reference for teachers, media librarians, curriculum developers, and researchers. The five core concepts read as follows: 1. All Media messages are constructed; 2. Media messages are constructed using a creative language with its own rules; 3. Different people experience the same media message differently; 4. Media have embedded values and points of view; 5. Most media messages are organized to gain profit and/or power.

Target group: adults.

4.4 DCA

The DCA (Digital Competence Assessment) framework is part of a wider project on "Internet and Schools: Problems of Accessibility, Equality Policies, and Information Management". The framework proposes a definition and conceptualisation of Digital Competence which is linked to a series of tests, generally aimed at secondary school students (15-16 years old).

Target group: secondary school students.

4.5 DigEuLit

This project was set up by the EC eLearning initiative and led by the University of Glasgow to develop a general framework for Digital Competence. The main output of the project was a series of publications on a conceptual framework for the development of Digital literacy, which is seen as the convergence of several literacies. The authors highlight the need to

move the discussion on Digital Competence from listing skills towards the contribution of digital tools in the growth of the individual in society.

Target group: all citizens.

4.6 ECDL

ECDL is one of the leading authorities of computer skills certification programmes. It is a not-for-profit organisation supported by national computer societies and international organisations across the globe. There are ten certification programmes ranging from entry-level for beginners to advanced level to professional programmes. The main focus of the most widespread programmes (ECDL/ICDL) is on the development of skills and knowledge necessary to use word processing, database, spreadsheet, and presentation applications.

Target group: all citizens.

4.7 eLSe Academy - eLearning for senior citizens

The eLSe-Academy - eLearning for Seniors Academy - focuses on increasing the social participation, empowerment and inclusion of European senior citizens in the knowledge and information society with a special focus on reducing the isolation of those who are vulnerable. eLSe aims to develop and test an eLearning environment specifically devoted and pedagogically adapted to the needs of older learners. The target group are European senior citizens interested and able to acquire and further develop competences in ICT and other subjects, with special emphasis on those who are geographically or through domestic circumstances 'isolated'. eLSe-Academy offers a two-year, non-formal, flexible and accessible eLearning-based ICT qualification course that is tailored to the needs of elderly learners.

Target group: elderly people.

4.8 eSafety Kit

More than a framework, this tool is a kit prepared for children and their families to raise awareness on safety issues on the Internet and to support an efficient but secure use of technologies. The kit, providing online activities, a parents' guide, and a booklet to be printed for offline use, covers the following themes: Security, Communication, Entertainment and Downloading, and Cyberbullying. The aim of the kit is to spark inter-generational discussions between parents/careers and children on the above issues.

Target group: 6 to 12 year old children.

4.9 Eshet-Alkalai's conceptual framework for survival skills

This paper by Eshet-Alkalai reports on the different aspects of digital literacy and on the multiple literacies that are needed for people to be functional in a digital era. It proposes a conceptual framework to clarify the skills pertinent to digital literacy.

4.10 IC³ Internet and Computer Core Certification

The Internet and Computing Core Certification (IC³[®]) aims to provide students and job-seekers with the foundation of knowledge they need to succeed in environments that require the use of computers and the Internet. IC³ certifies critical entry-level skills needed to effectively use the latest computer and Internet technology to achieve business objectives, expand productivity, improve profitability, and provide a competitive edge.

Target group: all citizens.

4.11 iSkills

The iSkills assessment framework claims to be the only Information and Communication Technology (ICT) literacy test that assesses critical thinking and problem-solving skills in a digital environment. The framework is based on the recognition that both cognitive and technical skills are necessary for people to be functional in a digital society.

Target group: adults.

4.12 NCCA: ICT framework for schools in Ireland

This framework is a guide that helps teachers embed ICT as a cross-curricular component for all subjects. It identifies the knowledge, skills and attitudes which are expected from pupils and students attending primary and lower secondary schools. It supports a vision of digital literacy as the ability to create, communicate and collaborate to organise and produce information; to understand and apply knowledge of the functions of ICT; to use ICT for thinking and learning; and to develop a critical appreciation of the role of ICT in society.

Target group: primary and lower secondary schools.

4.13 Pedagogic ICT licence

This Danish initiative offers current and prospective teachers the opportunity to upgrade their ICT skills and to integrate ICT and media as a natural part of learning in school subjects. This certificate is obtained by successfully completing assignments in four basic modules and four elective modules. The aim is to use ICT and media for teaching and learning purposes. To achieve this aim, teachers work in cooperation with a supervisor to choose those modules which are closer to their everyday teaching.

Target group: current and prospective teachers.

4.14 Information literacy project – Scotland

This information literacy framework has been developed in Scotland in order to promote the understanding and development of information literacy in all education sectors. A pilot was conducted with secondary schools, in which information literacy was defined in terms of statements of skills, knowledge and understanding.

Target group: secondary schools.

4.15 UNESCO ICT Competency Framework for Teachers (ICT-CFT)

This framework aims to define various ICT competency skills for teachers in order to enable them to integrate technologies in their teaching and to develop their skills in pedagogy, collaboration, and school innovation using ICT. The UNESCO ICT-CFT project consists of a policy framework, a set of competency standards and implementation guidelines. The standards developed in this framework include training on ICT skills as part of a comprehensive approach to education reform that includes: policy, curriculum and assessment, pedagogy, the use of technology, school organization and administration, and teacher professional development.

Target group: teachers.

5 Digital Competence: its development in the selected frameworks

The frameworks that have been collected through this exercise constitute a qualitative snapshot of how Digital Competence can be translated into curricula, courses, certification programmes or how it can be conceptualised in academic papers. As a general remark on the about hundred frameworks originally collected, it can be noted that, while there are numerous "digital literacy" initiatives, especially ones that aim to improve digital inclusion, few of these are based on what we understand here as a framework, i.e. an organised conceptualisation of intertwined competences. Several "digital literacy" initiatives still have accessibility as their main focus, and the didactic component is not necessarily developed in a structured way. It is generally considered the task of formal and non-formal education to create curricula, course programmes, and syllabi. In general terms, though some notable exceptions must be acknowledged, institutional courses tend to have a more systemic approach to content. Therefore, Digital Competence frameworks can more easily be found in certification programmes or school programmes, whereas other types of digital literacy initiative tend to show a less structured approach to content and didactical issues.

For this reason, the 15 cases collected here represent a specific view of the digital literacy landscape, as they account for cases with a structured approach to the development of Digital Competence. Four of them have a certification purpose; 5 are aimed at formal, compulsory schools; 2 have teachers as the main target group; 2 are theoretical stances; and the remaining 2 have other purposes (one is a project for the digital inclusion of the elderly and the other has a lifelong learning perspective, even if the main focus is on schools/university learning). This means that more than 2/3 of the selected frameworks are contextualised in either formal school or certification settings.

Notwithstanding this common tendency towards formal instruction and certification, the selected frameworks vary in scope and target groups. They are therefore different in organisation, aims, granularity of available information, and complexity. With the objective of providing a comparative analysis and discussion of the frameworks, we have selected three areas to report on:

- Definitions of Digital Competence;
- Competence areas;
- Levels.

The selected frameworks are considered here as good practices of Digital Competence development. Consequently, the current analysis seeks to understand which components of Digital Competence have already been developed and how; what current trends characterise Digital Competence acquisition; and whether frameworks propose different approaches to Digital Competence. The current chapter will therefore critically discuss definitions and visions of Digital Competence, and subsequently analyse the competences proposed by the selected frameworks. It will then discuss the levels that are currently foreseen by these frameworks and finally it will propose comprehensive descriptors of Digital Competence. These descriptors summarise and bring together the competence areas as they are outlined in the selected frameworks.

5.1 A common definition of Digital Competence

As the concept of Digital Competence is much debated and multifaceted, as shown in Chapter 2 with the discussion of the literature, it comes as no surprise that two thirds of the selected frameworks provide a definition of digital literacy. The definitions used in the frameworks can be merged and summarised as follows:

Digital Competence is the set of knowledge, skills, attitudes, abilities, strategies, and awareness that are required when using ICT and digital media to perform tasks; solve problems; communicate; manage information; collaborate; create and share content; and build knowledge effectively, efficiently, appropriately, critically, creatively, autonomously, flexibly, ethically, reflectively for work, leisure, participation, learning, and socialising.

This long and comprehensive definition has been produced by merging and comparing the definitions in the different frameworks. Each framework proposes a less exhaustive and encompassing view of digital literacy. Nevertheless, none of them endorses a perspective which could be said to be in contrast with this overall, encompassing definition.

The definition can be broken down into several building blocks, namely: learning domains; tools; competence areas; modes; purposes (see Figure 3). We suggest that the complexity of this definition and its multiple building blocks should be taken into account in the development of frameworks for Digital Competence.

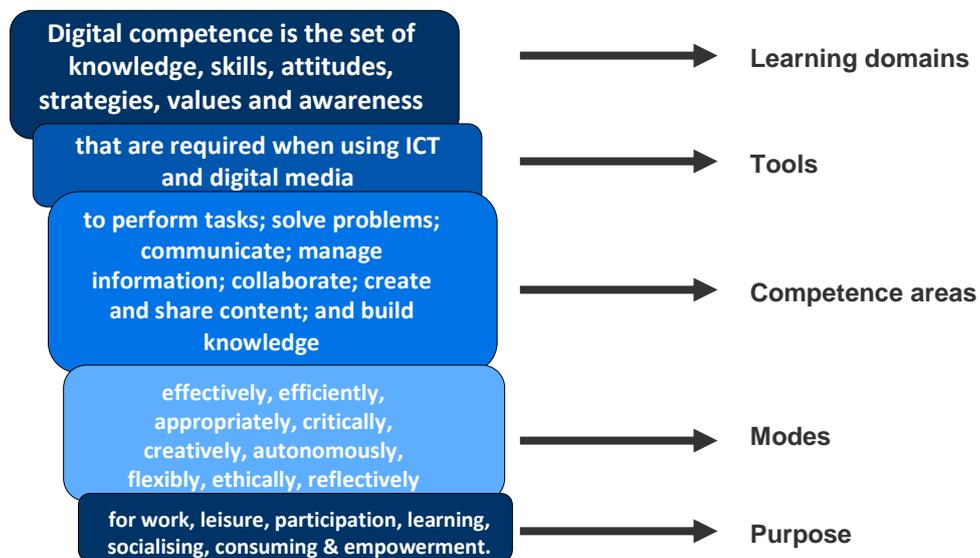


Figure 3: Parts of the definition

Firstly, the learning domains are listed: to the more expected knowledge, skills, and attitudes – the three constituent parts of a competence – some frameworks add awareness, and strategies. Half of the frameworks that provide a definition insist on skills, while a third mentions awareness. The tools generally include ICTs, only two frameworks explicitly mention media, whereas the main focus – for frameworks which provide a definition as for those which do not – is on computers and the internet. Regarding the competence areas that are foreseen in the definitions, certainly "use" and "performing tasks" recur most, followed by communication and information management. It should be noted that the

competences that are foreseen in the definitions do not necessarily mirror the competences that are developed in the frameworks. The modes – effectively, efficiently, appropriately, critically, creatively, autonomously, flexibly, ethically, reflectively – could be interpreted as a specification of the different "attitudes" foreseen by framework developers. These refer to "how" learners should ideally use ICTs and digital media. Finally, purposes – work, leisure, participation, learning, and socialising, – are in line with commonly agreed purposes and needs for digital literacy, see for instance the work on monitoring Digital Competence carried out in the frame of the Digital Agenda Scoreboard.⁹ Here it is claimed that Digital Competence, beyond technical skills, involves the active application of these skills to aspects of life, namely: work/professional life, learning, communication, participation in society, leisure and collaborative networking. In this context, purposes are seen as proxies for advanced Digital Competence.

It can furthermore be noted that the definition that results from merging the different definitions of the collected frameworks bears similarities and differences with the definition established in the Key Competences for Lifelong Learning Communication (European Parliament and the Council, 2006), as can be noted in Figure 4.

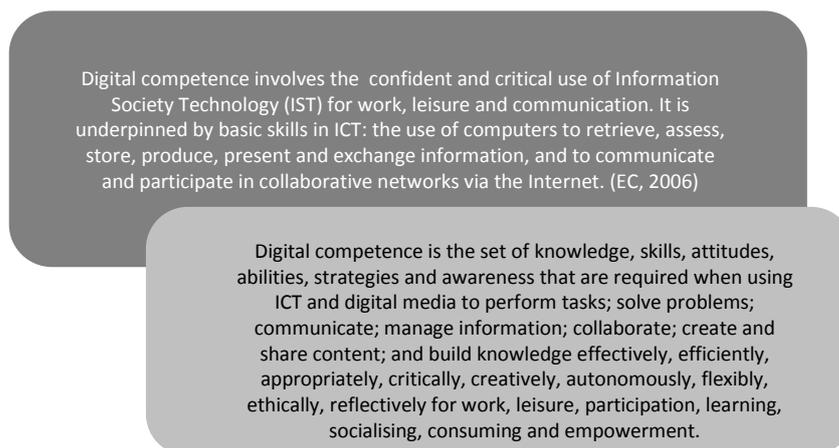


Figure 4: Definition from frameworks and definition from Key Competences for lifelong learning

The main similarity consists in the fact that both definitions are based on the same building blocks: learning domains; tools; competences areas; modes; and purposes. Furthermore, both definitions recognise the importance of information management and communication. The main difference is that, although the 2006 definition was already quite comprehensive, the definition we propose as a summary of the various definitions of the case studies is even more detailed. For instance, the Key Competences definition focuses primarily on skills – although further on in the text of the Communication the knowledge, skills and attitudes related to Digital Competence are detailed. Regarding the tools, the 2006 definitions emphasises IST and internet, while we propose that media should be taken into account as well. Regarding the competence areas field, the definition we propose includes: solving problems and building knowledge. Moreover, content creation is understood in the Communication definition as solely the production and presentation of information. The

⁹ http://ec.europa.eu/information_society/digital-agenda/scoreboard/docs/pillar/digitalliteracy.pdf

modes foreseen in the communication are "confident and critical", against the long list derived from the frameworks definitions, which includes: effective, efficient, appropriate, critical, creative, autonomous, flexible, ethical, reflective. Finally, it can be noted that the purposes recognised in the Communication do not explicitly involve "learning".

The definition we propose has been built merging the several definitions encountered in the cases collected here. Although it is certainly an encompassing definition, it should be noted that there are at least two purposes which were missing from the various definitions: "consuming" and "user empowerment". Online shopping is spreading, with 40% of EU citizens buying goods online.¹⁰ However, it is of paramount importance that consumers are aware of the risks connected with online purchases, such as for instance inadequate security settings. To transact safely (Lusoli et al., 2011), there are certain competence requirements, which are recognised as a priority in the Digital Agenda (European Commission, 2010a, Action 61). In addition, it has been noted that social computing practices allow for user empowerment (Ala-Mutka et al., 2009). As a consequence, we added "for consuming and empowerment" to the encompassing definition.

5.2 Competence areas

The NCCA (2004) report claims that most approaches to Digital Competence regard skills that are tool-dependent: they focus on the practical abilities to use a specific software or hardware. This reinforces common visions of digital literacy or media literacy (Livingstone, 2003). Although tool-dependent approaches become outdated in no time, they have the advantage of describing skills that are specific and easily measurable (NCCA, 2004). Indeed, the collection provided here presents some frameworks which are oriented at developing skills more than competences and which are structured around the most-used software or tools. For instance, the **ECDL** core programmes consists of 13 modules which are mainly aimed at being able to use a specific application, though they are vendor neutral, i.e. not tied to any one brand of software. Modules develop skills in using databases, spreadsheets, word processing tools, image editing and presentation software, to give but a few examples. The certification for the "word processing" module includes tasks like the creation of a new document, the formatting of text, the creation of tables, the spell-check and the printing of a document. In the same vein, and although it measures content topics together with technology topics, the **iSkills** test assesses the ability to use the web (email, instant messaging, bulletin board postings, browsers, search engines); databases (data searches, file management); and software (word processing, spreadsheet, presentations, graphics). The test is built around the assessment of seven task types: namely: define, access, evaluate, manage, integrate, create, and communicate. An example of a "create" task type, as available from the ETS website, is the creation of a graph from a series of given data, followed by questions related to the interpretation of the graph. Even though this includes a cognitive component – the interpretation of a graph – the main task is built around a common application, i.e. the spreadsheet package. The **IC3 Internet and Computer Core Certification** by Certiport provides another example of a tool-related framework. The exams for this certification are explicitly based on Microsoft Windows 7 and Office 2010. Original exams were based on previous Windows and Office versions. As can be seen in Figure 5, the framework is built around three modules, namely: Computing Fundamentals, Key

¹⁰ http://ec.europa.eu/information_society/digital-agenda/scoreboard/docs/scoreboard.pdf

Applications and Living Online. The first module is based on hardware, software and operating systems, thus reflecting a computer engineering approach. The second module has topics on word processing, spreadsheets and presentation software, plus a section covering features common to all applications. The third module is described as addressing "skills for working in an Internet or networked environment"¹¹ and is based on the use of distinctly recognisable tools: online networks, emailing systems, Internet browsers. The section on "the impact of computing and the Internet on Society" is the only one which goes beyond a tool-related certification process, and mainly relates to risks connected to the use of hardware, software and the Internet.

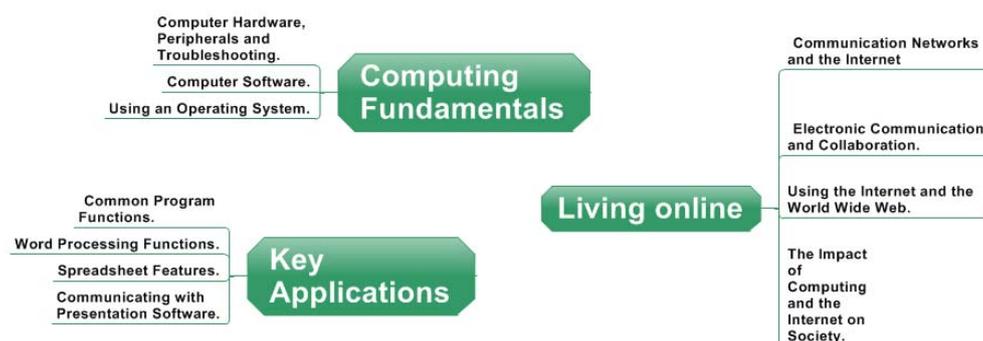


Figure 5: Certiport IC3 modules

It comes as no surprise that the above examples are taken from certification frameworks, which have to satisfy the need for measurability and assessment. This aspect could also be reinforced by the requirements of employers, who probably demand specific abilities in hardware/software packages use. Moreover, the IC3 framework case is a consequence of the widespread use of Microsoft tools. Although the need for specific skills for employability could be a possible driver for application-oriented programmes, other initiatives which do not have an employability aim also have a focus on tool-related operational skills. The **eLSe Academy** is an eLearning environment aimed at senior citizens interested in acquiring or further developing their competences in ICT and able to do so. Even this course is typically structured on application-based modules: using the learning platform; writing with a computer (word-processors including word pad); communicating via a computer (emails); and so on. Like the IC3 certification, this case is based on the use of Microsoft Office packages and Windows. The **UNESCO ICT competency framework for teachers**, even though it is embedded in a more complex structure, also foresees elements of technical operations. The framework is not about Digital Competence per se, but rather suggests entrenching ICT in every aspect of educational institutions from policy to pedagogy to administration, thus proposing an innovative approach to using technologies in education. In module four, the basic technology literacy expected of teachers is based on an application-oriented approach, at least at basic level:¹² use of common hardware technologies; basic tasks and uses of word processors; basic features of presentation software; basic function of graphic software; use of the Internet and the World Wide Web; use of a search engine to do a

¹¹ http://www.certiport.com/portal/common/documentlibrary/IC3_Program_Overview.pdf

¹² <http://unesdoc.unesco.org/images/0021/002134/213475e.pdf>, see page 23.

keyword Boolean search; creation and use of an email account; function and purpose of tutorial and drill and practice software; location and evaluation of educational software packages and Web resources; use of networked record keeping software; use of common communication and collaboration technologies, such as text messaging, video conferencing, and web-based collaboration and social environments. However, in this framework the tool-oriented approach is only a relatively small part of the framework. This shows that, although mastery of tools is still considered a basic background need, we are now moving towards a wider spectrum of competences that in the case of the UNESCO ICT CFT includes the integration of technologies with a pedagogical perspective (for instance, when and how to use or not to use ICT for classroom activities). Moreover, although while not explicitly mentioning it, the UNESCO ICT CFT is an example of the fact that for the development of digital competence the context of use (or application/implementation) is one of the most relevant variables.

The examples above show that tool-oriented approaches are predominant in certification schemes, in employability related courses, and are also adopted in eInclusion projects or included in wider innovative frameworks. Many digital competence initiatives build on a consolidated although relatively recent tradition. As pointed out by Erstad (2010a), digital literacy moved through three main phases. After a first 'mastery phase' (1960s to the mid 80s) where technologies were accessed by professionals who knew programming languages, interfaces became more user-friendly from the mid-80s to the late 90s and were thus opened up to society. This second 'application phase' gave rise to mass certification schemes. As technologies became simpler and started getting domesticated, they also became more necessary, hence augmenting the population's needs for specific skills in order to "tame" these new tools – and therefore triggering targeted courses to answer to these specific needs. We see the application phase as a recent but consolidated tradition: many eInclusion/eLearning initiatives and digital literacy discourses are built upon discourses linked to this phase, highlighting access and accessibility and tool-related operational skills as a basic competence. From the late 90s, we entered a third phase – the reflective phase– in which the need for critical and reflective skills in the use of technology is widely recognised (Erstad, 2010a). Yet in 2004, the NCCA reported that most definitions and approaches to Digital Competence did not take into account higher order thinking skills (NCCA, 2004). Our framework collection cannot confirm this statement, as several of the cases we have gathered here do recognise the importance of reflective and critical uses. However, the modes and ways in which this is translated into learning objectives or competences vary.

The **iSkills** framework, although it has a central operational/technical component as shown above, is an example of an approach which acknowledges thinking skills for Digital Competence and at the same time is still based on applications. The framework explicitly recognises the need for cognitive skills in order to be functional in a digital environment:

"ICT literacy cannot be defined primarily as the mastery of technical skills. The panel concludes that the concept of ICT literacy should be broadened to include both critical cognitive skills as well as the application of technical skills and knowledge. These cognitive skills include general literacy, such as reading and numeracy, as well as critical thinking and problem solving. Without such skills, the panel believes that true ICT literacy cannot be attained." (International ICT Literacy Panel, 2007).

An example might illustrate how the above-mentioned philosophy is translated into assessment of competences. As explained above, the framework is built around seven competence areas. One of these, "Access", implies the collection and/or retrieval of information in digital environments, and therefore is typically endowed with cognitive and critical needs. The two sample tests provided on the website¹³ are based on searches within a database, on accurate search terms and correct search strategies (for instance, using Boolean operators or quotation marks). The cognitive dimension is certainly taken into account, although we are left with the impression that this cognitive and critical component is not far from an application-oriented skill. In other words, critical and thinking skills seem to be seen as a means to a specific end, the end being a more efficient use of computers.

A similar competence, i.e. "access to information", can be found in **The Scottish Information Literacy Project**, a complex framework where competences are articulated around levels/target groups. For further and higher education, the equivalent of the iSkills "access" competence lies between the following two competences: "The ability to construct strategies for locating information" and "The ability to locate and access information". In the framework they are described as follows:¹⁴

- The ability to construct strategies for locating information:
- to articulate information need to match against resources
- to develop a systematic method appropriate for the need
- to understand the principles of construction and generation of databases

The ability to locate and access information:

- to develop appropriate searching techniques (e.g. use of Boolean)
- to use communication and information technologies
- to use appropriate indexing and abstracting services, citation indexes and databases
- to use current awareness methods to keep up to date

Similarities between the two approaches can be found, for instance, in the development of search techniques, to select the appropriate information retrieval services (selecting, for instance, the appropriate database). However, the Scottish Information Literacy Project, probably as a consequence of its focus on information literacy rather than digital literacy, involves higher order thinking skills and cognitive approaches at a more advanced level.

The cognitive dimension is often associated with access to information. Another case, the **DCA**, develops a competence which links access to information with cognitive skills. The DCA is a test which was originally developed for high school students aged 15-16 and which is currently under development for younger learners. The framework foresees four dimensions: the technological, underpinned by the ability to explore new technological contexts in a flexible way; the ethical, based on responsible and safe use of technologies; the cognitive, centred on access, selection and critical evaluation of information, and the integrated, for networked technologies and collaborative knowledge building. The cognitive dimension translates into the following learning objectives: being able to read, select,

¹³ See <http://www.ets.org/s/iskills/flash/FindingItem.html> and <http://www.ets.org/s/iskills/flash/ComplexSearch.html>

¹⁴ <http://caledonianblogs.net/nifls/framework-levels/further-higher-education/assessment-level-scaf-level-8-she-level-2-dip-he-hnd-svg-4/>

interpret and evaluate data and information taking into account their pertinence and reliability.

The cognitive dimension seems to be particularly relevant for compulsory school frameworks. Tabetta Newmann, in charge of a review of digital literacy for children up to age 16 for BECTA, in an attempt to simplify the complex terminology this domain generates, proposes looking at digital literacy as the use of critical thinking skills in the context of technology use (Newman, 2008). According to this reading, digital literacy can be understood as requiring both technical skills and critical thinking skills, as shown in Figure 6.

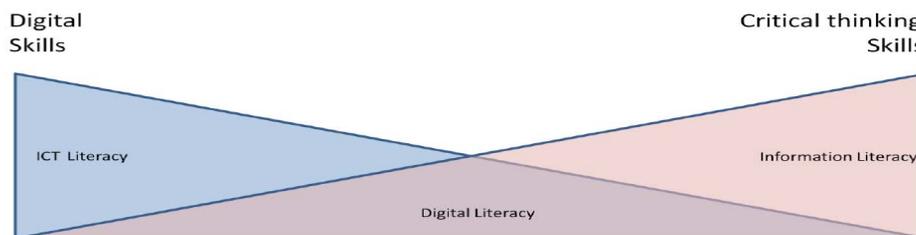


Figure 6: Digital Literacy. Source: Timmus Limited for Becta

In this diagram, critical thinking skills are seen as an attribute of information literacy. In the review, Newmann clarifies that the focus is more on thinking rather than technical skills and in fact, in the review information literacy is sometimes used as a synonym for digital literacy.

In the **ICT framework for schools in Ireland**, "thinking critically and creatively" is one of the four areas of learning foreseen by the NCCA.¹⁵ Access and evaluation of information are two important learning outcomes, which reflect approaches that we have encountered in other frameworks. The novelty of this curriculum consists of its other two learning outcomes; "express creativity and construct new knowledge and artefacts using ICT" and "explore and develop problem-solving strategies using ICT". The NCCA website proposes sample learning activities that could be used by teachers in different subjects to develop these competences, such as organising a digital storytelling project or recording a field trip using a digital camera.

Area T Thinking critically and creatively	
Students should be able to	
T1	research, access and retrieve information using ICT
T2	evaluate, organise, and synthesise information using ICT
T3	express creativity and construct new knowledge and artefacts using ICT
T4	explore and develop problem-solving strategies using ICT

Figure 7: NCCA framework - learning outcomes: Area T

A competence area which is at times linked to thinking skills and at times presented on its own is what could be called "Ethics and responsibility" and includes a safe, legal and ethical use of the Internet in particular and technologies in general. The **IC3** framework displays, as we have seen above, 3 application-oriented modules, the third one being called "Living online". After three sections related to applications (Internet, emails and communication

¹⁵ Together with "Creating, communicating and collaborating"; "Developing foundational knowledge, skills and concepts"; and "Understanding the social and personal impact of ICT".

networks), a fourth section is about "The Impact of Computing and the Internet on Society" and aims to identify: how computers are used in different areas of work, school, and home; the risks of using computer hardware and software; and how to use the Internet safely, legally, and responsibly. While in the IC3 framework, this area constitutes a small part of the syllabus, in the **eSafety Kit** this issue holds centre stage. Three of the four envisaged competences are based around ethics and responsibility, as in fact this framework, which is developed for children between the ages of 6 and 12, has the safe use of the internet as its primary scope. Competences are described as follows:

- Security: use of anti-virus, spam-filters; avoiding email and sms spam.
- Communication: online and off-line identities; behaviour in chats and instant messaging; online privacy, safe online profiles; sharing content; online and off-line networking.
- Cyberbullying: dealing with cyberbullying – emotionally and pragmatically; privacy issues and disclosure; sharing and trust; netiquette.
- Entertainment: downloading and legal issues; property rights; viruses and spam; privacy.

It can be noted that attention to the emotional aspect of dealing with cyber-bullying is a novelty of this framework. Ethics and responsibility are also accounted for in the **ICT framework for schools in Ireland**. As part of the fourth competence area ("Understanding the social and personal impact of ICT"), students should demonstrate an awareness of, and comply with, responsible and ethical use of ICT.

As we are dealing with Information and Communication Technologies, it seems obvious that several frameworks include "communication" as a competence area. However, it should be remarked that different frameworks do not necessarily concord in way they translate this competence into learning outcomes. As a matter of fact, a huge difference can be seen between application-oriented frameworks and more cognitive approaches, as shown in Figure 8.

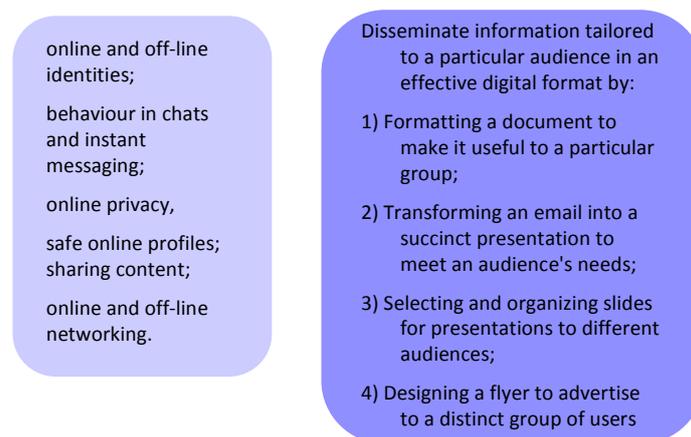


Figure 8: two different ways to translate the competence "Communicate"

The left hand side of Figure 8 deals with online and off-line identities, privacy, and behaviour. In this framework, the needs for communication in an online environment are interpreted as cognitive needs. At the same time, there is a focus on privacy and security. In addition, there is an interest in comparing the online and off-line worlds, as communicating is a competence that one develops in real as well as virtual contexts. The framework depicted on the right hand side, on the contrary, perceives "communication" as the

targeting of information to different audiences through specific software. Therefore, being able to communicate in a digital environment means, according to what is described in this framework, being able to format a document, to transform an email into a PowerPoint-like presentation, to organise slides and to design a flyer. It goes without saying that being able to communicate cannot be reduced to merely formatting a text.

5.3 Levels

Two thirds of the frameworks collected here propose a division into levels. Even among frameworks which have a certification aim, there are cases which only foresee a minimum pass mark and not proficiency levels. Among the frameworks which do not propose levels, two (i.e. UNESCO and BECTA) take into account differentiations which can be considered as proxies for levels. The **Unesco ICT framework for teachers** is built around three approaches (called in the framework "policy and visions")¹⁶ which can be seen as having increasing levels of complexity. The approaches are considered as visions that a country – or training institution – might want to endorse for education reform. The **Becta framework** proposes development steps which are divided into two categories: 1) close enquiry (learners respond to practitioner-generated questions); 2) open enquiry (learners define own questions). The amount of guidance provided by the teacher is different in these two categories. The highest stage, or the ideal learning output, is that the learners become able to evaluate their own needs and to solve problems independently.

An analysis of the levels proposed highlights three main criteria for unravelling a competence into levels: 1. age of target group; 2. width or depth of the application-related content;¹⁷ and 3. cognitive complexity.

In the first case – levels according to the age of the learner – we find those frameworks which have been developed for children. An example of this is the **ICT framework for schools in Ireland**, where different levels of competence are foreseen according to the year of study. This differentiation is typical of school curricula and is based on the assumption that cognitive development increases with age. Although we should not forget that there are different stages of maturation, and that not all children reach the same maturation stage within the same school year, we believe that different age groups have different needs. It should moreover be acknowledged that curricula have to respond to a series of criteria and obligations, and that challenging this principle when establishing levels would mean rethinking formal educational institutions, which is not what we want to argue here. At the same time, differentiating levels according to the broad age of a target group could be a criterion to be taken into account for the implementation of the DIGCOMP framework. Moreover, it should be noted that this approach considers, as a criterion for defining levels, the autonomy of the learner. Support from the teacher or peers is foreseen for the lower levels while the higher levels are expected to be more autonomous and work independently.

¹⁶ The UNESCO ICT framework for teachers identifies these three visions as the main approaches that should be endorsed by institutions. Each approach constitutes a way to understand educational reform and is linked to a series of aspects (as for instance "curriculum and assessment" or "pedagogies") which in turn develop a specific way to integrate educational innovation.

¹⁷ With this, we intend that the higher the level the more application the user is expected to know; or the higher the level the more function of an application the user is familiar with.

The second principle for defining levels is taking into account the width or depth of the application-related content. Frameworks which adopt this approach describe levels in two ways: 1. an increase in the number of applications that the learner is able to use; 2. an ability to use more commands/functions within an application. This approach to unravelling a competence is typical of application-oriented frameworks. In some cases, the highest level of competence is seen as a candidate/learner's ability to make the jump from being a user of an application or a tool to being a developer: for instance, by showing some programming abilities or being able to write/build a webpage.

The third criterion, where levels are described according to an increasing cognitive complexity, is the most widespread.¹⁸ Cognitive complexity can certainly be interpreted in many ways. For instance, there are frameworks which consider the capability of learners to evaluate their own work or to judge information reliability as a high competence level. Other frameworks see communication, information management and understanding of the media as competence areas as being at a higher level than technical, operational skills. Other frameworks see innovation as the highest point of Digital Competence proficiency. An example of the latter approach is the DigEuLit three-level model (see Figure 9). Level I includes the basic skills, competences and approaches that are considered to be the foundation for Digital Competence. Level II refers to the application of Digital Competence within specific professional or domain contexts, where Digital Competence is applied to practice. Level III is about innovation and creativity, and the ability to stimulate significant change within the professional or knowledge domain.

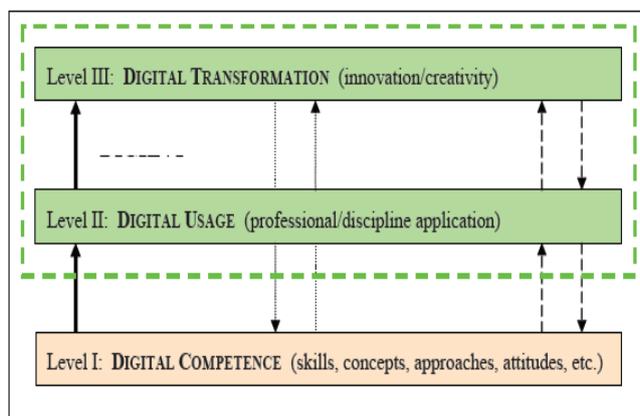


Figure 9: DigEuLit three levels

This hierarchical three step approach (know → use → create) builds on the hypothesis that knowledge is a pre-requisite for use and that transformation is the highest achievable cognitive output. In our view, it depicts a theoretical understanding of learning rather than reflecting how learning with and about technology actually takes place. When we observe how users appropriate technology, we see a different chain of events: first we all tend to use the new tool, and then we may want to learn something about it. In general terms, Digital Competence is always applied to an area or domain, be it professional or private. Therefore,

¹⁸ Even frameworks where the main difference criterion is age use cognitive complexity as a variable for the description of the level, although in this cases the assumption is that the older the child the more complex the task.

it seems somehow unrealistic to understand Digital Competence without its application to a real-life context. Moreover, we believe that innovation may take place even among groups who are not necessarily early or competent adopters. For example, the uptake of mobile phones was not forecasted by researchers to happen the way it did. The appropriation of this technology by young people in particular can be considered as innovative (Silverstone & Hirsch, 1992). However, this group of users is not necessarily endowed with high proficiency levels in other areas of Digital Competence, or might not be completely competent in the area of communication, although displaying some innovative uses.

Finally, it seems that the majority of frameworks develop a three level model: basic, intermediate and advanced. The competence areas and the levels are not disjointed, which is to say that a general advanced level of competence means an advanced level in all the areas or sub-competences described in the framework. This approach does not take into account the fact that, usually, proficiency levels vary according to content. In other terms, a learner can show very high levels of competence in one area and an intermediate level in another, for a variety of reasons (interest in the content, previous knowledge, relevance of the content for the needs of the learner, to give a few examples). In this perspective, we believe that the approach developed in the **eCompetence framework** (henceforth: eCF) provides an innovative way of unravelling levels of competence.¹⁹ The eCF is based on proficiency levels that range from 1 (the lowest) to 5 (the highest). However, none of the 36 identified eCompetences are graded into the five levels. Each competence is described in a minimum of two levels and a maximum of 4 levels. This is because level gradation was established following certain criteria, and then competences were described according to these criteria (example: moving from application – lower level – to transformation – higher level). This approach permits us to differentiate competences which are more sophisticated or which refer to a higher cognitive domain from those competences which are more basic in approach. At the same time, it suggests that different levels can be reached in different competences and also competence areas. We believe that not all citizens or learners are interested in or need to develop advanced proficiency in all domains of Digital Competence. Differentiating levels according to sub-competences would allow the implementation of a framework that fits the specific needs of a target group or learner.

In addition, it should be noted that the frameworks considered here have the general population as a target group and not ICT professionals. While there is a clear distinction between end-users and ICT professionals, and frameworks exist that cover the competence needs of this target group (such as the above-mentioned eCF), we wish to highlight the fact that in the near future this distinction may not be as clear-cut as it has been. Gillen and Barton (2010) describe the current blurring of engineering and usage which is taking place as consumers of technology start to create applications and develop open software. As this blurring of roles is already taking place, we believe that engineering or professional competences should be part of, or be taken into account in, "end-user" frameworks. Moreover, technologies are currently used in a variety of ways and for a variety of purposes. As a consequence, it might not necessarily be true that ICT specialists have the highest competence or skill in a specific area of Digital Competence. For instance, professionals are

¹⁹ Although the eCompetence framework is not one of the cases analysed in this report, the framework has been considered for its structure and for the methodology of its development.

not necessarily up-to-date with the continuous changes of legal aspects or copyright regulations, or might not be the most critical readers when it comes to information retrieval.

6 Conclusions

This report collects and analyses 15 frameworks that develop Digital Competence. These frameworks vary in scope (from school curricula to certification schemes to academic papers) and target groups (adults, children, the young, the elderly). The analysis carried out in this report identified three areas to be reported upon: a definition of Digital Competence, the identification of competence areas and a discussion on the levels.

According to the different understandings of Digital Competences in the cases studied here, we propose the following **definition** of Digital Competence:

Digital Competence is the set of knowledge, skills, attitudes (thus including abilities, strategies, values and awareness) that are required when using ICT and digital media to perform tasks; solve problems; communicate; manage information; collaborate; create and share content; and build knowledge effectively, efficiently, appropriately, critically, creatively, autonomously, flexibly, ethically, reflectively for work, leisure, participation, learning, socialising, consuming, and empowerment.

This definition is encompassing and should be considered for the development and implementation of Digital Competence frameworks. It highlights that Digital Competence is built on different learning domains (knowledge, attitudes and skills) and spreads across several competence areas.

Several of the frameworks selected for this analysis suggest that technical skills constitute a central component of Digital Competence. In our opinion, having technical skills at the core of a Digital Competence model does not give enough importance to other equally relevant aspects. Digital Competence should be understood, in its wider sense, as a multi-faceted concept. Figure 10 summarises the competence areas that emerged from the 15 frameworks presented in this report. Each component has been taken from more than one framework. We wish to suggest that technical operations should be considered like any other component of the framework.



Figure 10: Components of Digital Competence

The above listed areas are currently taken into account in the majority of the frameworks that have been collected here, although at times they constitute a minor focus. It has to be

acknowledged that, although the intention was to simplify the different proposals of the frameworks into a simple list of main elements, some of the foreseen items still overlap with other categories. All areas are here explained taking current examples from the analysed frameworks. **Information management** refers to the knowledge, skills and attitudes (henceforth: KAS) needed to identify, locate, access, retrieve, store and organise information. **Collaboration** refers to the KAS for linking with other users, participate in networks and online communities, and interact with others constructively and with a sense of responsibility. **Communication** refers to the KAS for communicating through online tools, taking into account privacy, safety and netiquette. **Creation of content and knowledge** refers to the expression of creativity and the construction of new knowledge through technology and media, and also to the integration and re-elaboration of previous knowledge and content and its dissemination through online means. **Ethics and responsibility** is understood as the knowledge, attitudes and skills needed to behave in an ethical and responsible way, aware of legal frames. **Evaluation and Problem-solving** is understood in more than one case study as the identification of the right technology and or media to solve the identified problem or to complete a task and also as the assessment of information retrieved or the media product consulted. Finally, **technical operation** is the area that refers to the KAS one needs for effective, efficient, safe and correct use of technology and media. It should be noted that some of the analysed frameworks are not internally consistent, which is to say that they define Digital Competence in one way and then describe it differently in terms of practice. For instance, the competence areas that are listed in the definition do not necessarily coincide with the description of competences in the framework. In developing the above descriptors, we have sought to be consistent with the definition proposed earlier on in the report.

The above competence areas refer to knowledge, attitudes and skills. In particular, we would like to highlight that attitudes should be taken into account in the development of a Digital Competence framework. The attitudes that are listed in the definition should be considered, namely: effectively, efficiently, appropriately, critically, creatively, autonomously, flexibly, ethically, reflectively; together with awareness. However, not all attitudes are necessarily relevant for all competence areas: therefore, attitudes should be selected according to the needs of the specific competence area.

Regarding levels, it was noted that the analysed frameworks develop levels according to three criteria: age of learners; width or depth of the application-related content; cognitive complexity. We suggest that all three criteria should be considered when developing levels for the DIGCOMP framework. At the same time, we believe that levels should not be cross-cutting the competence areas, but should be differentiated. This is to say that levels might vary between competence areas and that any learner should be allowed and encouraged to work at different levels according to each competence area.

The outcome of this report will contribute to and be further developed in the upcoming phases of the IPTS DIGCOMP project. The reader is encouraged to follow the progress and results of the project at the project website:

<http://is.jrc.ec.europa.eu/pages/EAP/DIGCOMP.html>

7 Annex: Case studies fact sheets

This annex provides information on the frameworks that have been considered as case studies for this report. Frameworks are presented in an alphabetic order. For each case study, a fact sheet outlines the main features of the framework or initiative, according to a common grid (explained in Chapter 3).

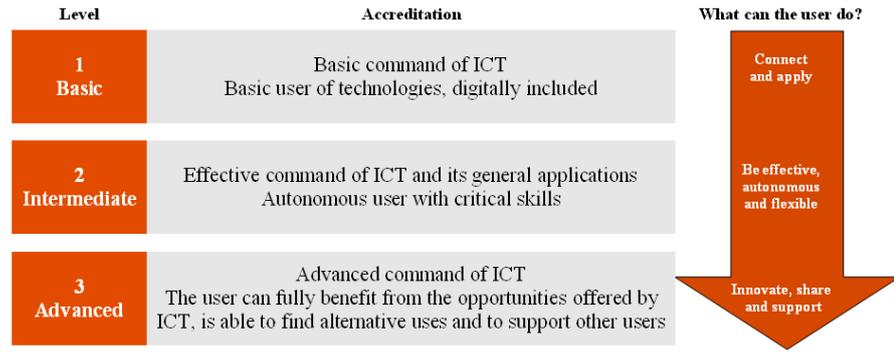
The information reported here for each framework has been collected from publicly available documents, websites, or academic literature. This information has been accounted in the most possible neutral way. A maximum of three pages per fact sheet was foreseen. For synthesis reasons, it has not always been possible to report fully on the different dimensions of the competences developed in each framework. The reader is referred to the specific webpage for a more exhaustive understanding of the syllabi or of the framework.

Factsheets have been submitted to case owners for validation and have been revised according to case owners' feedback. Feedback has been given by 2/3 of case owners.

Name	ACTIC
Institution	Generalitat de Catalunya (Government of Catalonia, Spain)
Brief outline	ACTIC stands for "acreditación de competencias en tecnologías de la información y la comunicación" (Certification of ICT competences). This initiative is being carried out in Catalonia and is targeted at all citizens above the age of 16. Digital literacy is considered to be the safe and critical use of Information Society Technologies for work, leisure and communication. The aim is to provide a certificate of digital competence that is recognised by businesses and administrations. It is based on a three-level model. ACTIC evaluates the digital competence of individuals and not their ability to use a specific tool or application. It includes essential knowledge about the Information society, digital culture and good digital practices. It considers ICT not only as technologies but also as mediums for communications and information. It regards Digital Competences (DC) as the basis for lifelong Learning.
Webpage	Information available in Spanish and Catalan: http://www20.gencat.cat/portal/site/actic/menuitem.74f23dec65fff202f055c310b0c0e1a0/?vgnextoid=0dafd65ab5d3e110VgnVCM1000000b0c1e0aRCRD&vgnnextchannel=0dafd65ab5d3e110VgnVCM1000000b0c1e0aRCRD&newLang=es_ES
Type of initiative	Applied digital literacy initiative for certification of DC.
Objective of the case	The aim of the initiative is to promote digital competence among citizens to contribute to an inclusive, dynamic and competitive knowledge society. The objectives are, among others: to improve the use of ICT by citizens; to improve the quality of ICT training and adult education; to standardise the reference level of DC for employment; to increment digital cohesion.
Context	Funded by the Government of Catalonia, Spain.
Literacy focus and approaches	Digital competence (including information literacy).
Vision	From the website, Digital Competence is understood as the combination of knowledge, attitudes and skills in the domain of ICT that people develop in real situations to achieve concrete objectives in an effective and efficient way. Within this frame, digital competence is foreseen as a basic competence for all and applies to the professional, personal and social domains. Digital competence is therefore defined as encompassing the critical and safe use of the technologies of the knowledge society for work, leisure and communication. It involves the confident use of computers and other digital tools to obtain, evaluate, store, produce, present and exchange information, as to communicate and participate in communities and networks on the Internet.

Target Group	All citizens over 16
Material	As ACTIC is an accreditation system, it promotes through local centres the teaching and training of citizens on digital literacy. The ACTIC webpage provides information on courses of digital literacy and on local centres that collaborate with ACTIC. The website also offers links to online material and courses for the development of digital competence.
Methods	For the implementation
Duration	Ongoing, from 2009.
Implementation level	Yes, further education and lifelong learning.
Width of implementation	Regional: Catalonia, Spain
Competence Components	<p>The accreditation framework is built around 8 competences (from C1 to C8):</p> <p>C1: Digital Culture and Participation and civic web;</p> <p>C2: Digital technology, use of computer and of the operating system;</p> <p>C3: Surfing and Communicating in the digital world;</p> <p>C4: Dealing with written information</p> <p>C5: Dealing with non-written information (audio; video; and graphic);</p> <p>C6: Dealing with numeric information;</p> <p>C7: Dealing with data;</p> <p>C8: Presentation of contents.</p>
Levels	The model is composed of 3 levels: Level 1 – Basic Certificate; Level 2 – Intermediate certificate; Level 3 – advanced certificate. Indicators are defined for every of the 8 competences described above, for all levels according to the following criteria: Level 1 consists of 6 competences (C1 to C6); Level 2 is the reference level and includes all 8 competences; level 3 requires level 2 and involves the accreditation of at least two competences that have to be chosen by the candidate among the following: C4, C5; C6; C7; and C8.
Assessment of competences	<p>Competences are assessed through an automated test, with a given maximum time to answer, consisting in a series of tasks with higher levels of complexity according to the level.</p> <p>Details of the content of the tests are described here: http://www20.gencat.cat/docs/actic/01%20Informacio/Documents/Arxius/AnnexII_c.pdf</p>

Diagram



Source: ACTIC (IPTS translation from Catalan)

Name	Becta: a review of Digital Literacy in 0-16 year olds
Author	Tabetha Newman (Timmus Limited)
Brief outline	A model for teachers and learners of primary and secondary schools. It is based on the understanding that digital literacy is composed of digital skills and critical thinking skills. It is supported by a review of the literature of digital literacy for 0-16 year olds.
Webpage	As Becta, the founder of this project, was closed in 2011, there is no official website storing the review and the material. However, the resource package for teachers and learners is available from http://www.timmuslimited.co.uk/archives/117 and the review can be requested (http://www.timmuslimited.co.uk/)
Reference	Newman, T. (2008). <i>A review of digital literacy in 0 – 16 year olds: evidence, developmental models, and recommendations</i> . London: Becta.
Type of initiative	A research initiative founded by Becta
Objective of the case	The general aim of the study is to "increase the number of learners with the skills and abilities to access and make effective, safe, discriminating use of technologies for learning". The more specific aims is to gather evidence and models in order to constitute a framework for digital literacy for 0-16 year olds that could be used by partners and practitioners.
Context	Funded by BECTA and developed by Timmus limited (Tabetha Newman)
Literacy focus and approaches	Digital literacy skills, with a great focus in information literacy and online safety.
Vision	From the resource pack for teachers, digital literacy is defined as "a combination of functional ICT skills, critical thinking, collaboration skills and social awareness." Digital literacy is seen as the intersection of ICT literacy and Information Literacy. Digital skills characterise ICT literacy and Critical thinking skills exemplify Information literacy. Media literacy is seen as being sometimes used with the same meaning of digital literacy.
Target Group	Learners (0-16 years old) and teachers of these age groups. The material is in particular address to teachers to support them in embedding digital literacy development in their lessons, regardless of their subject area.
Material	The material available from this project consists in a review (three documents) and a Package for teachers and learners. The package includes: a resource pack introduction; a PowerPoint presentation for teachers and older learners; a brief explanation of the framework; a starter document with explanation for teachers; a document with a

Methods	<p>self assessment grid and three activities for primary school pupils (Key Stage 2)</p> <p>The rationale frames digital literacy as follows (source: Resource pack): "Part of digital literacy relates to the functional skills of knowing about and using digital technology, from PowerPoint presentations, simulation software and weblogs, to Internet search engines and digital cameras. Digital literacy also refers to the ability to be analytical and evaluative about digital information, and to be aware of how to act sensibly, safely and appropriately online. Digital literacy also involves knowing when not to rely on digital technology, for example it is often useful to validate information in printed publications (that have been subject to peer review and/or publisher scrutiny)." By raising teachers' awareness on the meaning and implication of digital literacy, activities are proposed to foster the knowledge and skills that have been identified within the framework.</p>
Tools	<p>A review of Digital Literacy (divided in three documents, available upon request) and a resource pack for teachers and learners (available from http://www.timmuslimited.co.uk/archives/117)</p>
Duration	<p>The review came out in 2008. As the project was done on behalf of Becta, which has closed in 2011, the material is now only available through Timmus Limited.</p>
Competence Components	<p>Five critical steps have been identified, based on the Ofcom framework and taking into account the literature on information literacy, media literacy and digital literacy: define; access, understand& evaluate; create; and communicate. The developmental model comprises key questions for these five-step processes for digital skills and critical thinking skills, arguing that those two are the components of digital literacy.</p>
Levels	<p>Instead of detailed level of digital competence, the model proposes developments steps which are divided into two categories: 1) closed enquiry (Learner responds to practitioner-generated question); and 2) Open enquiry (Learner defines own question). Both categories comprise different levels of guidance from the teacher.</p>
Assessment of competences	<p>The model proposes a series of questions that can be used for self-assessment. The resource package provides a grid for self-assessment of KS2 pupils (aged 8-11).</p>
Further information	<p>The review warns against the equation of exposure with competence: educators should not assume that the generally intensive use of technologies by young people enhances their digital competence.</p>

Diagram

		Choose the best teaching style for the task		
		Directing	Guiding	Facilitating
	Define the task and proposed solution			
	Find information			
	Evaluate information to match audience/aims			
	Create your solution			
	Communicate your methods and findings			

You can fill in the empty cells as a summary of what you plan to do at each stage.

Alternatively give this table to students, and ask them to use it to review their progress.



The diagrams above illustrate the framework and the grid for self-assessment or teacher planning. The version of the framework is the one that is provided for teachers.

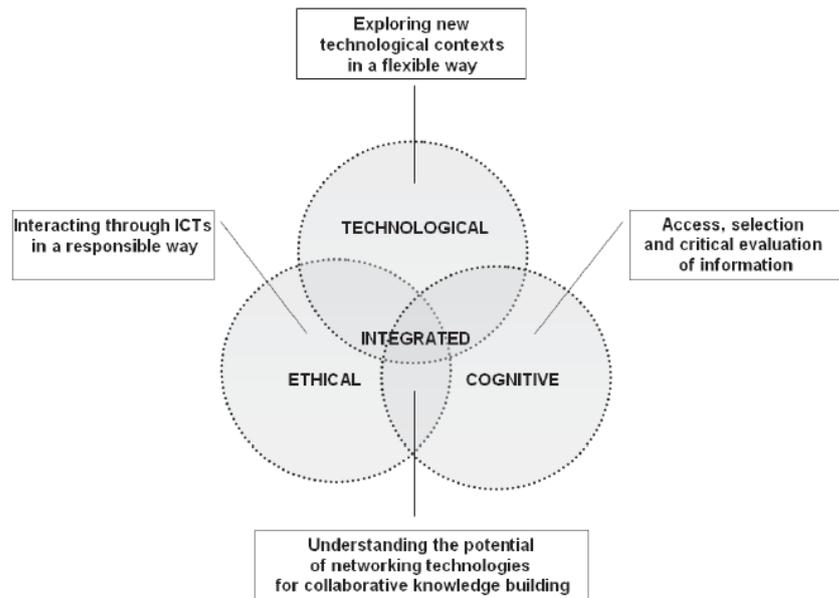
Source: Timmus Limited Digital Literacy Resource Pack.

Name	CML
Institution/provider/author	Center for Media Literacy
Brief outline	The CML (Center for Media Literacy) provides the MediaLit Kit and establishes a basic framework featuring five "Core Concepts" and five "Key Questions" of media literacy. The framework aims to enable learners to deconstruct, construct and participate with media. It is seen as a reference for teachers, media librarians, curriculum developers, and researchers. The five core concepts read as follows: 1. All Media messages are constructed; 2. Media messages are constructed using a creative language with its own rules; 3. Different people experience the same media message differently; 4. Media have embedded values and points of view; 5. Most media messages are organized to gain profit and/or power.
Webpage	http://www.medialit.org/cml-framework
Reference	A series of position papers, articles and report can be downloaded at http://www.medialit.org/reading-room
Type of initiative	Supporting material for the development of Media literacy
Objective of the case	The Center for Media Literacy (CML) is dedicated to a new vision of literacy for the 21st Century: the ability to communicate competently in all media forms as well as to access, understand, analyze, evaluate and participate with powerful images, words and sounds that make up our contemporary mass media culture. Their mission is to help children and adults prepare for living and learning in a global media culture by translating media literacy research and theory into practical information, training and educational tools for teachers and youth leaders, parents and caregivers of children.
Context	Founded in 1989, it is an association based in the USA. It is an independent for-profit organization that is self-sustaining
Literacy focus	Media literacy and 21 st Century skills
Vision	Media Literacy is a 21st century approach to education. It provides a framework to access, analyze, evaluate, create and participate with messages in a variety of forms — from print to video to the Internet. Media literacy builds an understanding of the role of media in society as well as essential skills of inquiry and self-expression necessary for citizens of a democracy.
Target Group	Children and adults
Structure of the case study	The framework is built around five core concepts and two sets of five key questions (for consumers - to enhance ability to deconstruct the media and for producer – to construct and produce media messages).
Material	The website provides a wealth of downloadable material: books, newsletters, presentations, lesson plans, papers. Curriculum resources and lesson plans are available to subscribers only.

Methods	The focus is on the development of 21 st century skills or transversal competences.
Duration	ongoing
Implementation level	Implemented
Width of implementation	International, but mainly adopted in the United States
Competence Components	<p>In the CML MediaLit Kit™, the Five Key Questions flow directly from Five Core Concepts that media literacy practitioners around the world have evolved to explore five analytical aspects of a media message. These Keywords create a brief outline of the analytical construct behind the concepts and questions:</p> <ol style="list-style-type: none"> 1. Author ('constructedness') 2. Format (and techniques of production) 3. Audience 4. Content (or message) 5. Motive (or purpose) <p>The five key questions for consumers reads as follows:</p> <ol style="list-style-type: none"> 1. Who created this message? 2. What techniques are used to attract my attention? 3. How might different people understand this message differently from me? 4. What lifestyles, values and points of view are represented in, or omitted from, this message? 5. Why was this message sent? <p>The five key questions for producers reads as follows:</p> <ol style="list-style-type: none"> 1. What am I authoring? 2. Does my message reflect understanding in format, creativity and technology? 3. Is my message engaging and compelling for my audience? 4. Have I clearly and consistently framed values, lifestyles and points of view in my content? 5. Have I communicated my purpose effectively? <p>The five core concepts are thus related to the above questions:</p> <ol style="list-style-type: none"> 1. All media messages are 'constructed.' 2. Media messages are constructed using a creative language with its own rules. 3. Different people experience the same media message differently. 4. Media have embedded values and points of view. 5. Most media messages are organized to gain profit and/or power. <p>For every step, the MediaKit available with the framework provides a series of tips and related questions in order to help teachers and educators develop each area of the framework.</p>
Levels	Levels are not foreseen
Assessment of competences	Tips and suggestions are provided for assessing media literacy. Sample assessments have been developed and used by CML and are available for subscribers. They consist of diagnostic assessment tools, summative assessment and self-assessment by the learner.

Name	DCA
Institution	Project lead by Antonio Calvani (University of Florence)
Brief outline	The DCA (Digital Competence Assessment) framework is part of a wider project on "Internet and Schools: Problems of Accessibility, Equality Policies, and Information Management". The framework proposes a definition and conceptualisation of Digital Competence which is linked to a series of tests, generally aimed at secondary school students (15-16 years old).
Webpage	Information on the project can be found at: http://www.digitalcompetence.org/
References	<ul style="list-style-type: none"> • Calvani, A., Cartelli, A., Fini, A., & Ranieri, M. (2009). Models and instruments for assessing digital competence at school. <i>Journal of e-Learning and Knowledge Society</i>, 4(3) • Calvani, A., Fini, A., Ranieri, M. & Picci, P. (2011). Are young generations in secondary school digitally competent? A study on Italian teenagers. <i>Computer and Education</i>. DOI information: 10.1016/j.compedu.2011.10.004. • Calvani, A., Fini, A., & Ranieri, M. (2010). <i>Digital Competence in K-12. Theoretical models, Assessment tools and Empirical research. Analisi</i>, 40, 85-99. • Li, Y., & Ranieri, M. (2010). Are «Digital Natives» really digitally Competent? A Study on Chinese Teenagers. <i>British Journal of Educational Technology</i>, 41(6), 1029-1042. • Calvani, A., Fini, A. & Ranieri, M. (2009), <i>Assessing Digital Competence in Secondary Education. Issues, Models and Instruments</i>, in M. Leaning (Ed.), <i>Issues in Information and Media Literacy: Education, Practice and Pedagogy</i>, Santa Rosa, California: Informing Science Press, 153-172. • In Italian: • Calvani, A., Fini, A., & Ranieri, M. (2011). <i>Valutare la competenza digitale</i>. Trento: Erickson. • Calvani, A., Fini, A., & Ranieri, M. (2010). <i>La competenza digitale nella scuola. Modelli e strumenti per valutarla e svilupparla</i>. Trento: Erickson.
Type of initiative	Academic project.
Objective of the case	The objectives of the project have been summarised as follows by the research team: <ul style="list-style-type: none"> - reviewing national and international literature concerning problems in accessing ICTs from a social, cultural, cognitive and educational point of view, and on the emerging concept of digital competence; - producing and testing digital competence assessment tools and experimental instruments to evaluate attitudes of students and teachers towards technologies.
Context	Within a wider project funded by MIUR (Italian Ministry of Education).

Literacy focus and approaches	Digital literacy (as multiple literacies)
Vision	Digital competence consists in being able to explore and face new technological situations in a flexible way, to analyze, select and critically evaluate data and information, to exploit technological potentials in order to represent and solve problems and build shared and collaborative knowledge, while fostering awareness of one's own personal responsibilities and the respect of reciprocal rights/obligations.
Target Group	High-school learners (15-16 years old), schools interested in testing their students.
Structure of the case study	The tests were originally developed for high school students aged 15-16. Now tests are available for lower secondary school learners and primary school pupils.
Material	Free tests are available for downloading (for primary and lower secondary) or to be used as an online tool (for upper secondary) through the project website: http://www.digitalcompetence.org/moodle/mod/resource/view.php?id=54
Tools	Online and offline assessment (tests in Italian); papers to define digital competence, website to present the project (in Italian and English), links to other DC frameworks.
Duration	Started in 2006 and still running.
Implementation level	Tests can be implemented upon registration through the webpage.
Width of implementation	Mainly national - Italy (for those who wish to take part to the testing). The test was also used with a sample of students in China.
Competence Components	The DC model envisages "the co-existence of dimensions characterised both on the technological, cognitive and ethical levels, and also their integration: <u>technological dimension</u> : being able to explore and face problems and new technological contexts in a flexible way; <u>cognitive dimension</u> : being able to read, select, interpret and evaluate data and information taking into account their pertinence and reliability; <u>ethical dimension</u> : being able to interact with other individuals constructively and with sense of responsibility using available technologies; <u>integration between the three dimensions</u> : understanding the potential offered by technologies which enable individuals to share information and collaboratively build new knowledge." (Calvani, Cartelli, Fini, & Ranieri, 2009).



Source: Calvani et al. (2009)

The technological dimension includes the ability to solve problems when the digital tool/application they are using does not work; the knowledge and ability needed to recognise and use icons and interfaces; the awareness and knowledge related to the digital world as opposed to the real world and the human-computer interaction. The cognitive dimension includes tasks on linguistic and numeric competences applied to the digital word (including graphic representations, for instance); tasks to gauge their information literacy and communication skills. The ethical dimension is concerned with issues related to Internet privacy and security, and to risks awareness, property rights, internet exposure and cyber-bullying; digital divide. The integration between dimensions concerns the competences needed for collaborative work.

Assessment of competences

The assessment of competences is the main aim of the project. Tests are available upon registration and consists in a series of questionnaires or short scenario tests (*Instant Digital Competence Assessment iDCA*), and *authentic tasks (real life problem solving)* elaborated for three school types: primary (pdf only); lower secondary (pdf only); and upper secondary (online version). Tests measure the technological, cognitive, ethical and integrated dimensions outlined above. The authentic tasks include:

Technological Exploration: students have to deal with an unknown technological interface and learn how to use and master it.

Simulation: data must be empirically processed and hypotheses on possible relationships have to be formulated.

Inquiry; relevant information pertaining to a predefined subject must be critically selected and gathered.

Collaboration: students have to draft a document together following criteria of collaborative activity management.

Participation: this involves the subject's awareness of the risks and duties related to communication on the Net and participation in social networks.

Name	DigEuLit
Author	Allan Martin, from the University of Glasgow, was the principal investigator in the project. Partners organisations included: Scotland: Reid Kerr College, Paisley; West Lothian College, Livingston. Denmark: ACU, Aabenraa; Center for Fleksibel Voksenuddannelse, Aabenraa; Sønderborg Handelsskole; CVU, Sønderborg. Finland: Kainuun Ammattiopisto, Kajaani. Poland: Technical University of Lodz. France: CNRS, Lyon. Norway: ITU, Oslo.
Brief outline	A 2005-2006 project found by the EC eLearning initiative and lead by the University of Glasgow with the aim to develop a general framework for Digital Competence. The main output of the project is a series of publications reporting a conceptual framework for the development of Digital literacy, which is seen as the convergence of several literacies. The authors highlight the need to move the discussion on Digital Competence from listing skills towards the contribution of digital tools in the growth of the individual in society.
Webpage	The webpage is no longer available.
Reference	Several articles and reports emerged from this study, examples include: Martin, A., & Grudziecki, J. (2006). DigEuLit: Concepts and Tools for Digital Literacy Development. <i>ITALICS: Innovations in Teaching and Learning in Information and Computer Sciences</i> , 5(4), 246-264, Rosado, E., & Bélisle, C. (2006). <i>Analysing Digital Literacy Frameworks. A European Framework for Digital Literacy</i> . LIRE, Université Lyon, Lyon, http://lire.ish-lyon.cnrs.fr/IMG/pdf/Analysing-Edu-Frameworks.pdf .
Type of initiative	International European framework for education.
Objective of the case	The goal of DigEuLit is to develop a European Framework for Digital Literacy (EFDL): a definition, generic structure, and set of tools which will enable educators, trainers and learners to share an understanding of what constitutes digital literacy and how it can be mapped into European educational practice.
Context	eLearning Programme of the European Commission (LLL).
Literacy focus and approaches	Digital Literacy. Here it is conceived as a convergence of different literacies, including elements of ICT literacy, Information Literacy, Media Literacy and Visual Literacy.
Vision	"Digital Literacy is the awareness, attitude and ability of individuals to appropriately use digital tools and facilities to identify, access, manage, integrate, evaluate, analyze and synthesize digital resources, construct new knowledge, create media expressions, and communicate with others, in the context of specific life situations, in order to enable constructive social action; and to reflect upon this process" in Martin, A., & Grudziecki, J. (2006). DigEuLit: Concepts and

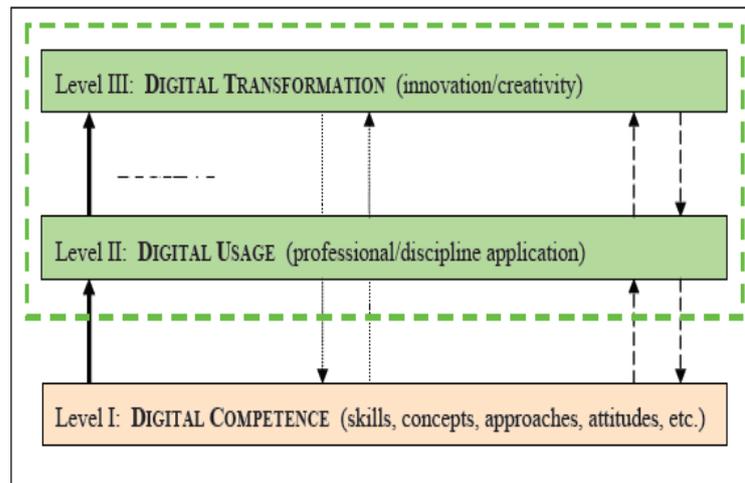
Target Group	Tools for Digital Literacy Development. ITALICS: Innovations in Teaching and Learning in Information and Computer Sciences, 5(4), 246-264. European citizens, course providers, policy-makers, curricula developers.
Structure of the case study	The project was divided into 4 phases: 1) Identification of concepts related to DL; 2) Analysis of existing frameworks of DL; 3) Construction of a framework for DL; 4) Dissemination and revision of the framework.
Tools	The project had foreseen 4 online tools (currently not available or not visible): 1) The Digital Competence Content Reservoir, indicating the range of digital competence elements; 2) The Digital Literacy Provision Profile, enabling mapping of the provision in order for the individual to acquire the appropriate digital competences; 3) The Digital Competence Needs Analysis which enables the assessment of student progress in the digital competence elements identified in the Requirement Profile; 4) The Digital Literacy Development Profile enables each student to map their acquisition of Digital Competence through a learning log (to record achievements), an ePortfolio (to collect evidence of progress), and a personal development file (to plan the learning trajectory).
Duration	2005-2006
Implementation level	The framework seems not to have been implemented.
Competence Components	Main competences (Level 1 of the model) are developed around 13 processes identified by the European Commission working group and are summarised as follows: <u>statement</u> (to state clearly the problem to be solved or task to be achieved and the actions likely to be required); <u>identification</u> (to identify the digital resources required to solve a problem or achieve successful completion of a task); <u>accession</u> (to locate and obtain the required digital resources); <u>evaluation</u> (to assess the objectivity, accuracy and reliability of digital resources and their relevance to the problem or task); <u>interpretation</u> (to understand the meaning conveyed by a digital resource); <u>organisation</u> (to organise and set out digital resources in a way that will enable the solution of the problem or successful achievement of the task); <u>integration</u> (to bring digital resources together in combinations relevant to the problem or task); <u>analysis</u> (to examine digital resources using concepts and models which will enable solution of the problem or successful achievement of the task); <u>synthesis</u> (to recombine digital resources in new ways which will enable solution of the problem or successful achievement of the task); <u>creation</u> (to create new knowledge objects, units of information, media products or other digital outputs which will contribute to task achievement or problem solution); <u>communication</u> (to interact with

relevant others whilst dealing with the problem or task); dissemination (to present the solutions or outputs to relevant others); reflection (to consider the success of the problem-solving or task-achievement process, and to reflect upon one's own development as a digitally literate person).

Levels

Three level model: level 1- Digital Competence (General skills and attitudes organised around thirteen processes, the components may be mastered at different levels of expertise, varying from basic skills to more analytical competence); Level 2: Digital usage (The application of DIGITAL COMPETENCE within specific professional or domain contexts); Level 3: Digital Transformation (Achieved when digital usage enables innovation and creativity and stimulates significant change at individual or organisational level)

Diagram



The diagram above illustrates the three level model proposed by the DigEuLit project. Source: Martin & Grudziecki (2006)

Name	ECDL
Institution	ECDL Foundation is the certifying authority of the leading international computer skills certification programme ECDL (European Computer Driving Licence), known as ICDL (International Computer Driving Licence) outside of Europe.
Brief outline	ECDL Foundation is a not-for-profit organisation supported in the delivery of its certification programmes by a global network of national operators. ECDL Foundation offers a range of certification programmes. These range from entry-level for beginners to advanced level to professional programmes. The most widespread programme (ECDL/ICDL) involves taking a combination of modules to develop the skills and knowledge necessary to use applications such as word processing, database, spreadsheets, presentation, image editing and web editing.
Webpage	http://www.ecdl.org/programmes/index.jsp
Reference	A series of position papers can be found at : http://www.ecdl.org/index.jsp?p=94&n=2417 Papers deal with: ICT infrastructure, promoting skills development; IT security, promoting a digitally literate Europe among others.
Type of initiative	Certification initiative, supporting the promotion of digital skills.
Objective of the case	ECDL Foundation's mission is to enable proficient use of Information and Communication Technology (ICT) that empowers individuals, organisations and society, through the development, promotion, and delivery of quality certification programmes throughout the world. ECDL Foundation's values are: - Social Responsibility: as a not-for-profit organisation, ECDL Foundation is committed to improving digital skills proficiency within society. ECDL Foundation certification programmes are designed to be accessible to all citizens, irrespective of age, gender, status, ability or race. - Vendor Independence: ECDL Foundation certification programmes give candidates the flexibility and freedom to acquire digital skills and confidently apply them in any software environment that they may be required to use. - Quality: ECDL Foundation strives for continuous improvements in all that they do and ensure that our programmes are implemented to consistent standards internationally.
Context	A not-for-profit organisation.
Literacy focus and approaches	Digital literacy, computer skills.
Vision	"Digital literacy is often viewed as consisting of the set of enabling skills that are required to efficiently use commonly available technology,

Target Group	<p>including computers." From the ECDL position paper " Building a Digitally Literate Europe through Education"</p> <p>http://www.ecdl.org/media/ECDL%20Position%20Paper%20-%20Building%20Dig.%20Literate%20Europe%20Through%20Educ_2010.pdf</p>
Structure of the case study	<p>All citizens, as the ability to use a computer effectively is an essential life skill.</p> <p>ECDL Foundation's certification programmes are made up of modules that set the standard for computer proficiency. There are two introductory modules (EqualSkills and e-Citizen); 13 modules to be chosen from for the ECDL programme and an Advanced programme containing four modules. ECDL Foundational also offers professional programmes for ICT practitioners (not reported here). ECDL Foundation's range of certification programmes enable the end-user to develop and certify their ICT skills in a progressional manner - from introductory to advanced – depending on the end-user's needs.</p>
Material	<p>A syllabus of defined learning objectives for each module, and certification tests to determine attainment of the standard set out in the syllabus. Candidate learning is supported by materials, including training manuals and e-learning programmes created by third-parties, but approved by ECDL Foundation and/or the national operator.</p>
Duration	<p>From 1995 to present, ongoing.</p>
Implementation level	<p>Yes, adult citizens, students.</p>
Width of implementation	<p>Worldwide (148 countries), programmes are delivered in 41 languages.</p>
Size of the initiative	<p>Certification programmes to over 11 million people.</p>
Levels	<p>Programmes are catering for different levels. From lower to higher level:</p> <p>1- <u>Introductory</u>: this foundation level offers two modules: Equalskills and e-Citizens. EqualSkills is an introduction to computers, emails, and the Internet developed for complete novices. e-Citizen is focused on Internet skills and explains how to use the Internet effectively to communicate with individuals and groups, retrieve information, and access products and services.</p> <p>2- <u>ECDL/ICDL</u>: this core certification programme consists of 13 modules. To obtain a digital literacy level (understood as a solid base of skills and knowledge), the foundation recommends taking 4 modules out of 13. To obtain a Digital Competence level (a recommended level of ICT competence), a minimum of 7 modules is required.</p> <p>3- <u>ECDL / ICDL Advanced</u>: these high-level certification programmes are made up of modules for those who have successfully reached ECDL / ICDL skills levels and wish to further enhance their expertise in any one, or all, of four commonly-used computer application types: word processing, spreadsheets, databases, and presentations.</p> <p>ECDL Foundation offers two professional level certifications, the European Certification of Informatics Professionals (EUCIP) & Certified Training</p>

Competence Components	Professional (CTP). ²⁰ Competence components depend on the chosen programme. For the ECDL/ICDL level (see above), 13 modules are foreseen, covering the following areas: <ol style="list-style-type: none"> 1. Concepts of ICT 2. Using the Computer and Managing Files 3. Word Processing 4. Spreadsheets 5. Using Databases 6. Presentation 7. Web Browsing and Communication 8. 2D Computer Aided Design 9. Image Editing 10. Web Editing 11. Health Information System Usage 12. IT Security 13. Project Planning
Assessment of competences	As this is a certification programme, its aim is to assess competences through a proctored test and provide a certificate. Following appropriate preparation, the candidate sits a test in each module at the approved test centre. Upon completion of the appropriate number of modules, the approved test centre informs the national operator and the certificate is awarded to the candidate. The certificate lists the modules and/or programmes completed by the holder. The certification process is supported by a standardised set of global Quality Assurance Standards.

²⁰ These two programmes will not be taken into account in our competences analysis as the target group – professional- is beyond the scope of the DIGCOMP project.

Name	eLSe Academy - eLearning for senior citizens
Institution/provider	Consortium: ILI - Institute for Innovation and Learning (FIM-NewLearning) University of Erlangen - Nürnberg, Germany; Bundesarbeitsgemeinschaft der Senioren-Organisationen, Germany; EDUCALINE S.L, Spain; imaginary, Italy; The University of the Third Age, UK; The University of the Third Age, Sweden; Kauno technologijos universitetas, Lithuania; Université Nancy2 – VIDEOSCOPE, France;
Brief outline	<p>The eLSe-Academy - eLearning for Seniors Academy - focuses on increasing the social participation, empowerment and inclusion of European seniors in the knowledge and information society with a special focus on reducing the isolation of vulnerable seniors. eLSe aims at developing and testing an eLearning environment specifically devoted and pedagogically adapted to the needs of older learners who have no or almost no experience using computers or who already have some basic experience but are not fully ICT competent enabling them to make use of virtual information, communication and eLearning opportunities in an autonomous and self-directed way. The target group are European senior citizens interested and able to acquire and further develop competences in ICT and other subjects, with special emphasis on those who are geographically or through domestic circumstances 'isolated'.</p> <p>eLSe-Academy focuses offering a two-year, non-formal, flexible and accessible eLearning-based ICT qualification course that is coherent, tailored, and pedagogically adapted to the needs of elderly learners will be developed, tested, and evaluated.</p>
Webpage	http://www.arzinai.lt/else/
Reference	<p>Technical concept: http://www.arzinai.lt/else/index.php?option=com_docman&task=doc_download&gid=10&Itemid=28&lang=en</p> <p>Pedagogical concept: http://www.arzinai.lt/else/index.php?option=com_docman&task=doc_download&gid=9&Itemid=28&lang=en</p> <p>Final evaluation report: http://www.arzinai.lt/else/index.php?option=com_docman&task=doc_download&gid=8&Itemid=28&lang=en</p> <p>Final Report: http://www.arzinai.lt/else/index.php?option=com_docman&task=doc_download&gid=1&Itemid=28&lang=en</p> <p>Link to course content: http://www.arzinai.lt/else/index.php?option=com_content&view=article&id=9&Itemid=11&lang=en</p>
Type of initiative	Digital inclusion for elderly citizens.
Objective of the case	The primary goal is to develop and establish a European eLearning academy for seniors - the eLSe-Academy - in six European countries.
Context	eLSe is co-funded by the Grundtvig -Life long learning programme, DG

	Education and Culture (DG EAC)
Literacy focus and approaches	ICT literacy
Vision	Enable older people to make use of virtual information, communication and eLearning opportunities in an autonomous and self-directed way.
Target Group	Elderly people who are interested in and able to acquire or further develop their competences in ICT, in particular people with unsystematic and very fragmented ICT-knowledge.
Structure of the case study	eLSe-Academy is a two-year follow-up project of eLSe (eLearning for Seniors), a 2004 Minerva project, which was more limited in focus.
Methods	Face-to-face and distance learning using a specifically developed eLearning environment.
Tools	eLearning environment which is fully conceived and tested to meet older learners' needs in terms of knowledge, flexibility, diversity and support. A book with accompanying CD is available in the UK.
Duration	2007-2009
Implementation level	Yes. Project has run out, but course content is still available online
Width of implementation	Europe: Italy, Germany, France, Sweden, Lithuania, Spain
Size of the initiative	Almost 600 participants in 6 European countries
Competence Components	<p>Basic competences:</p> <ol style="list-style-type: none"> Using the learning platform Aim: To learn about the different elements in the learning platform – communication and file transfer area; to learn about the structure of the units and the media elements embedded in there. Writing with a computer (including word pad) Aim: To learn and exercise computer basic skills and concepts. Keeping in touch with others via the Internet Aim: How to communicate via computer– email, outlook express or/and Web-based application How to find exactly what you are looking for (Information Search on the Internet) Aim: Improving "search skills" Keeping a tidy computer –Windows XP Aim: Data Storage and administration Services on the Internet. Aim: Discover the world of information opportunities and services on the Internet Where you might go next (further e-learning opportunities on the Internet) Aim: Further learning and information opportunities on the Internet and Computer-based

	<p>Advanced competences:</p> <ol style="list-style-type: none"> 1. Communication on the Internet Aim: How to profit by the communication possibilities over the Internet. The use of Skype and forums 2. Digital photography Aim: In this unit basics of digital photography and image processing are taught 3. Presentation Aim: know the principles of designing and creating presentations 4. Media on the Internet Aim: Radio and TV, music and speech, films on the Internet'
Levels	No levels, but two courses, basic and advanced
Assessment of competences	No assessment

Name	e-safety kit
Institution	Insafe
Brief outline	This initiative aims at raising awareness on the risks that children could run on the internet. The e-safety kit and related materials support children, their parents/tutors and teachers in safe internet use.
Webpage	www.esafetykit.net www.saferinternet.org
Type of initiative	Awareness raising campaign for internet safety for children (6-12 years old)
Objective of the case	The self-reported aim of the initiative is to gradually teach children about issues such as visual discrimination, critical thinking, values, privacy and many more. The eSafety kit initiative provides materials (a series of booklets, an activity website, a portal and national supporting websites/services) for children to be used with the support of parents/tutors or teachers. The objective is to make children (and their parents and tutors) aware of a series of risk that are related to the use of the internet and provide tips in order to avoid or reduce risk.
Context	Insafe is a European network of Awareness Centres promoting safe, responsible use of the Internet and mobile devices to young people. It is co-funded by the Safer internet Programme and the European Commission.
Literacy focus and approaches	e-skills (Internet literacy, e-awareness and e-safety)
Vision	The developers claim to firmly believe that technologies should not separate generations, but unite them. In line with this vision, they developed booklets and activities for children, where the material provides points for discussion between children and parents/teachers about internet safety. The dangers that children can encounter on the internet are compared to those they are exposed to in the playground or crossing the street – situation that, it is claimed, can be dangerous if children are not careful or if unwary.
Target Group	Children aged 6 to 12, their parents/tutors and teachers.
Material	Material is available for several groups: parents and families, children and teachers. There are two main forms of dissemination: a printed kit for families and a website with interactive games/activities. The family toolkit consists of a comprehensive parent's guide, an activity-based guidebook designed specifically for children between 6-12 years old, a family certificate and situation cards. In the family toolkit, the booklet, intended to be used by parents and children together, tells the story of two young people and their family, and provides input for discussion. The e-safety kit is specifically targeted at children aged 6 to 12, however

Methods	<p>the same team developed along the same lines a series of "Family e-safety tools" that include a variety of books, booklets and material in support of online safety for children of different ages.</p> <p>The main materials provided through the initiative consist of booklets (which are available in printed forms or can be downloaded as pdf); an activity website and links to national websites with more specific, nationally developed material. Resources provide tips and activities for children and guidance for parents and teachers to develop internet awareness and safety. The material is seen as a trigger for discussion between adults and children about internet safety, security, and privacy. The activity website: At www.esafetykit.net. Activities are available in 9 languages. For every of the four topics around which the model is built (see competence components), the user can choose to perform activities which are labelled as follows: golden rules (guidelines for safe internet use); download (downloadable images and wallpapers); quiz (a self-assessment test on each of the topics); games (online games related to the topic).</p>
Tools	<p>e-safety kits containing for instance: Family fun booklet, a parental guide, cut-out cards for extra activities and/or games, and links to national websites. Moreover, there is an activity webpage (www.esafetykit.net). The central webpage (www.saferinternet.org) provides links to national portals (awareness centres).</p>
Duration	<p>Developed in 2008, the network is still running and several resources are available from the central and from the national websites.</p>
Implementation level	<p>Primary school children. The initiative is not part of a compulsory scheme.</p>
Width of implementation	<p>International, European. Awareness centres are present in 30 countries. The main booklets are translated in 22 languages. The activity website (www.esafetykit.net) is available in 9 languages.</p>
Competence Components	<p>The material is built on the development of four areas or topics: security, communication, cyber bullying, and entertainment. For each topic, awareness is raised on the following issues (some issues appear in more than one area):</p> <p><u>Security</u>: use of anti-virus, spam-filters; avoiding email and sms spam.</p> <p><u>Communication</u>: online and off-line identities; behaviour in chats and instant messaging; online privacy, safe online profiles; sharing content; online and off-line networking.</p> <p><u>Cyber-bullying</u>: dealing with cyber-bullying – emotionally and pragmatically; privacy issues and disclosure; sharing and trust; netiquette.</p> <p><u>Entertainment</u>: downloading and legal issues; property rights; viruses and spam; privacy.</p>
Levels	<p>Levels are not foreseen.</p>
Assessment of competences	<p>Competences are not assessed, but some booklets (for instance: Family fun Booklet: Taming the web) and the activity website provide quizzes or tests</p>

Picture

for self-assessment.

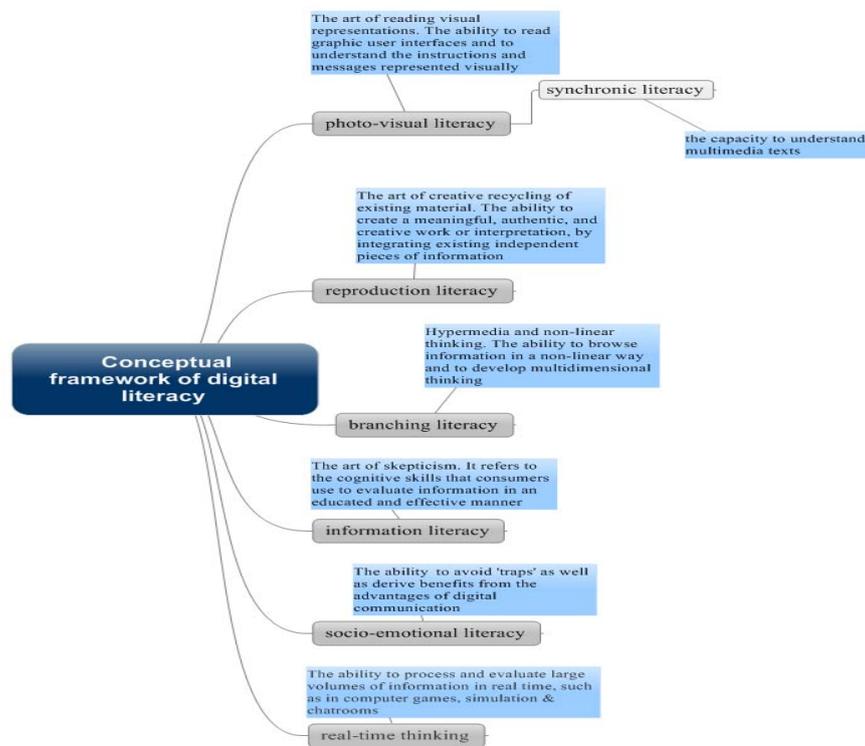


Printscreen of the activity webpage. Source: www.esafetykit.net

Name	Eshet-Alkalai's conceptual framework for survival skills in the digital era
Author	Eshet-Alkalai (main author)
Brief outline	The conceptual framework has been reported in a series of article which detail different aspects of digital literacy and on the multiple literacies that are needed for people to be functional in a digital era. It proposes a conceptual framework to clarify the skills pertinent to digital literacy.
References	<p>Eshet-Alkalai, Y. (2004). Digital Literacy. A Conceptual Framework for Survival Skills in the Digital Era. <i>Journal of Educational Multimedia & Hypermedia</i>, 13(1), 93-106.</p> <p>Eshet, Y., & Amichai-Hamburger, Y. (2004). Experiments in digital literacy. <i>cyberpsychology & behavior</i>, 7(4), 421-429.</p> <p>Eshet-Alkalai, Y., & Chajut, E. (2009). Changes over time in digital literacy. <i>cyberpsychology & behavior</i>, 12(6), 713-715.</p> <p>Eshet-Alkalai, Y., & Chajut, E. (2010). You can teach old dogs new tricks: The factors that affect changes over time in digital literacy. <i>Journal of Information Technology Education</i>, 9, 173-181.</p>
Type of initiative	Academic papers
Objective of the case	The papers were written with the aim to propose a conceptual framework on digital literacy, in order to improve understanding on the concept of digital literacy, which is use in an ambiguous way.
Literacy focus and approaches	Digital literacy as multiple literacies.
Vision	Digital literacy is defined as follows: "In light of the rapid and continual development of digital technology, individuals are required to use a growing variety of technical, cognitive, and sociological skills in order to perform tasks and solve problems in digital environments. These skills are referred to in the literature as digital literacy" (Eshet-Alkalai, 2004, p. p. 93); "Digital literacy can be defined as survival skill in the digital era. It constitutes a system of skills and strategies used by learners and users in digital environments" (Eshet-Alkalai, 2004, p. p. 102); "Having digital literacy requires more than just the ability to use software or to operate a digital device; it includes a large variety of complex skills such as cognitive, motoric, sociological and emotional that users need to have in order to use digital environments effectively" (Eshet & Amichai-Hamburger, 2004, p. p. 421); "The expansion of digital technologies and the rapid changes they undergo through time face users with new cognitive, social and ergonomic challenges that they need to master in order to perform effectively" (Eshet-Alkalai & Chajut, 2010, p. p. 173)
Target Group	Academics, scholars.

Duration	The first paper was published in 2004 and refers to a study carried over in 2002; the latest paper (2010) refers to a further study carried over in 2007.
Implementation level	Not implemented
Competence Components	The Eshet Alkalai conceptual framework of digital literacy includes six literacies: 1- photo-visual literacy; 2- reproduction literacy; 3- information literacy; 4-branching literacy; 5- socio-emotional literacy; and 6- real-time thinking. They are so defined. Photo-visual literacy is intended as the ability to read graphic user interfaces and to understand the instructions and messages represented visually. It includes synchronic literacy, which is the capacity to understand multimedia texts. Reproduction literacy is the ability to create a meaningful, authentic, and creative work or interpretation, by integrating existing independent pieces of information. Branching literacy is the ability to browse information in a non-linear way and to develop multidimensional thinking. Informational literacy, or the art of scepticism, refers to the cognitive skills that consumers use to evaluate information in an educated and effective manner. Socio-emotional literacy is the ability to avoid 'traps' as well as derive benefits from the advantages of digital communication. Real time thinking refers to the ability to process and evaluate large volumes of information in real time, such as in computer games, simulation and chatrooms.
Levels	No levels are proposed.

Diagram



Source: IPTS elaboration from Eshet-Alkalai (2004, 2010)

Name	IC³ Internet and Computer Core Certification
Institution/provider	Certiport Inc, US private company
Brief outline	<p>The Internet and Computing Core Certification (IC³®) aims to provide students and job-seekers with the foundation of knowledge they need to succeed in environments that require the use of computers and the Internet. The Global Standard 3 is an internationally recognized standard for digital literacy that aims to reflect the most relevant skills needed in today's academic and business environments. IC³ certifies critical entry-level skills needed to effectively use the latest computer and Internet technology to achieve business objectives, expand productivity, improve profitability, and provide a competitive edge.</p> <p>The IC³ Certification comprises of three individual examinations:</p> <ol style="list-style-type: none"> 1. Computing Fundamentals (Covers a foundational understanding of computing); 2. Key Applications (Covers popular word processing, spreadsheet and presentation applications and the common features of all applications); 3. Living Online (Covers skills for working in an Internet or networked environment).
Webpage	http://www.certiport.com/Portal/desktopdefault.aspx?tabid=229&roleid=102
Reference	Case studies: http://www.certiport.com/portal/desktopdefault.aspx?page=common/page/library/IC3_case-studies.html .
Type of initiative	Certification programme.
Objective of the case	<p>Certification of digital skills to increase employability, i.e. to</p> <ul style="list-style-type: none"> • Validate candidates' Internet and computing skills; • Highlight their unique talents; • Demonstrate their qualifications in emerging fields.
Context	Private company: Individuals can purchase exams; education providers can purchase a classroom licence; for companies a commercial licence is offered.
Literacy focus and approaches	Digital literacy; practical digital skills for employment
Vision	Digital Competence is here defined as the knowledge that students and job seekers need to succeed in environments that require the use of computers and the Internet to succeed in today's academic and business environments.
Target Group	Students and Job seekers
Structure of the case study	Courses and material aimed at exam preparation, including exam demonstration. The final aim is the certification of skills.
Material	<p>Links to several online and offline resources (which have to be purchased separately):</p> <p>http://www.certiport.com/Portal/desktopdefault.aspx?ipage=/portal/page</p>

[s/findcourseware.aspx&iheight=1000](https://www.pearsoncmg.com/api/v1/print/education/9780133737724/9780133737724_s/findcourseware.aspx&iheight=1000)

Tools	Tests take place in test centres. Results are available as "Certiport Authenticated Digital Transcript", which allows candidates to access their exam and certification status, and enables them to share this verified information with potential schools, employers, and staffing agencies.
Duration	Since at least 2003, ongoing
Implementation level	Implemented, for adult (further education)
Width of implementation	Worldwide (150 countries); however exams are (currently) only available in English
Size of the initiative	Delivered by more than 10,000 Certiport Centers worldwide.
Competence Components	<p>The IC3 Global Standard 3 Certification is comprised of three individual examinations.</p> <ol style="list-style-type: none">1. The <u>Computing Fundamentals</u> examination covers a foundational understanding of computer hardware, software, operating systems, peripherals, and troubleshooting. Students are requested to identify types of computers, how they process information, and the purpose and function of different hardware components; to explain how to maintain computer equipment and solve common problems relating to computer hardware, to know how software and hardware work together to perform computing tasks and how software is distributed and upgraded; to identify different types of application software and general concepts relating to application software categories; to know what an operating system is and how it works; to solve common problems related to operating systems; to use an operating system to manipulate a computer's desktop, files and disks; and to identify how to change system settings, install and remove software.2. The <u>Key Applications</u> examination covers popular word processing, spreadsheet and presentation applications. Students are expected to know about common programme functions (Be able to start and exit an application, identify and modify interface elements; utilize sources of online help; perform common file-management, editing and formatting, printing/outputting functions), about word processing functions (Be able to format text and documents, including the ability to use automatic formatting tools; be able to use word-processing tools to automate processes such as document review, security and collaboration); to use spreadsheet features (Be able to modify worksheet data, structure and formatting; be able to sort data, manipulate data using formulas and functions and create simple charts); and to be able to communicate with presentation software (i.e. to create and format simple presentations).3. The <u>Living Online</u> examination covers skills for working in an Internet or networked environment and maximizing communication, education, collaboration and social interaction in a safe and ethical way. Students are tested on their understanding of different networks (i.e. different types of data these transmit, on the roles of clients and servers in a network, and the fundamental principles of security); the appropriate use of different

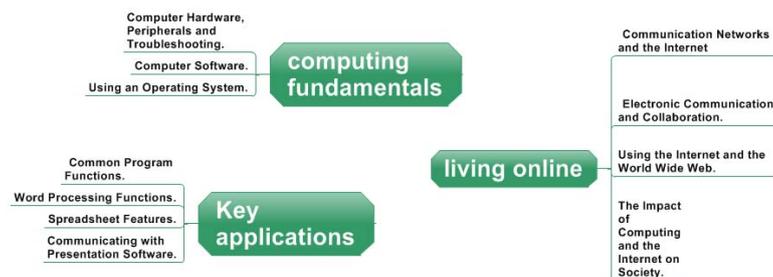
Levels

Assessment of competences

types of communication/collaboration tools (Email, cell phones, blogs, teleconferencing, social networks etc) and on their ethical use ("netiquette"); they learn how to use the Internet; how to evaluate the quality of information found on the Web; and to identify responsible and ethical behaviours when creating or using online content; students also need to know how computers are used in different areas of life, the risks of using computer hardware and software, and how to use computers and the Internet safely, ethically and legally.

The certification is not based on levels but on scores and a pass or fail final certification.

Certification is the aim of the framework. Exams take place in a Certiport recognised centre and are done through timed computer-based tests (CBT). Exams consist of a variety of question types: some questions require performing a function in a realistic simulation of an operating system or software (performance-based tasks); some questions are of the drag and drop style, or multiple-choice questionnaire.



Further information Diagram

Global Standard 3 Council: <http://www.gdlcouncil.org/index.html>

Source: IPTS elaboration from Certiport IC3 syllabi.

Name	iSkills
Institution	ETS (Educational Testing Service)
Brief outline	The iSkills assessment claims to be the only Information and Communication Technology (ICT) literacy test that assesses critical thinking and problem-solving skills in a digital environment. The framework underlying the assessment is based on the recognition that both cognitive and technical skills are necessary for people to be functional in a digital society.
Webpage	http://www.ets.org/iskills/
Reference	Katz, I.R. (2007). Testing information literacy in digital environments: ETS's iSkills Assessment. <i>Information Technology and Libraries</i> , 26(3), 3-12. http://www.ala.org/lita/ital/sites/ala.org.lita.ital/files/content/26/3/katz.pdf International ICT Literacy Panel. (2002). Digital Transformation: A Framework for ICT Literacy: ETS. Retrieved from http://www.ets.org/Media/Tests/Information and Communication Technology Literacy/ictreport.pdf
Type of initiative	ICT literacy measurement/assessment
Objective of the case	The framework was developed to establish literacy criteria for an outcome-based test. ETS has a long-standing involvement in large-scale assessment and wanted to develop a framework of ICT literacy to provide the foundation for the design of measuring instruments and tests.
Context	Developed by an ICT literacy Panel — involving leaders in education, business and government — convened by the ETS.
Literacy focus and approaches	ICT literacy (focus on cognitive skills as mediated by technology).
Vision	ICT literacy is defined as follows: 'ICT literacy is using digital technology, communications tools, and/or networks to access, manage, integrate, evaluate, and create information in order to function in a knowledge society.' ICT literacy is seen as a continuum, from daily life skills to the transformative benefits of ICT proficiency. The framework is "based on a strong view that mastery of technology alone does not define ICT literacy. It is only in the integration of technology skills and cognitive skills, such as traditional literacy, numeracy, and problem solving, that one can adequately define ICT literacy." (International ICT Literacy Panel, 2007)
Target Group	All citizens. "The framework provides a well-grounded rationale for defining the skills and knowledge required by students and adults as they complete secondary school, leave higher education, make career decisions or transitions, or function in everyday life in the 21st century." (International ICT Literacy Panel, 2007). The iSkills assessment targets

	students moving from secondary school into higher education and from higher education into the workforce.
Material	Reports (International ICT Literacy Panel, 2007) and an online test. Several additional research articles have also been published in academic and educational journals.
Methods	Task-based test.
Tools	Online assessment
Duration	The iSkills assessment is currently being used by colleges and universities in the United States as well as in a few institutions globally. The initiative started in 2001, when ETS organised the International ICT Literacy Panel. The first iSkills assessment was delivered in 2006 (Katz, 2007).
Implementation level	Yes, for all levels of education after compulsory education.
Width of implementation	International (US based).
Competence Components	<p>The <i>iSkills</i> assessment measures ICT literacy through seven task types representing a range of ways that students handle information through digital technology.</p> <p>Define — Understand and articulate the scope of an information problem in order to facilitate the electronic search for information by: distinguishing a clear, concise and topical research question from poorly framed questions, such as ones that are overly broad or do not otherwise fulfill the information need, asking questions of a “professor” that help disambiguate a vague research assignment, and conducting effective preliminary information searches to help frame a research statement</p> <p>Access — Collect and/or retrieve information in digital environments. Information sources might be web pages, databases, discussion groups, email or online descriptions of print media. Tasks include generating and combining search terms (keywords) to satisfy the requirements of a particular research task, efficiently browsing one or more resources to locate pertinent information, and deciding what types of resources might yield the most useful information for a particular need.</p> <p>Evaluate — Judge whether information satisfies an information problem by determining authority, bias, timeliness, relevance and other aspects of materials. Tasks include judging the relative usefulness of provided web pages and online journal articles, evaluating whether a database contains appropriately current and pertinent information, and deciding the extent to which a collection of resources sufficiently covers a research area.</p> <p>Manage — Organize information to help find it later by categorizing emails into appropriate folders based on a critical view of the emails’ contents, arranging personnel information into an organizational chart, and sorting files, emails or database returns to clarify clusters of related information</p> <p>Integrate — Interpret and represent information using digital tools to synthesize, summarize, compare and contrast information from multiple</p>

sources. Tasks include comparing advertisements, emails or websites from competing vendors by summarizing information into a table, incorporating information from different sources to conduct a scientific experiment and report the results, and placing results from an academic or sports tournament into a spreadsheet to decide the need for playoffs

Create — Adapt, apply, design or construct information in digital environments by editing and formatting a document according to a set of editorial specifications, creating a presentation slide to support a position on a controversial topic, and creating a data display to clarify the relationship between academic and economic variables

Communicate — Disseminate information tailored to a particular audience in an effective digital format by formatting a document to make it more useful to a particular group, transforming an email into a succinct presentation to meet an audience's needs, and selecting and organizing slides for distinct presentations to different audiences

Levels

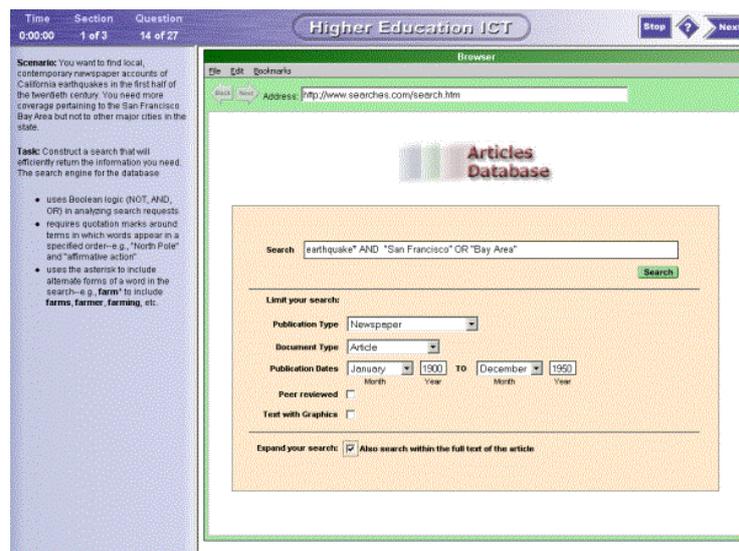
The iSkills assessment reports scores on a scale from 0-500. An international panel recommended a score of 260 corresponds to a foundational level of ICT literacy.

Assessment of competences

Competences are measure through a proctored online test. Questions simulate real-world scenarios through 14 tasks that take approximately 4 minutes each. An example of a task could be as follows (from ETS website http://www.ets.org/iskills/scores_reports/): "students are asked to locate resources (e.g., articles, web pages) relevant to a research issue. In this task the student would be asked to access information from a database using a search engine and identify the degree to which the information meets the needs of the task. Students are evaluated based on their ability to locate and identify relevant information with respect to an information need in a searchable database."

View examples: [Access 1](#) [Access 2](#) [Manage](#) [Integrate](#) [Create](#) [Communicate](#)

Diagram



In the iSkills assessment, students demonstrate their skills at handling information through interaction with simulated software. In this example task, students develop a search query as part of a research assignment on earthquakes. © 2007 Educational Testing Service. All rights reserved.

Name	NCCA ICT framework: A structured approach to ICT in curriculum and assessment
Institution	NCCA (National Council for Curriculum and Assessment), Ireland
Brief outline	This framework is a guide that helps teachers embed ICT as a cross-curricular component for all subjects. It identifies the knowledge, skills and attitudes which are expected from pupils and students attending primary and lower secondary schools. It supports a vision of digital literacy as the ability to create, communicate and collaborate to organise and produce information; to understand and apply knowledge of the functions of ICT; to use ICT for thinking and learning; and to develop a critical appreciation of the role of ICT in society. The framework outlines the kinds of learning experiences with ICT (knowledge, skills, and attitudes) a student should be afforded through their primary and post-primary education.
Webpage	http://www.ncca.ie/en/Curriculum and Assessment/ICT/#1
Reference	Several reports can be downloaded from the NCCA website, among which: NCCA (2004). Curriculum, Assessment and ICT in the Irish Context: A Discussion Paper http://www.ncca.ie/uploadedfiles/ECPE/Curriculum%20AssessmentandICT.pdf ; NCCA (2007). ICT Framework: A structured approach to ICT in Curriculum and Assessment http://www.ncca.ie/uploadedfiles/publications/ict%20revised%20framework.pdf NCCA (2008). ICT, the invisible Plan, http://www.ncca.ie/en/Curriculum and Assessment/ICT/ICT the invisible plan.pdf ;
Type of initiative	School curricula for primary and lower secondary schools in Ireland
Objective of the case	The framework was developed to support teachers to plan lessons and deliver them with ICT across the curriculum and to develop ICT skills by primary pupils and lower secondary students in all subjects. The purpose of the ICT framework is to: provide a rationale for ICT in the curriculum; identify the knowledge, skills and attitudes students should be able to achieve by the end of the Junior cycle (lower secondary); enable schools and teachers to select curriculum aligned content and teaching methods; provide opportunities to students to demonstrate mastery of ICT.
Context	Funded, developed and supported by the NCCA (National Council for Curriculum and Assessment), Ireland
Literacy focus and	ICT literacy (as multiple literacies, including information literacy and

approaches	the development of higher order thinking skills).
Vision	The NCCA vision of ICT literacy for Irish students has been reported in the 2004 discussion paper: "All students will leave school as capable independent learners, able to use ICT confidently, creatively and productively, able to communicate effectively, able to work collaboratively, and to critically evaluate, manage and use information" (NCCA, 2004, p. 29)
Target Group	Primary and lower secondary school learners. The material related to the framework is intended for teachers, parents, school support staff and management, policy-makers and all parties which have an interest and responsibility in primary and lower secondary education.
Structure of the case study	The webpage of NCCA offers a series of reports and support material for educators, as listed in the references.
Methods	The development of ICT literacy is seen as integrated in all subjects. NCCA promotes and endorses the following principles and methodologies: active involvement of students in their own learning; development of students' higher order thinking skills; students' learning situated in authentic environments; promotion of students' interest and engagement; differentiated learning; collaborative learning; assessment of and for learning. ICT literacy is seen as a mean and not a goal.
Duration	The draft framework was completed in 2006. A revised framework was published in 2007 and is still in force. NCCA's consultations and committees to develop the framework started in 1998.
Implementation level	Implemented at primary and lower secondary schools.
Width of implementation	National (Ireland)
Competence Components	<p>The framework is constituted by four interlocking and interdependent elements or learning objectives (LO), which are in presented in fifteen learning outcomes.</p> <p><u>LO 1: Creating, communicating and collaborating.</u> Students should be able to 1- draft, format and revise text using ICT; 2- create, manipulate and insert information in a variety of different formats (images, sound, video) using ICT; 3- gather, organise, manipulate and analyse data using ICT; 4- communicate and collaborate locally and globally using ICT; 5- plan, design, create and present information using ICT.</p> <p><u>LO 2: Developing foundational knowledge, skills and concepts.</u> Students should be able to: 1- demonstrate and apply functional knowledge and understanding of ICT; 2- develop skills for maintaining and optimising ICT; 3- understand and practice healthy and safe uses of ICT.</p> <p><u>LO 3: Thinking critically and creatively.</u> Students should be able to: 1- research, access and retrieve information using ICT; 2- evaluate,</p>

organise, and synthesise information using ICT; 3- express creativity and construct new knowledge and artefacts using ICT; 4- explore and develop problem-solving strategies using ICT.

LO 4: Understanding the social and personal impact of ICT. Students should be able to: 1- demonstrate understanding and critical awareness of the contribution of ICT to the individual and to our society; 2- develop independent and collaborative learning and language skills using ICT; 3- demonstrate an awareness of, and comply with, responsible and ethical use of ICT.

Levels

Learning outcomes across the four objectives are described for children at three levels, according to the level of education they attend: lower primary level, upper primary level and lower second level.

Assessment of competences

In the primary school curriculum of Ireland, assessment of learning (summative assessment) and assessment for learning (formative assessment) are seen as two complementary and inter-related processes. The framework comprises learning opportunities which have been identified for each of the fifteen outcomes of the framework. These learning opportunities are described for each objective according to three levels, which correspond to lower primary (level 1), upper primary (level 2), and lower secondary (level 3). The learning opportunities describe the knowledge, skills and attitudes that learners are expected to have in each area, for each learning outcome at the end of each cycle. Learning opportunities are listed here: <http://www.ncca.ie/uploadedfiles/publications/ict%20revised%20framework.pdf>

Further information

notes on aspects that have not been covered in other fields above,

Diagram



ICT framework objectives. Source: NCCA 2007

Name	Pedagogic ICT licence
Institution	Danish Government
Brief outline	The Pedagogical ICT Licence offers current and prospective teachers the opportunity to upgrade their ICT skills and to integrate ICT and media as a natural part of learning in school subjects. This certificate is obtained by successfully completing assignments in four basic modules and four elective modules. The aim is to use ICT and media for teaching and learning purposes.
Webpage	www.paedagogisk-it-koerekort.dk
Type of initiative	National framework for teacher education
Objective of the case	Provide current and prospective teachers with the DIGITAL COMPETENCE they need to implement technology in their teaching
Context	Governmental initiative
Literacy focus and approaches	ICT skills with a pedagogical perspective
Vision	DIGITAL COMPETENCE is seen as a need, as society is demanding citizens to be functional in a knowledge and digital environment.
Target Group	Teachers (current and prospective teachers)
Structure of the case study	The training courses are divided into modules
Material	Training material is available upon enrolment in the programme
Methods	Each module is build around the needs of teachers and seen in a pedagogical perspective, i.e. with the final aim of using technologies in class to improve teaching practices.
Tools	The webpage provides information on modules content. However, the framework is implemented through training bodies and material is provided by the training body. Courses are generally provided both in presence and through flexible training (i.e. a mixture of face-to-face and online modules)
Duration	Ongoing
Implementation level	Yes (teacher training, both Initial Teacher training and Continual Professional Development)
Width of implementation	National (Denmark)
Competence Components	The course is divided into core modules: 3 basic and a final. Basic modules: <ul style="list-style-type: none"> • Let's find something on the Web • Enter a text • Communication and cooperation Final module: <ul style="list-style-type: none"> • Work methods and IT – where IT makes a difference Moreover, a selection of more targeted modules can be done from the

	<p>following areas:</p> <ul style="list-style-type: none"> • Understanding and producing images • Computers in class • Data Collection • Digital learning resources • Flexible learning • Movies and animation • Making of own teaching materials [18] • Hyperlinks • Interactive Whiteboards • Databases • ICT as a compensatory tool in teaching (for students with special needs) • Layout and formatting • Games for learning • Literacy and IT • Teaching using audio material • Presentations and interactive programs • Spreadsheets in teaching • School Development and IT • Digital storytelling • Knowledge and knowledge systems • Websites and dissemination on the Internet [46]
Levels	No levels foreseen
Assessment of competences	<p>Teachers undergoing this training have to prove proficiency in the selected modules (some of which are compulsory while some others are elective). A pass or fail mark will be given. According to the chosen delivery mode (face-to-face or online), there are different options for teachers to be assessed on their competences, one of which is by providing a digital portfolio.</p>

Name	The Scottish Information literacy Project
Institution	Christine Irving & John Crawford (Glasgow Caledonian University).
Brief outline	This information literacy framework has been developed in Scotland in order to promote the understanding and development of information literacy in all education sectors. A pilot was conducted with secondary schools, in which information literacy was defined in terms of statements of skills, knowledge and understanding.
Webpage	http://www.gcu.ac.uk/ils/index.html http://caledonianblogs.net/nifls/
Reference	Publications that came out of the project include: Crawford, John and Irving, Christine (2010) The Scottish Information Literacy Project and school libraries, Aslib proceedings. Irving, Christine (2009) Collecting case studies / exemplars of good practice to enrich The National Information Literacy Framework (Scotland), Library and Information Research, 33 (105) pp. 10-18. Crawford, John and Irving, Christine (2009) Our information literacy journey, ALISS quarterly, 4(3) April pp.35-37. Crawford, John and Irving, Christine, (2008) Going beyond the 'library': the current work of the Scottish Information Literacy Project, Library and Information Research, 32(102) pp.29-37. Crawford, J. & Irving, C., (2007) Information literacy, the link between secondary and tertiary education project and its wider implications, Journal of librarianship and information science, 39 (1) pp.17-26. Irving, C., (2006) The identification of information literacy skills which students bring to university, Library and Information Research (LIR), 30(96) pp.47-54. Irving, C and Crawford, J (2005) From secondary school to the world of work: the experience of evaluating Information Literacy skills development at Glasgow Caledonian University (GCU). JeLit 2(2). http://www.jelit.org/tocDec2005.html Crawford, John et al (2004) Use and awareness of electronic information services by students at Glasgow Caledonian University: a longitudinal study, Journal of librarianship and information science, vol. 36, no.3, pp. 101-117. For a full list of publication, go to: http://www.gcu.ac.uk/ils/publications.html
Type of initiative	Project developed by the Caledonian University (Glasgow).
Objective of the case	The project was developed to promote the understanding and development of information literacy in all education sectors, in the workplace, the home and the wider community (primarily in Scotland).

Context	The project was funded by several bodies and institutions, for a full list, please see: http://www.gcu.ac.uk/ils/funding.html
Literacy focus and approaches	Information Literacy
Vision	The vision that project members endorse is the one adopted in 2004 by CILIP, the professional body for librarians, information specialists and knowledge managers: "Information literacy is knowing when and why you need information, where to find it, and how to evaluate, use and communicate it in an ethical manner." It encompasses all media types and formats, from printed matter to electronic tools and media, to people.
Target Group	Learners, from primary to secondary to further and higher education, including workplace and lifelong learning. Target groups are so divided: 1- schools, 2- Secondary schools and further education; 3- Further education and higher education; 4- lifelong learning, learning communities and workplace learning.
Material	The webpage (http://www.gcu.ac.uk/ils/index.html) and the blog (http://caledonianblogs.net/nilfs/) provide links to the framework; examples of information literacy material;
Duration	October 2004 - April 2010
Implementation level	Piloted.
Width of implementation	National- Scotland (pilots run in secondary schools)
Competence Components	<p>The division of target groups implies different Information literacy competences, which are foreseen as so in the framework:</p> <p>1- Schools: planning; locating; organising; representing; evaluating</p> <p>2- Secondary schools and further education: planning and organising; defining the topic; identification of key words; identification of suitable information sources; effective searching; evaluating information; reviewing; understanding ethics and responsibility of use; understanding how to communicate and share your findings.</p> <p>3- Further education and higher education: recognise a need for information; distinguish ways in which the information 'gap' may be addressed; construct strategies for locating information; locate and access information; compare and evaluate information located from different sources; synthesise and build upon existing information, contributing to the creation of new knowledge.</p> <p>4- lifelong learning, learning communities and workplace learning: understanding a need; understanding availability; understanding how to find information; understanding the need to evaluate results; understanding how to work with or exploit results; understanding ethics and responsibility of use; understanding how to communicate and share your findings; understanding how to manage your findings.</p>

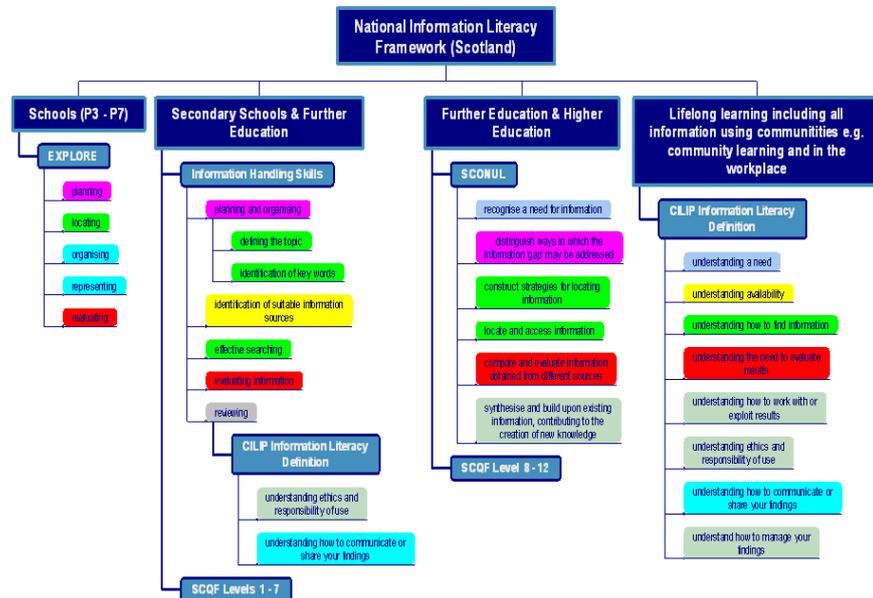
Levels

Attainment levels are foreseen for each category and are linked to the age of the learner or to their educational level, see

Assessment of competences

Descriptors for evidence of competence level are foreseen for each level descriptor.

Diagram



Source: National Information Literacy framework (Scotland)

Name	UNESCO ICT Competency Framework for Teachers (ICT-CFT)
Institution/provider	UNESCO
Brief outline	This framework aims to provide guidelines to develop courses for pre-service or in-service teachers, in order to enable teachers to integrate ICT in a pedagogically effective way. As such, the framework does not focus on the development of teachers' ICT skills only. It rather aims to improve teachers' practice as a whole, applying ICT skills acquisition with emergent views in pedagogy, curriculum, and school organization.
Webpage	http://portal.unesco.org/ci/en/ev.php-URL_ID=22997&URL_DO=DO_TOPIC&URL_SECTION=201.html Version two can be found at: http://unesdoc.unesco.org/images/0021/002134/213475e.pdf
Type of initiative	International framework for teacher education
Objective of the case	Create international standards for teacher education to support teachers in developing competences for incorporating ICT into their classroom practices. More specifically (from the policy guidelines), the aims of the framework are: "1) to constitute a common set of guidelines that professional development providers can use to identify, develop or evaluate learning materials or teacher training programs in the use of ICT in teaching and learning; 2) to provide a basic set of qualifications that allows teachers to integrate ICT into their teaching and learning, to advance student learning, and to improve other professional duties; 3) to extend teachers' professional development so as to advance their skills in pedagogy, collaboration, leadership and innovative school development using ICT; 4) to harmonize different views and vocabulary regarding the uses of ICT in teacher education." It is emphasised that it is not enough for teachers to be digitally competent in general terms, as they need to integrate technologies into classroom practices in an effective way. For this reason, the ICT CFT addresses all aspects of the teacher work.
Context	Within the Unesco's "Education for All" (EFA) Programme, the framework has been developed in partnership with Microsoft, Intel, Cisco, the International Society for Technology in Education (ISTE) and the Virginia Polytechnic Institute and State University (Virginia Tech).
Literacy focus and approaches	ICT literacy applied to effective pedagogical practice
Vision	No definition of ICT skills is provided in this framework. Technologies are perceived as a mean to an end and the focus of the framework is on the application of technologies and the skills that are needed to

Target Group	<p>use them proficiently, effectively and innovatively in the educational context for the benefits of the learning experience.</p> <p>Teachers (mainly of primary and secondary schools, but not only), education decision-making and teacher professional development institution who are dealing with the preparation of courses (ITT or CPD) for teachers</p>
Material	<p>There are three main documents that describe the ICT-CFT framework, namely:</p> <p>1- A policy framework, retrievable from http://cst.unesco-ci.org/sites/projects/cst/The%20Standards/ICT-CST-Policy%20Framework.pdf</p> <p>2- Competency standards modules, retrievable from http://cst.unesco-ci.org/sites/projects/cst/The%20Standards/ICT-CST-Competency%20Standards%20Modules.pdf</p> <p>3- Implementation guidelines, retrievable from http://cst.unesco-ci.org/sites/projects/cst/The%20Standards/ICT-CST-Implementation%20Guidelines.pdf</p>
Duration	Launched in 2008 after 5 years of research, still active
Implementation level	Teacher education (Initial Teacher Education and Continual Professional Development)
Width of implementation	The framework is intended to be implemented internationally (world-wide)
Competence Components	<p>Three approaches to educational change (Technology literacy, knowledge deepening, and knowledge creation), crossed with the 6 components of the education system, namely: Understanding ICT in education, curriculum and assessment, pedagogy, ICT, organisation and administration, teacher professional development). The crossing of approaches and components – which is called "module" – gives way to the modules of the framework (see diagram below). For instance, the intersection of technology literacy (approach 1) and Curriculum and assessment (component 2) is labelled as "basic knowledge" and might entail improving literacy skills through technology and adding the development of ICT skills into relevant curriculum contexts.</p>
Levels	<p>The three approaches can be considered to be three increasing levels of educational change and imply increased complexity. Three approaches: 1- Technology literacy (basic); 2- Knowledge deepening (intermediate, applied knowledge); 3- Knowledge creation (higher, 21 century skills). The three approaches can be seen as a proxy for level and refer to the type of approach that a country decides to adopt for education reform, although more than one approach can be endorsed. Approaches depend on the extent to which ICT is integrated into society and educational system. As such, the levels do not necessarily refer to the competence that is acquired by the</p>

teachers at the end of the programme, but illustrate a policy vision with the aim to improve a country's workforce and fostering economic growth. *Technology literacy* focuses on the introduction of technology as a learning and teaching tool and the understanding of technology as a mean to support social development. The *knowledge deepening* approach emphasises collaborative and problem solving approach to the application of technology to learning and teaching. The *knowledge creation* focus is on innovation and 21st century skills and the classroom environment is perceived as a technology-enabled learning community.

Diagram

THE UNESCO ICT COMPETENCY FRAMEWORK FOR TEACHERS			
	TECHNOLOGY LITERACY	KNOWLEDGE DEEPENING	KNOWLEDGE CREATION
UNDERSTANDING ICT IN EDUCATION	Policy awareness	Policy understanding	Policy innovation
CURRICULUM AND ASSESSMENT	Basic knowledge	Knowledge application	Knowledge society skills
PEDAGOGY	Integrate technology	Complex problem solving	Self management
ICT	Basic tools	Complex tools	Pervasive tools
ORGANIZATION AND ADMINISTRATION	Standard classroom	Collaborative groups	Learning organizations
TEACHER PROFESSIONAL LEARNING	Digital literacy	Manage and guide	Teacher as model learner

Source: UNESCO ICT-CFT (2011)

The diagram above constitutes the matrix of the Unesco ICT-CFT. Each of the cells of the matrix constitutes a module in the framework. Source: UNESCO ICT-CFT

Further Information

The updated version of the framework was released in November 2011. It provides a thorough explanation of the three approaches and the six aspects of the teacher work. For each aspect and approach, examples are provided to illustrate how the framework could look like when applied in practice. The annex provides detailed specifications of the different items that belong to each module.

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Abstract

This report aims to identify, select and analyse current frameworks for the development of Digital Competence. Its objective is to understand how Digital Competence is currently perceived and implemented in fifteen cases, drawn from school curricula, implementation initiatives, certification schemes and academic papers. It develops a proposal for a common understanding of Digital Competence and identifies the sub-competences that compose it.

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Key policy areas include: environment and climate change; energy and transport; agriculture and food security; health and consumer protection; information society and digital agenda; safety and security including nuclear; all supported through a cross-cutting and multi-disciplinary approach.

