DECODE

DEvelop COmpetences in Digital Era.
Expertise, best practices and teaching in the XXI century

IO2. Innovative training models, methods and tools for teachers in the digital age

NATIONAL REPORT: Spain

Author: UOC

Version: 1.0

DECODE

TABLE OF CONTENTS

SPANISH NATIONAL REPORT

This national report aims to present trends and policies activated at the Spanish level in relation to the introduction of training models and successful methodologies to integrate into school staff digital competences and a framework of the main national laws and legislative funding programs, educational policies and best practises in the integration of Information and Communications Technologies (ICT) in school.

This national report will take into account the Spanish context, although due to its proximity much of the interest of this report will be focused in the autonomous community of Catalonia.

1. Description of national context

1.1- National legislative framework for the adoption and the development of ICTs in education

In the first place, in order to obtain an overview of education in Spain, it may be useful to locate the Spanish governmental educational context, its structure and competences.

The Ministry of Education, Culture and Sport of Spain is the department of the General State Administration responsible for the proposal and execution of the Government's policy on education, vocational training and universities (Royal Decree 257/2012, of 27 January, Ministry of Education, Culture and Sport).

In the Spanish educational system the following educational stages are distinguished:

1. **Child education** (non-compulsory): 0 to 6 years.

   a) 1st cycle: 0 to 3 years.

   b) 2nd cycle: 3 to 6 years.

2. **Primary education** (compulsory): 6 to 12 years.

3. **Secondary education** (compulsory): 12 to 16 years

4. **Baccalaureate** (Voluntary post-compulsory secondary education): 16 to 18 years.

5. **Vocational Training** (In Spanish: Formación professional of FP).

6. **Higher education** (university education): From the age of 18.

The [Departament d'Educació](#) (in English: Department of Education) of the Government of Catalonia is the public organism of Catalonia in charge of educational policy in the field of non-university education.

It should be noted that although there is a common educational frame, the different autonomous communities have certain competences in education; as in the case of **Catalonia**, which is the closest context to the UOC, and for this reason will be highlighted throughout this report

In Spain the competences in education have been transferred to the different autonomous communities, until obtaining a "*decentralized model of administration of the Spanish educational system that distributes competences between the State, Autonomous Communities, Local Administrations and Educational centers*" (Government of Spain, 2012).

More specifically, this document specifies that "*in recent years the Autonomous Communities, based on their respective statutes of autonomy, have been assuming more and more educational competences as well as the means necessary for their exercise*".

1.1.1. Spanish Education Law

At a general level in the **Spanish context**, the inclusion of educational policies for the integration of ICT into the education system has been progressive.

In reference to specific laws, decrees and acts, references in the implementation and use of ICT can be found in successive Spanish laws. In this sense, this implementation in the last three educational reforms (LOGSE, LOE, LOMCE) will be described.

- **LOGSE**: *Ley de Ordenación General del Sistema Educativo español* (Law of General Management of the Spanish Educational System).

Organic Law adopted on October 3, 1990. In this law there is no direct mention of the implementation of ICT in school, a concept popularised in the mid-1990s (Grau, 2013).

However, the preamble pointed to the importance that information will have in the society of the future, and concretely cites that "*In that society of the future, progressively shaped as a society of knowledge, education will share with other social bodies the transmission of information and knowledge, but will acquire even greater relevance its ability to critically order them, to give a personal and moral sense, to generate attitudes and individual and collective habits, to develop skills (...) adapting them to emerging situations, the values with which we identify individually and collectively*".

- **LOE**: *Ley Orgánica de Educación* (Organic Law of Education).

Organic Law 2/2006, of May 3, is a state organic law passed on April 6, 2006 in the Congress of Deputies. In this law, references to ICT are increased.

The promotion of the use of ICT was already promoted from early childhood education: "*Conceived as a single stage, the education of children is organised in two cycles that both respond to an educational intentionality and which forces the centers to count from the first cycle with a specific pedagogical proposal. In the second cycle, will be promoted a first approach to literacy, to the initiation of logical-mathematical skills, to a foreign language, to the use of information and communication technologies and to the knowledge of the different artistic languages* ".

The promotion of the use of ICT had to fall on educational administrations, since according to this law: "*It is the responsibility of the education authorities to promote a first approach (...) to reading and writing, as well as experiences of early initiation in basic numerical skills, information and communication technologies and visual and musical expression*".

The relevance of ICT makes it one of the objectives of **primary education**, specifically in objective number 17: "*Initiate in the use, for learning, of information and communication technologies , developing a critical thinking (for students) before the messages that receive and elaborate*".

In **Compulsory secondary education**, ICT are referred in the objective 23: "*Develop basic skills in the use of information sources to critically acquire new knowledge. Acquire a basic preparation in the field of technologies, especially those of information and communication*".

The promotion of ICT is also named in **post-compulsory education**: *"It is up to the education authorities to organize the public offer of distance education in order to provide an adequate response to the ongoing training of adults. This offer will include the use of information and communication technologies"*.

In this Law, ICT are contemplated in the economic resources for the improvement of the learning and support to the teaching staff, specifying: "*The establishment of programs to reinforce the learning of information and communication technologies*".

- **LOMCE**: *Ley orgánica para la mejora de la calidad educativa* (Organic Law for the Improvement of Educational Quality).

Organic Law 8/2013, of December 9, for the improvement of educational quality (LOMCE), was approved in 2013.

In LOMCE, ICT are addressed in a more precise and concrete way, and are considered one of the areas most related to the transformation of the education system, since according to the tenth point of the preamble: "*It is necessary to highlight three areas on which LOMCE makes a special impact in order to transform the education system: Information and Communication Technologies, the promotion of multilingualism and the modernization of vocational training*".

The eleventh point of the preamble is dedicated exclusively to ICT and the process of digitization of education:

"*Technology has historically shaped education and continues to shape it. (...) The widespread incorporation of Information and Communication Technologies (ICTs) into the education system, which will take into account the principles of design for all people and universal accessibility, will allow the customisation of*

DECODE

Co-funded by the
Erasmus+ Programme
of the European Union

*education and adapt it to the needs and pace of each student. (...) The **Information and Communication Technologies** will be a fundamental piece to produce the methodological change that leads to achieve the objective of improving the quality of education. Likewise, the responsible and orderly use of these new technologies by the students must be present throughout the educational system (...).*

__Information and Communication Technologies__ will also be a key tool in the training of teachers and in the learning of citizens throughout life, by allowing them to combine training with personal or work obligations and, the management of the processes. (...) Having valued previous experiences, it is imperative that the digitalisation model of the chosen school is economically sustainable and that it focuses on the creation of a national digital ecosystem that allows the normal development of the options of each educational administration".

Finally, the subject *Tecnologías de la Información y la Comunicación* **(Technology of the information and communication)** was offered as one of the specific subjects, to be chosen from several, in compulsory secondary education.

Until the **LOGSE law** of 1990 there was no reference to ICTs in the articles of the different educational laws. As described, the LOGSE included some references to training in the field of audiovisual language and the training of students to analyse critically the messages through the different media, within the framework of what was called "new technologies", but there was no proper curriculum for this subject.

LOE provided to the concept ICT its own identity from early childhood education through the end of the education period (Grau, 2013). It is from **LOMCE** that ICT becomes one of the most relevant areas of educational transformation and even is proposed the specific subject: **Tecnologías de la Información y la Comunicación (Information and communication Technologies)** in educational curricula.

1.1.2. Catalonian Education Law

The **Llei d'Educació de Catalunya (LEC, in english: Education Law of Catalonia)** is an autonomous law approved by the Parliament of Catalonia in 2009 and published in the DOGC on the 10th of July of that same year.

In LEC, ICT are addressed explicitly, and are considered (Article 52) as a main objective "*to train students for the critical analysis of the media and the use of __new technologies__*", in addition to considering that curricula "*should be oriented towards the acquisition of basic skills, which should contribute to the personal development of students and to the practice of active citizenship, and must incorporate information and communication technologies in the learning processes*".

ICT are cited in the different levels of education. The aim of the **primary education** and the **compulsory secondary education** stage is (Article 58 and 59) "*to provide all students with an education which, in accordance with the basic competences established in the curriculum, allows them (...) the necessary skills for the use of new technologies and audiovisual communication*".

According the article 61 "*the curriculum and the educational activities of* **baccalaureate**, *in order to consolidate the basic competences acquired by students at the end of basic education (article 61), should favour the development of (...) the use of information and communication technologies, besides the acquisition of the own and specific competences of the modality taken*".

Regarding adult education (article 69), "a*dult education programs and related training actions should include at least the following areas (...) c) introduction to* **information and communication technologies** *and the training in the use of strategies for the acquisition of the basic competences*".

In specifying **pedagogical innovation projects** (article 84), the Department is oriented to "*favor initiatives for the development of pedagogical and curricular innovation projects with the objective of (...) particularly encouraging research and innovation projects in relation to the use of information and communication technologies for learning and knowledge and in relation to the training of students in multilingualism*".

It can be found several references to the **role of teachers in ICT**. Concretely, in the article 104 on **teaching function** it is indicated that "*The teachers and professors have, among others, the functions of (...) using information and communication technologies, which they must know and master as a methodological tool*". Also, with respect to teacher training in the text, it is specified that "*Initial teacher training should include (...) mastery of information and communication technologies*".

According to article 168 "*the Government and the universities of Catalonia must establish collaborative relationships to enhance the excellence of the education system*" incorporating, among other aspects, ICT".

1.2- Institutional and organisational processes for the adoption and the development of ICTs in education

This section on Institutional and organizational processes for the adoption and the development of ICTs in education will distinguish the Spanish and Catalan context.

1.2.1- The Spanish Context

a) Defining and deploying basic digital competences

One possible way of introducing and implementing ICT in the classroom efficiently is through the definition of basic digital competences, since is defined in which way and how these digital competences can be obtained.

According to Meseguer et al. (2015) at present the development of digital competence in **primary education** in Spain, in relation to the contents of the curriculum of this educational stage, is basically limited to some specific aspects of the areas of information and content creation, but are not sufficient for students to acquire a basic digital competency, as defined in the DIGCOMP Framework.

The development of digital competence in **compulsory secondary education** in Spain is also limited to some specific aspects of certain areas of this competence, such as information and content creation, but many other skills are not dealt with in other areas.

b) ICT Coordinators

During the last years the figure of the ICT coordinator has appeared for the implementation and the correct use of digital technologies in the educations centers. In the different autonomous communities, the figure is considered differently.

In the Community of Madrid, for example, the role of an ICT coordinator in educational centers is described with the task of promoting and coordinating the actions related to the curricular use of ICT, and concretely: coordinate and stimulate the integration of ICT curricula and communication in the center; prepare proposals for the organization and management of the center's technological resources and ensure compliance; and supervision of the installation, configuration and uninstallation of the curricular proposed software. In order to be an ICT coordinator, teachers who are candidates "*will be assessed the experience in the development of didactic activities with the Information and Communication Technologies, as well as the training and knowledge in this respect*" (Madrid's community, 2012).

Another example is found in the autonomous regions of Andalusia, where the ICT coordinator assumes the role of technical adviser, organizer of training activities for students and teachers (Boza, 2011) and the Canary Islands, where ICT coordinators support and advice to their colleagues involved in the process of educational innovation with ICT that materializes in tasks such as: providing information about what to do, how to do it, when to do it; initial teacher training; Implementation practice in the classroom; emotional support, encouraging the rest to get involved to achieve greater involvement and autonomy when necessary, minimizing resistance and fears; streamline internal coordination meetings at the center level (Hernández, 2011).

1.2.2. The Catalan context

In relation to the Institutional and organisational processes for the adoption and the development of ICTs in education it is interesting to highlight two institutional processes at Catalan Autonomous level for the introduction, promotion and use of ICT in the classroom: the **TAC Plan**, emerged from the Catalan administration, and at a curricular level the documents on basic competence of the digital field in primary and secondary education.

DECODE

Co-funded by the
Erasmus+ Programme
of the European Union

a) Defining and deploying basic digital competences

In order to introduce and implement ICT in the classroom efficiently, the definition of basic digital competences becomes a key process to assure that students take the maximum profit of it. For this purpose, the education department of the government of Catalonia defined this competences for students.

In fact, in Catalonia, the normative deployment of LEC (Law 12/2009, of July 10, on education), regulated the acquisition of basic skills in the digital field that students of the Catalan Education System have to acquire. According to what is established in articles 58 and 59 of this law in "*both primary and compulsory secondary education, the competences necessary for the use of new technologies must be developed at an appropriate level*".

Concretelly, to specify this point, two documents were published by the Government of Catalonia for the identification and deployment of the basic digital competences, both at primary and secondary education. The elaboration of these documents counted with the participation of university professors and of teachers of the public and private centers of Catalonia.

According to the Government of Catalonia (2013), these competences are linked to all subjects of the curriculum. The elements that constitute the document provide information on (Government of Catalonia, 2013):

- The gradation for obtaining the digital field competences at the end of primary education.

- Identification of the key contents associated with each competence.

- The methodological orientations for the application in the classroom.

- Examples of evaluation activities with indicators related to the different degrees of achievement.

- A compilation of the reference portals of the Department of Education where different teaching resources can be accessed, as well as a glossary of terminology related to digital competences.

In **primary education** four dimensions and ten competences were established (Government of Catalonia, 2013):

1. Dimension "Instruments and applications"

   - Competence 1: Select, use and program digital devices and their functionalities according to the tasks to be performed.

   - Competence 2: Use the basic functions of the applications of text editing, numerical data processing and multimedia presentations.

   - Competence 3: Use programs and applications to create drawing and editing of image, sound and moving image.

DECODE

Co-funded by the
Erasmus+ Programme
of the European Union

2. Dimension "Information processing and organization of work and learning environments":

- Competence 4: Search, contrast and select all digital information considering different sources and digital environments.

- Competence 5: Build new personal knowledge through information processing strategies with the support of digital applications.

- Competence 6: Organise and use the own personal digital work and learning environments.

3. Dimension "Interpersonal communication and collaboration":

- Competence 7: Carry out virtual interpersonal communications and digital publications.

- Competence 8: To carry out activities in group using online collaborative tools and environments.

4. Dimension "Habits, citizenship and digital identity"

- Competence 9: Develop healthy habits during the use of technology.

- Competence 10: Acting in a critical, prudent and responsible manner in the use of ICT, considering ethical, legal, security, sustainability and digital identity aspects.

In **secondary education** four dimensions and eleven competences were established (Government of Catalonia, 2015). While the first three dimensions were common in primary and secondary education, there were some changes in dimension 4:

4. Dimension "Habits, citizenship and digital identity"

- Competence 9: Carry out actions of citizenship and personal development, all using the digital resources of society today.

- Competence 10: To promote habits of healthy use of the TICs linked to ergonomics for the prevention of risks.

- Competence 11: Acting in a critical and responsible way in the use of ICT, all considering ethical, legal, security, sustainability and digital identity aspects.

b) The TAC Plan, an instrument for introducing ICT in the educational center

The decree of restructuring the Catalan department approved in 2007 meant a change in the conception of ICT (Alonso et al., 2010a). The *Servei de Tecnologies per l'Aprenentatge i el Coneixement* (STAC, in English:

Service for Technologies for Learning and Knowledge) was created. This service brought technical and pedagogical aspects related to ICT to the same level. It was structured in four subareas: digital inclusion, collaborative projects in network, digital resources and programs and standards and pedagogical innovation. It's then, according with the same document, when the educational policies of the Department of Education begin to reflect the new LKT policy and then began to be more cooperative environments that give students and teachers a more active role.

The TAC Plan (Pla de Tecnologies per l'Aprenentatge i Coneixement, in English Learning and Knowledge technologies or LKT) was a plan emerged from the Catalan administration, in the period 2011-2014, with the ultimate objective of having an integrated vision of the technologies in educational centres and to promote the development of digital competences of the students. The TAC Plan was intended to promote the integration of ICT in schools and institutes. Bearing in mind that the TAC plan is not mandatory, not all centers have it, but it is becoming increasingly widespread.

The central axis of the TAC Plan (Vivancos, 2012) was the adoption of ICT in the school in order to be at the service of learning and knowledge and guide the acquisition of digital competence in a broad sense and in the acquisition of knowledge, with the ultimate objective of incorporating the technologies in the school in order to facilitate students autonomous and personalized learning, with a requirement of different teaching roles.

The full integration of ICT in an educational institution can be approached as a process of management of innovation and change, which affects all the staff members and some practical aspects: **pedagogical**, **formative**, **organizational** and **technological**. The Center TAC Plan (figure 1) is the document that includes all this process and serves as a guide for its implementation:
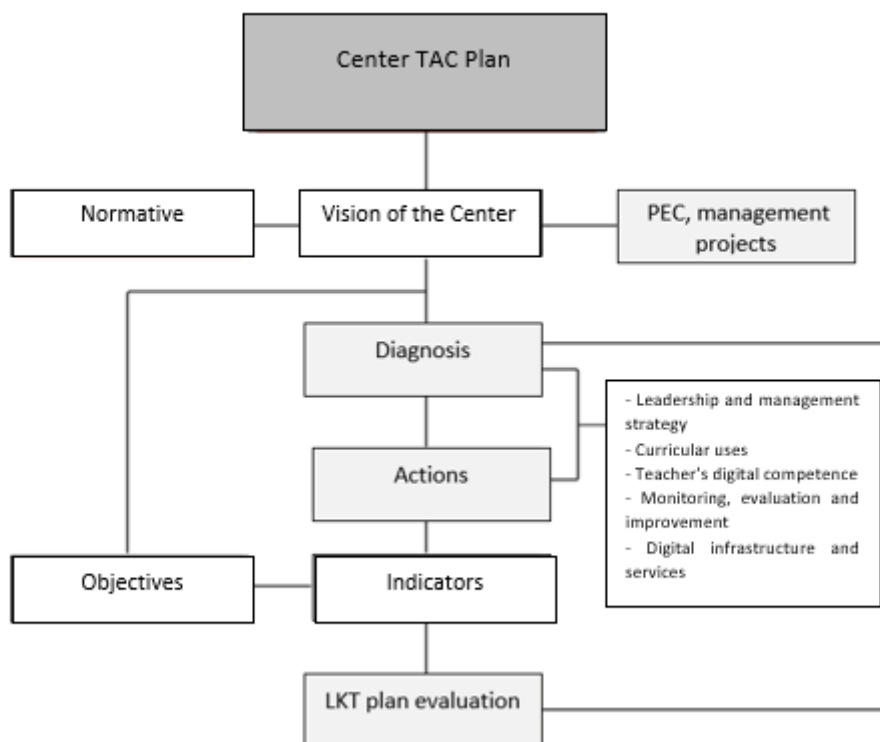
DECODE

Co-funded by the
Erasmus+ Programme
of the European Union

Figure 1: TAC plan organisation chart

In the TAC plan, decision-making is carried out based on **shared responsibility** in different areas: management team, pedagogical coordination, TAC coordination or TAC commission, department heads in the case of secondary education, school council or AMPA (in English: association of students' Mothers and Parents). The conception and application of the TAC Plan was intended to involve the whole educational community, with a management team in order to impulse and lead the whole process (Vivancos, 2010).

The different phases of the TAC plan are:

1. Definition of the vision of the center with regard to TACs in accordance with the specificities of the educational project of the center, the current regulations and for a specific time period.
2. Diagnosis of the digital maturity of the center (both in the curricular area as in the uses of management, organization, etc...).
3. Definition of objectives.
4. Planning priorities.
5. Identification of the necessary resources.
6. Allocation of tasks and responsibilities to different authors.
7. Plan applications.
8. Evaluation of the process and establishment of new objectives.

The TAC coordinator takes on a special role on the TAC plan and can be part of a TAC commission. All centers, whether or not they have a TAC Plan, have a **TAC coordinator**, whose functions are (Vivancos, 2010):

- To have the license of use for all the program that is used in each one of the computers of the center, fomenting free software.

- Take into account the respect for copyright and accessibility criteria in the digital materials published by the center.

- Ensure that the website of the center incorporates the graphic identification adapted to the Visual Identification Program of the Government of Catalonia.

- Ensure correct application of the principles of data protection legislation and the promotion of conduct that preserves ethic values.

Catalonia is an Autonomous Community that has prioritized the processes of ICT integration and, at least from the government, guidelines have been given for its implementation in the centers. Logically, the degree of implementation depends on the possibilities of each center.

1.3- National funding programs for the adoption and the development of ICTs in education

1.3.1 Main education funding programs in the Spanish context

The educational policies that aimed at incorporating ICT in schools in the Spanish context have a historical trajectory of more than a quarter of a century in the Spanish state, the main one was the **Atenea program**, driven by the Spanish Central Government during the eighties, subsequently converted into **PNTIC** (*Programa Nacional de Tecnologías de la Información y la Comunicación, in English: National Program of Information and Communication Technologies)* (Area et al, 2014).

In the mid-1980s, the Ministry of Education and Culture (MEC) was institutionally considering the integration of information technologies in education for the first time (The introduction of computers in schools: The Spanish Atenea project, 1991). Thus, in April 1985, a working group created at the request of the Ministerial Commission on Informatics and the Technical General Secretariat of the MEC presented a document titled "**Atenea Project**. A proposal for the rational integration of new information technologies in primary and secondary education" .

The abovementioned document on the Atenea project presented the general objectives for the effective integration of technology into education. These objectives were:

1. To promote the basic knowledge of Computer Science and its applications, taking into account its impact on all the factors that define the social context.

DECODE

Co-funded by the
Erasmus+ Programme
of the European Union

2. To improve the learning process of students.

3. To use the computer science and its applications as means of constant pedagogical renovation of the teacher.

According "*The introduction of computers in schools: The Spanish Atenea project*" (1991), in 1985 the MEC launched a pilot project with budget for teaching materials. It was applied in non-university centers of 11 autonomous communities and in Ceuta and Melilla. Out of the project were the six communities with competencies in educational matters that developed similar programs but with different names, as the case of Catalonia. The main conceptual aim of the project was to experiment with the integration of new technologies in different areas and curricular subjects instead of developing a specific subject of computer skills.

Since 1987, with the creation of the **PNTIC** (Program of New Technologies of Information and Communication), which encompassed the Atenea and Mercurio projects, the objectives were redefined, the lines of action were outlined, the contents and methodology of the training of teachers and the equipment were formulated and educational software were expanded and improved, imposing the computer classroom model with 10 computers. It was a model that survived until the 21st century (Atenea and Mercurio project, 1989).

During the last decade of the twentieth century and the first decade of the XXI, regional educational policies to integrate ICT in schools in Spain were raised and implemented without there being shared objectives or actions between regional governments; these were policies that followed European directives but were partly funded by the European Union. They agreed on some actions such as: provision of computer rooms to centers, teacher training or production of digital educational materials (Area et al., 2014).

Among other features, these projects of diverse nature throughout the nineties and the first decade of the 21st century were characterized because they intended to (Alonso et al., 2012):

- Provide technological resources (computers mainly) to the centers to properly undertake the tasks of management and administration.

- Provide Internet connectivity to these centers through broadband.

- Create computer classrooms in the centers with a sufficient number of computers so that teaching practices complementary to the ordinary classroom could be developed.

- Develop teacher training plans that enable them to use computer tools and resources.

- Create and generate educational materials of a digital nature (first in CD-ROM format and later online) that served to carry out activities with ICT.

The Escuela 2.0 Program

The Program Escuela 2.0 (School 2.0 Program) was an ongoing program between 2009 and 2012 and was an initiative included in the so-called E-Plan aimed at reactivating the Spanish economy, with **a budget of 200 million euros** financed between the central government and the Autonomous Communities (Alonso et al., 2012).

The School 2.0 Program in Spain was framed in a global context that, in the middle of the first decade of the 21st century, began to develop policies aimed at incorporating technology in the classroom. These policies began to shape what became known as the "1 x 1 model", that is to say one computer per child (OECD, 2010).

The School 2.0 Program had a similar **philosophy** to other 1x1 projects, in which it was intended to incorporate ICT successfully and transforming the educational practises of schools (Area et al, 2011). Some of the ideas of this shared philosophy were (Alonso et al., 2012):

- To provide sufficient technological and telecommunication resources to the schools with organizational and functional quality.

- To change the meanings, beliefs and pedagogical culture of teachers and other educational agents.

- To reformulate and stimulate new practises in the organizational culture of the center and involve families in educational actions with ICT.

- To evaluate impacts, exchange experiences and build self-knowledge on the 1x1 model.

- To define the educational model for the 21st century school through policies 1x1.

The **objectives** of the program were:

1. That young generations acquire skills and competences based on ICT.

2. Reducing the digital divide between individuals and social groups.

3. Improve students' educational practices and academic achievement.

The **autonomous communities** that participated in the program were Andalusia, Aragon, Asturias, Cantabria, Castilla-Leon, Castilla-La Mancha, Catalonia, Galicia, Extremadura, Balearic Islands, Canary Islands, La Rioja, Navarra, Murcia and the Basque Country. The autonomous communities that didn't want to adopt this policy were Madrid and Valencia.

The School 2.0 Program was intended, in principle, to students in 5th and 6th grade Primary Education, although in Catalonia and Extremadura focused on the first courses of Compulsory Secondary Education (ESO).

Some of the **results** of the School 2.0 Program program have been (Alonso et al., 2012):

- About 650,000 students in the third cycle of Primary Education and the first cycle of ESO have a laptop as a learning tool.

- 30,000 digital classrooms have been put into operation.

- More than 160,000 teachers have participated in ICT-related training activities.

- Significant boost has been given to the production and use of digital educational content by both educational administrations and the publishing industry.

At the autonomic level, this program was linked to the following projects in the following autonomous communities, and in general lines, the programs coincided with the objectives of the School 2.0 Program (Area et al, 2014): **Educastur**: Asturias, **Escuela TIC2.0**: Andalusia, **Clic-Escuela 2.0**: Canary Islands, **Educat 2.0**: Catalonia (that will be analysed in subsequent section) and **Eskola 2.0**: Basque Country.

In April 2012, the *Secretaría de Estado de Educación, Formación Profesional y Universidades* (State Secretariat for Education, Vocational Training and Universities) of the Ministry of Education, Culture and Sport published the budget cuts for the Spanish education system. It was then when, among the various educational policies, **announced the extinction of the so-called School 2.0 Program**.

The arrival of the "School 2.0 Program", according to Area et al. *(2014)*, have not completely reversed the situation of ICT in education the Spanish context, because has had a fundamentally technical character, without didactic applications. However, according to the same article some trends that have emerged since the School 2.0 Program have been: the slow disappearance of textbooks on paper; the creation of educational content platforms that promote the development of digital competence; the incorporation of tablets in the classrooms; the enhancement of wireless technology for access to the network of centers; the consolidation of the interactive whiteboard in the classroom; the promotion of web portals or online educational resources; the introduction of the BYOD model (Bring Your Own Device); and the consolidation of the virtual classroom concept.

1.3.2 Main education funding programs in the Catalan context

Programs prior to Educat: PIE and XTEC

There are two projects to highlight in the Catalan field prior to the Educat program.

The **Programa de Informática Educativa** (PIE, in English: Educational Informatics Program) was a unit of the *Department of Ensenyament of the Generalitat de Catalunya* (Department of Education of the Generalitat of Catalonia) created for Decree 31/1986 in mid eighties with the aim of promoting and coordinating the educational integration of information technology in non-university education and supporting it.

In this line, the second article of Decree 31/1986 stated that the objectives of the PIE were:

- To contribute to the improvement of the teaching process and to favour the development of the capacity and to pose and to solve problems, the intuition and the creativity.

- To promote the use of the computer as an academic management tool in non-university educational centers.

- To increase the incidence of informatics, as science and technology, in the curricula of all training plans, both general and specialized.

- To coordinate the experiences that in the field of educational informatics are carried out in the centers of the different non-university educational levels of the Department of Education.

A decisive factor in the decision to create the PIE was the guarantee of a significant investment in computer equipment. In fact it can be considered that the PIE was the organization created to coordinate the actions derived from the investment agreed in this protocol of cooperation.

The provision of equipment and related equipment was carried out over four years, with items of 3 million euros, 3.76 million and 4.12 million allocated in the budgets of the years 1987, 1988 and 1989. (Mominó, 2007).

With regard to the other project; the *Xarxa Telemàtica Educativa de Catalunya* (XTEC) (The Telematics Educational Network of Catalonia) is a public telematics network at the service of primary and secondary schools in Catalonia.

It was created in 1988 and a first version was put into operation in 1989, within the framework of actions of the Educational Informatics Program (PIE), with services of electronic messaging, educational news, and access to databases. Since 1995 it is an online service, used by teachers, students, educational centers, educational services and other estates related to the teaching.

It proposes a whole series of telematic tools: file hosting service, interactive blogs, electronic mail, official information, pedagogical resources, permanent teacher training, information and pedagogic games for students. Also, it hosts websites of teachers and educational centers.

Educat 1x1 and 2.0

The EduCAT1x1 project (2009-2011) can be considered as a own and specific of Catalonia concretion and adaptation of the project "School 2.0" (Government of de Catalonia, 2010), mentioned before. The initiative focused its first actions in secondary schools (1st and 2nd year of ESO) and later in 5th and 6th years of primary school. There were no conditions of the centers to enrol in the EduCat1x1 project (Alonso et al., 2012).

The Educat 2.0 project was the continuation of the Educat 1x1 program, with an investment of 42 million euros (Departament de Ensenyament, 2011). Unlike the Educat1x1 project, there were criteria for the centers in Educat2.0.

Within the framework of these projects, the Catalan educational administration proposed four main lines of update (Alonso et al, 2012):

1. **Digitalize the classrooms** (generally in the first courses of Secondary and punctually in some centers of Primary). A laptop was provided for the students and teachers participating in the project. The classrooms were equipped with projectors and interactive whiteboards. The electrical installation of the centers was adapted.

2. **Ensure the connectivity of all secondary schools**. The classrooms of the schools were provided with connectivity to the network.

3. **Promote access to textbooks and other digital content**. The creation of the educational portal ATRIA was promoted: a platform that made it possible for teachers, students and families to access textbooks and other educational content in digital format.

4. **Provide training and advice to teachers**. ICT-related courses were offered and a TAC (Learning and Knowledge Technologies, LKT in English) consultant was assigned to the department at each center on a regular visits basis.

According to Alonso et al., (2015) the introduction of these programs allowed to amplify the concept of technology using it not only as a learning channel but to develop the basic digital competences and expand the learning context of the students. In this sense, and according to the authors, it could be affirmed that the 1x1 programs have promoted learning from technology, and that schools have been allowed to achieve a technological maturity that otherwise would not have been achieved, in addition to orienting training providers to give a step forward in the digital transformation and open the debate for management and universities to rethink the digital competencies of teachers.

Projects derived from the Educat programs

At present, there are many Catalan schools that continue to bet on 1: 1 models from multiple interpretations: from those centers where students from the first year of ESO have to buy a laptop (families pay 100% of their amount) and take it daily to class, from those who consider that the previous model is not a sustainable model and bet that laptops are owned by the center, from the financing of AMPAS (Mothers and fathers' associations) or local administrations (city councils), among other institutions and agencies (Area et al, 2014).

At the regional level, and at the level of Educat 1x1 and Educat 2.0, there is currently no unifying project. In any case, initiatives, plans or projects derived from, or related, to the eduCat 1x1 or eduCat2.0 programs have been (Alonso et al, 2012):

- Projecte Marsupial / Atria: A platform that is used throughout the Spanish state and has recently begun to be implemented in Latin America, which defends communication protocols between different publishing platforms.

- Punto Neutre: Created in 2012 by experts in metadata and members of the Departments of Education of the Autonomous Communities and INTEF, it was a portal next to Atria that didn't find any kind of reception among those responsible for TAC (Learning Technologies and Knowledge) in Catalonia or among the publishers of the sector.

DECODE

Co-funded by the
Erasmus+ Programme
of the European Union

- Alexandria: It is an initiative of the Department of Education of Catalonia based on Open Educational Resources, which allows to upload some kind of digital educational material, such as Moodle courses, to facilitate their subsequent localization and exchange. To share the new resources it is necessary to have a user number and password of the XTEC network.

- Xarxa EduCat: Social network within the NING that serves as a communication space and as a platform for the design and organization of open workshops, activities that are not regulated, do not have a final certification and that start from the interests and collaborative work between teachers . It is a modality that moves between the concept of MOOC and community of practice.

- Centres de Recursos Pedagògics (Pedagogical Resource Centers): The Pedagogical Resources centers are teams that support the pedagogical activity of the centers and the teaching task of teachers and teaching staff, especially in the areas of ongoing training, pedagogical resources and the dynamization of projects in the center and in the area, as well as media resources of educational technology.

In the near future, the Government of Catalonia plans to publish a resolution presenting two innovation programs related to ICT. Firstly, one expanding the MSchools project[1], which was already instated, and secondly, STEMcat, a program to foster mathematical, scientific and technological vocations for students, and which aims to expand training in teacher technology.

1.4- Teacher's Digital Competence

In this section two frameworks related with teacher digital competence will be described: the Common framework for Teaching Digital Competences in Spain and the Project of Digital Teaching Competence in Catalonia. These frames of reference emphasize the Digital Competences of teachers and their implementation in educational practice.

1.4.1- Spanish context: The Common Framework for Teacher Digital Competence

The Ministry of Education, INTEF, created in 2012 the Common Framework for Teacher Digital Competence based on DigComp. The use was agreed between the State and Regional governments. It is used as a base for planning teacher Professional Development programmes, such as MOOC, NOOCS and other digital resources (European Commission, 2017). In 2015 Extremadura implemented Teachers Digital Competence Portfolio a document that details and organizes in levels the digital competences necessary for the exercise of teaching in the context of the current society (DOE 112, General Secretariat of Extremadura, 2015).

---

[1] Programa mSchools: Public / private collaboration initiative promoted by the Mobile World Capital Barcelona Foundation, in collaboration with the Government of Catalonia, the Barcelona City Council and the GSM association. The project has 3 axes of action: 1. Incorporate mobile technologies in a broad sense (mobile devices for personal use) in the learning processes. 2. To promote the digital competences and the entrepreneurship of the students. 3. Create an open environment for Education.

DECODE

Co-funded by the
Erasmus+ Programme
of the European Union

At the Spanish level, the Common framework for Teaching Digital Competences project was born in 2012 with the intention of offering a descriptive reference that could be used for training purposes and in evaluation, certification and accreditation processes. It became part of the "Plan de Cultura Digital en la Escuela (Plan of Digital Culture in the School)", whose set of projects are the result of a process of shared reflection that the *Ministerio de Educación, Cultura y Deporte* (Ministry of Education, Culture and Sport) opened with the active participation of the Autonomous Communities and external experts (INTEF, 2017).

Initially, the project, coordinated by the *Instituto Nacional de Tecnologías Educativas y Formación del Profesorado* (INTEF, in English: National Institute of Educational Technologies and Teacher Training), with representatives of 14 of the 17 Autonomous Communities and collaborating experts in this field, presented the corresponding lines of action of the project for the creation of a Common Frame of Digital Teaching Competence, aligned with the European guidelines, and according to the JRC DigComp model, that serves as a common reference to progress towards the certification of digital competence of teachers (INTEF, 2017).

In 2013 the draft version v1.0 was published, and in 2017 the Digital Teacher Competence Framework has been updated to its current version.

The "Common Framework of Digital Competence for Teachers 2017" is a standardized proposal that specifies (Figure 2) the digital competence through competency descriptors of 21 sub-competencies organized in 6 levels and five areas of competence (INTEF, 2017):

1. **Information and information literacy.** Identify, locate, retrieve, store, organize and analyse digital information, evaluating its purpose and relevance.

2. **Communication and collaboration.** Communicate in digital environments, share resources through online tools, connect and collaborate with others through digital tools, interact and participate in communities and networks; Intercultural awareness.

3. **Creation of digital content.** Create and edit new content (texts, images, videos ...), integrate and re-elaborate previous knowledge and contents, perform artistic productions, multimedia content and computer programming, know how to apply intellectual property rights and use licenses.

4. **Security.** Personal protection, data protection, digital identity protection, use of security, safe and sustainable use.

5. **Problem solving.** Identify digital needs and resources, make decisions when choosing the appropriate digital tool, according to the purpose or need, solve conceptual problems through digital means, solve technical problems, use creative technology, upgrade own competence and that of others.

This is an adaptation (Figure 3) to the teaching profession of the European DigComp Framework, updated in September 2016, for any European citizen in relation to the Digital Agenda 2020 (INTEF, 2017).
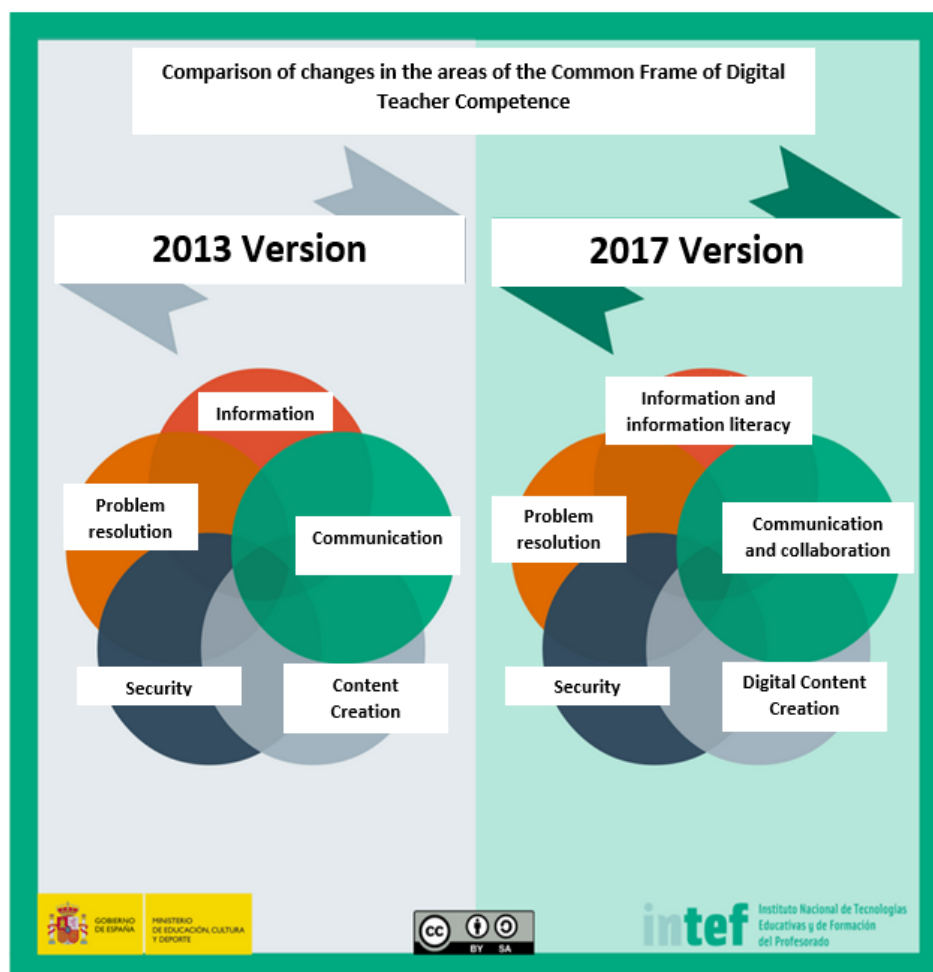
(Figure 3, INTEF)

1.4.2- Catalan context: The Project of Digital Teaching Competence (PICDD)

The Projecte Interdepartamental de Competència Digital Docent (PICDD) (Project of Digital Teaching Competence in English) was created in 2014, with the objective of identifying the digital competences of non-university teachers and establishing the framework and design of the ways for acquiring and accrediting these competences, both in initial training and in-service teachers (ENS/1356/2016 resolution, DOGC, 2016).

During 2015, the Catalan government approved the definition of the different digital competences that should have Catalan teachers. This work was the result of the Interdepartmental Project of Digital Teaching Competence (PICDD), which aimed to guarantee the digital competence of non-university teachers in Catalonia. The project was coordinated by the Department of Ensenyament, with the participation of representatives of all the universities and the Departments of Business and Economics and Knowledge (ENS/1356/2016 resolution, DOGC, 2016).

In this project, **Digital Teacher Competence** is understood *"as the ability of teachers to apply and Transfer all the knowledge, strategies, skills, and attitudes of their professional practice in order to* (ENS/1356/2016 resolution, DOGC, 2016)*:*

a) *Facilitate students' learning and acquisition of the digital competence.*

b) *Carry out processes of improvement and innovation in teaching in accordance with the needs of the digital age*

c) *Contribute to professional development in accordance with the processes of change taking place in society and in schools. The Digital Teaching Competency (CDD) consists of knowledge and skills of two types: ICT competence related to instrumental use Of the technologies (CDI) and the didactic and methodological aspects".*

Within PICDD, a proposal for the definition of digital teaching competence was developed. On the other hand, a set of recommendations for implementation and accreditation has been made, both in the initial training and among in-service teachers. A proposal for an implementation timetable has also been established, with a 2020 deadline, in line with the digital agenda for Europe and the Digital Agenda for Catalonia (idigital) (Government of Catalonia, 2015).

In this project, the initial and continuous training of ICT teachers was analysed in order to make proposals. In this sense, the project defined five areas or dimensions of digital teacher competences:

1. **Design, planning and didactic implementation.** Ability to select, use and evaluate digital support technologies in the definition and execution of the teaching-learning process, inside and outside the classroom, to optimize the planning and dynamic organization of the experiences, activities and resources planned to guarantee the acquisition of learning and facilitate collaboration and dissemination among the educational community.

2. **Organization and management of educational spaces and resources.** Ability to organize and manage, in a responsible and sustainable way, the digital technologies in a way that facilitates and/or allows to improve working conditions, both in terms of educational management and didactic level.

3. **Communication and collaboration.** Knowledge, skills, attitudes, strategies and sensitization required when using digital technologies to communicate, collaborate, create and share content and build knowledge in the framework of the design, implementation or evaluation of an educational action between teachers and the students.

4. **Ethics and digital citizenship.** Knowledge and assumption of the implications derived from the use of digital technologies in the educational field in terms of legality, security and digital identities. Training of students on these courses as long as they make an ethical and responsible use of these technologies.

5. **Professional development.** The competences related to the professional development of the teacher have to reflect on their professional practice, in relation to the educational challenges posed by today's

society; As well as the involvement in virtual educational environments, where it configures its professional digital identity, contributes and disseminates educational resources and is formed on a permanent basis.

DECODE

Co-funded by the
Erasmus+ Programme
of the European Union

2) Description of the national surveys results

2.1- Development of the Focus Group

The **Focus Group** have had one group of 24 participants, all of them from Catalonia and numbered to carry out the analysis. The participants have been chosen based on their **profile as ICT experts** and extensive professional experience in the ICT and education sector. In addition, most of them are school teachers who have been TAC coordinators.

To **develop** the discussion group a structured virtual forum was created and divided into different sections, with different issues within each section. The sections were activated progressively by a moderator, so the participants had time to make their contributions and enable communication between them. New questions or reflections were introduced by the moderator at specific moments to generate debate.

Focus Group was performed for three weeks, during the month of March. Once the period for the completion of the focus groups was finished, and all the contributions and communication among the participants were made, all information was emptied into documents and an **analysis of the discourse** was carried out, in which the most relevant and significant information was extracted, and summarized below.

2.1.1- Analysis of the Focus Group

a) Emerging teacher skills in digital era

In the first block, where participants were asked for the key competences of the 21st century, various **official documents** and **reference frames** were cited. These documents share the idea that the integration of ICTs and the promotion of digital competences is absolutely basic for teachers in the 21st century society.

Starting with the references made by the focus group participants, *P1 (participant 1)* shared those that according to the World Economic Forum (2016) are the 16 key skills of the XXI century, and that teachers would also have to have.

Following with the official documents, *P5* cited the four great dimensions explained in the digital competency documents of the Departament d'Ensenyament (2013), cited in point 1.2.1 "Defining and deploying basic skills in the digital field" (Government of Catalonia).

The other participants cited the skills they **personally** and **professionally** believe to be key to SXXI society. In this sense, the majority of participants share the idea that **nowadays the use of ICT technology is relevant and necessary**, and thus the promotion of digital skills, but there are also nuances in how to define, focus and address this digital or technological competence.

In the one hand, many participants of the focus group have cited **digital competence,** and have considered it a competence with its own entity, and in the other hand, many of them consider it a **transversal** competence, because it relates to critical thinking in the global world, civility, interaction and communication. In this sense, *P5* makes an interesting summary of the characteristics of the transversality of the competences related to ICT:

1. Select, configure and program digital devices according to the tasks to be performed. It includes the need of critically differentiate which digital devices have to be used according to the needs of the task, moment and situation, so people must be digitally literate. But it also considers, know how to use different software and applications, configure cloud computing spaces, elaborate and manage digital documents, or image and sound editing.

2. Search, contrast and select digital information suitable for the work to be done, all considering different sources and digital media. Participants highlighted the importance that any person in the digital age need to be able to define and apply accurate search criteria, and to know search engines beyond Google. In addition, they need to have a critical vision of the information found and discriminate useful information and contrast it with several sources in order to verificate its pertinence. And it goes beyond searching information, it requires to organise and use a personal work environment and learning with digital tools to become profligate in the knowledge society. As P15 stated: "*It is important to understand the various aspects of the information search process, (...) to evaluate the results obtained in the searches according to the utility to solve an information problem and (...) to choose from the results obtained those that are more suitable according to quality criteria*".

3. Participate in interpersonal communication environments and virtual spaces. Considering the explosion of virtual spaces and Social Networks, is very important that Digital Competence, according to most of participants, includes communication skills and strategies to interact online with others and to develop criteria that allow them to share the adequate information considering the space in which will be published such as social networks. In fact they stated the relevance of the correct and proper use of social networks.

4. Citizenship, security, sustainability and ethics in the use of ICT, as experts on the use of ICT in education, participants showed to be aware of the civic dimension of the use of technology. They highlighted needs such as the respect of a code of conduct to be active online, the responsible and ethical use of digital resources and the awareness of benefits and risks of use of ICT for personal development of today's society. Being responsible for the use of ICT.

It is important to highlight the role of **technology** in relation to key competences. According most of the participants, is needed to integrate technology in all aspects of life, but this integration, as can be seen in the description of the digital competence above, is not enough by itself and has to be accompanied by critical thinking. *P4* states that citizens "*do not have to be simple users of basic search engines, they have to interpret the data they find and use it for their benefit depending on the situation*". But they don't forget the relevance of the instrumental use of ICT, as P5 indicates "*Basic knowledge of computer systems and networks is important (...) and computer equipment management: operating system management, storage unit management, connection of peripheral devices and basic maintenance*". Also, skills in the digital age should include those

related to **attitudes** when using technology, since "*technologies must be used responsibly and efficiently as a means of communication and interaction.*" (P9) and "*is needed a proactive attitude towards networking*" (P10).

As P4 indicates, regarding the educational environment, **instrumental** digital competencies can be separated from **methodological** ones. In this sense, P4 presents the strategic plan for integrating ICT (**IntegraTIC**) of the educational institution where he teaches, and in which there are defined the following methodological competences related to the educational use of ICT:

- Plan and design learning objects and tasks.
- Select technological resources and evaluate them based on their validity and suitability for their subsequent implementation in the case that is necessary.
- Evaluate the students' learning of the content and the appropriate use of the technology, using a variety of evaluation instruments that reflect the evolution of the student throughout this process.
- Identify and use methodologies that reinforce estimable human values, taking into account human, ethical and social issues.
- Promote meaningful student learning through student-centered strategies.
- Give support to the learning needs of students respecting the different rhythms in the focus of digital content.

When participants were asked to briefly synthesize the competences mentioned and which were the most important, they commonly mentioned the **selection of information**, **communication and online collaboration**, **use of technology** and **civics**.

There is an expectation and interest in get to know how new technological tendencies can affect these key competences in the XXI century and how citizens should evolve to adapt to this tendencies, as pointed out by participant 7, "*In just 17 years we have seen disruptive computer tools have transformed many areas of People's lives: Facebook in 2004, YouTube in 2005, Twitter in 2006 and WhatsApp in 2009. Now, we are at the doors of the robotic invasion, big data, artificial intelligence and the fourth industrial revolution. The citizens of the 21st century have to live in a constant evolution, in a continuous learning, as the environment constantly changes (...) one of the key capabilities is that of adapting to a constantly changing environment*".

In this sense, regarding the **role of the school** in the promotion of the emerging teacher skills in digital era, P22 summarizes which is the current situation: "*despite the fact that society is increasingly aware of the need for change and educational transformation to respond the current demands and needs, the school continues to be linked to obsolete and decontextualized practices that are distant from the development of the competencies cited in this discussion group (...) Preparing the students for these competencies implies changes at different levels: organizational, spatial, architectural methodological and technological*". Therefore, according to the P7 "*we have to **plan gradual changes** that do not have a lot of risk, that will expand the comfort zone of the teaching staff, that bring good results, that give confidence and that motivate them to continue online.*"

Regarding the role of schools in acquiring these competences, the focus group has raised the need to strengthen **TAC coordinators** beyond technical issues, since "it is necessary to separate the ICT coordinator from the one responsible for maintenance (...) the TAC coordinators must have good ICT and TAC competence" (P5). In this sense, according to P8 "*although they perform an acceptable job, it is necessary to consolidate the relevance*

DECODE

Co-funded by the
Erasmus+ Programme
of the European Union

of the ICT coordinator (TAC) as a catalyst for innovation and the necessary commitment to a methodological change of teaching staff, as well as the renewal of educational methodologies to strengthen The didactic use of ICT. In addition, it would be necessary to offer support to those teachers who implement the continued and systematic use of ICT, since unlike most content, these are changing by definition".

The **leadership** of the management teams is also fundamental "so that the schools improve the digital competence of teachers and consequently increase their use in schools and reach the students" (P20). In this sense, this participant considers that "ICT knowledge and competences should be a requirement from university studies". Another solution may be "to host computer technicians in practices (...) has worked in our center" (P7). Schools are concerned with competency learning, but this point is still not resolved.

It should be aware of the importance of ICTs and the competences related to their use; competences in the digital age include those most related to methodological and attitudes processes linked to the use of technology and adaptation to change.

b) Innovative practises with ICT

When participants were asked for innovative educational practices with ICT, they shared several interesting initiatives. The most relevant have been highlighted.

- P5 describes the practice, also cited by other participants, "Mobilitzem la Informàtica (Mobilise computing)" experience, for the optative course in "Informatics" of 4 of ESO.

  The project consists on the design and programming of an APP for mobile devices. The students work in groups of 5, and throughout the course the use of different tools and applications is considered. The course is structured with the following parts: Multimedia Creations, Publication and dissemination of contents, and Tools for communication.

  As *P5* explained "*the thread of this didactic proposal is the approach of a project that works in groups, focused on the design and programming of an app for mobile devices. Throughout the process different tools and applications are used, in a well contextualized and guided way, until reaching the final product. Therefore, the integration of ICT in this proposal is quite relevant, in addition to working in a very wide range of skills*". As participant 11 stated, it is a very complete experience because "*it is necessary to learn the use of necessary tools such as audio and video processing, website creation, APPs programming language, economics and marketing concepts, cinematographic script, security and digital attitude, and ethical code in the use of the TIC* ".

- P1 explains a few educational practices that he is currently using and which he finds particularly interesting about the use of ICT. TECNO 12-18 is digital textbook that allows users to configure the books of each course by independent chapters. The book allows to work the contents with animations "*and allows the students to carry out activities of self-evaluation on the knowledge of each subject*".

The book of each group or class is formed by selecting 6, 8 or 10 chapters from among all available, which allows teachers to adapt to different curriculum designs. When the student enters his / her individual access key, he / she visualizes the structure of his / her book, which will have the chapters chosen by his / her teacher.

The digital book is designed to be used in conventional computers, mini-notebooks, Windows tablets and digital whiteboards. It can be used from any computer with Internet connection, from the center or from the students' or teachers' homes.

- *P1* also comments a couple of projects she is working on. In the first of them she works collaboratively with students of the technology optative subject **to design an APP for Android (App Inventor) that allows them to control 10 robots**, assembled with Arduino (Arduino is an open electronic platform to create prototypes based on free software and hardware) to play a soccer match.

  In this course, explains the P1, as a great novelty "*we will work together with the students of the technology optative, about 40, to design an Android App (using App Inventor), that allows to control 10 robotics that will design the technicians with Arduino. Then, they will be divided into 2 teams and will play a football match, 5 against 5; so this experience has a real teamwork among technical students, computer and teachers*".

- *P5* comments a project where he is involved called **Summem.cat**: A project from the Escuela Pia de Catalunya for interdisciplinarity in the classroom, promoting teaching / learning from interdisciplinary learning paths, with active methodologies based on work by projects, problem-based learning, investigation and service learning.

  The project promotes a cooperative structure of work making use of communicative tools, based on practical, real, contextualized and transferable learning; that ensure the attainment of skills, attitudes and skills

  The role of ICTs is highlighted in the subjects and areas involved in interdisciplinary work. As indicated in the guide document of the project "*the areas of Social Sciences, Citizenship, or Experimental Sciences and Technology will usually be the nuclear areas of each one of the blocks of the interdisciplinary didactic proposal*".

  According to P5, this project "*seeks to progressively implement innovative educational praxis, based on other key foundations, project learning and research, using ICTs in a preeminent way (...) Is innovative because it aims to change the process by which the students get to obtain the competences of the citizen of the S.XXI*".

- Two other innovative educational practices, are cited by P21. The first one is a program of the educational project of l'Escola Projecte (a School called Project School in Barcelona) in which it presents a series of workshops with videogames to "*through the use of the technologies from a playful vision to favour the learning of the students*".

The Escola Projecte integrates in its educational project a program that through the use of technologies from a playful vision as a methodology to promote learning, presents a series of workshops with videogames as the main axis. Thus, in different courses of the Primary Education, the following workshops are worked: Analysis of video games, Creation of video games, Introduction to robotics, Creation of interactive digital narratives and Programming with real objects. In this innovation project the collaborative work among teachers stands out for its potential in the learning of the cloister, helping to establish common goals.

- The other project cited by P21 is one carried out by the [Escola Arenal de Llevant](#) that consists on an educational project based on the double axis of science and technology. Students do not have individualized textbooks and the main methodology of the center is work by projects, in which students have to learn to answer their own questions, "*thus fostering innovation processes and keeping curiosity alive as an aspect Key to promoting lifelong learning*".

It is interesting to note that when innovative practices are mentioned it have been cited **projects**, as well as **Apps** or **initiatives**. For P8 "*the resources that help the student in the labor market are very important*" and has named several useful tools such as [Kahoot](#)!, [edulastic](#), [evernote](#), [plickers](#), [quizalize](#), [socrative](#) or the [Google Apps](#) package. This participant highlights [Europass](#), [Todofp](#), and [SOC](#), three portals that provide users with resources to find work at the European, national and regional Catalan level, respectively.

As for **why are these practices innovative**, focus groups have generated an intense debate in this respect, *P22* synthesized this debate stating that that these practices are innovative "*because they amplify the possibilities and opportunities of learning of the students, generating more enriched scenarios where the students acquire a leading role. (...) spaces of interaction and collaborative construction of knowledge are created, and learning is established as a social fact, real and contextualized. (...) They are practices where the evaluation goes beyond the simple qualification and is part of the learning process of the students, becoming authentic and formative*".

As a highlighted summary, P11 understands as innovative practices "*all those methodologies that place the student in a network as subject and object of the teaching and learning process. (...) Although not all ICT-based practices are innovative, in most cases they are likely to be innovative: belonging is in the capacity and ability of teachers and educational institutions*".

ICT plays an important role in these innovative practices as they "*break the space-time barriers; bring people closer together and boost their collaboration; allow you to go beyond the walls of the classroom and connect with students' real life experiences; and act as facilitators of learning and as enablers of knowledge creation*" *(P4).*

In this sense, it is interesting the reflection made by the P7: "*In many centers the use of mobile phones is totally prohibited, although there is a document from the School Council of Catalonia that recommends its use. We complain about the lack of connectivity, lack of devices, malfunctioning devices, and we ban personal devices when there are examples that the **BYOD (bring your own device)** model can be a valid model at certain time*s".

DECODE

Co-funded by the
Erasmus+ Programme
of the European Union

c) Teachers' Professional Development

In the first place, as the *P5* indicates "*a teacher, as it also happens with other professions, as doctors or lawyers,* **never has to stop forming**, *through lectures, face-to-face courses, online, meetings, teachers' associations... Digital and written publications, as well as the adequate monitoring of social networks, so as to be up to date in this area*". P8 warns that "*the teaching task sometimes leaves the teacher isolated within his own classroom. Therefore you have to find strategies to carry out the update of content and methodology. (...) Social networks like* **Twitter** *are a good tool for empowering the teaching practice, 'following' certain 'nodes' that facilitate many resources*".

Participants have cited a multitude of ways of teachers' professional development. P2 makes a list of ways in which teachers can update permanently, some of the most outstanding are:

- Carrying out innovative methods and tools in the workplace.

- Participating in professional networking groups.

- Attending courses and conferences.

- Reading the news of the areas of interest.

- Collaborating with colleagues.

- Learning from the students.

- Incorporating new resources of teaching practice as usual.

- Designing training actions.

An interesting point, quoted by P12, is the **daily update in ICT** to participate in other contexts and its application in the classroom. At the center level, P12 emphasized the implementation of didactic strategies in the integration of ICT, which could be "*improve the teaching / learning processes, incorporating technology in didactics and organization, promoting the use of devices for networking and enhancing the reflective practice of teachers*". At the UOC, the ICT update has a response in the **CTIC** course that promotes the use and application of ICT in the academic and professional spheres. At the Catalan Autonomous level, the Department of Education of the Government of Catalonia offers LKT telematic courses from the TAC area, at basic, advanced level and specific courses.

Another way to update professionally mostly recognised by the participants is through being **active online**, since as P14 says "*trying to participate in the network as a content curator is a very formative practice. The process known as the 4S (Search, Select, Sense making and Share) greatly facilitates both being well informed and sharing what is really relevant, concretizing the original formation*". **Virtual groups** are cited as a good meeting point for professional updating. In this sense, the *P1* indicates that it is in several of these virtual groups "of which

the most active is the one of **Tecnoprofes**, the educational network educat 2.0 and Fundació Bofill". The participant also finds interesting and useful to follow different profiles on Twitter and blogs. "

Also be active by participating in **projects of teaching innovation**, such as those presented by the P6 that are "a training program for an appropriate use of technologies aimed at parents teachers and students and a blog that collects different information around the use of iPads in a school environment. In this sense it is interesting to highlight **personal initiatives** made by some of the participants, which have been doing training in the center, such as the P1, that this course, with other professors, has set up in the institute "*a working group on robotics and programming, a the level of technology, mathematics and natural sciences, along with 6 teachers with a desire to do thing*s".

Another of the participants, *P4*, comments the strategic plan for integrating ICT mentioned before **IntegraTIC** in which he collaborates. As he stated, "*the dynamics of this training will vary according to the degree of knowledge and skill of each teacher, trying to adapt to the basic objectives of ICT implementation*". According to this participant, "*the dynamics of this training will vary according to the degree of knowledge and skill of each teacher, trying to adapt to the basic objectives of ICT implementation*". In this plan the following objectives are proposed as long as they are achieved within three years:

- At the technical level: It is intended that all the teacher of the center can solve basic incidents in the classroom, both machinery and program.
- At the level of tools and resources: It is intended that all teachers use correctly and efficiently the programs and platforms necessary for pedagogical practice.
- At the methodological level: It is intended that teachers create, produce and adapt the materials necessary for the proper development of their teaching practice.
- At the administrative level: It is intended that the center will happen open management, all simplifying the steps of administrative processes with the use of ICT.

Most of the participants share the idea that the formations consisted basically of formal courses and that today the use of **ICT expands these possibilities**, because nowadays there is a set of context configurations composed of activities, materials, resources and relationships that are generated in physical or virtual spaces and that provide learning opportunities and allow us to study the mechanisms of development and professional updating of different types of professionals. In this sense, many participants cite i**nteresting spaces** for professional teacher development outside the classroom such as conferences, face-to-face courses, online, meetings or associations. On the other hand, several participants commented that one of the channels, besides the regulated courses (face-to-face or online) are the **MOOC** courses "offered by prestigious organizations from around the world" (*P9*) or professionals (*P8*).

There is a consensus that teachers should put all competencies into play in educational practice and be able to be **constantly learning** in order to improve their professional activity and evolve according to social needs. However, there are important **limitations**, as the participant 22 explains, since "*depending on the context, teachers will have more or less possibilities to do a teaching with an intensive use of ICT. (...) There are centers that have integrated ICT in their educational project and have an adequate infrastructure and, instead, there are other centers that do not have Wi-Fi or digital whiteboards*".

According to several participants, the **training** and **accreditation** of digital competences "*must also be transversal to teaching pedagogical competences". The teacher must be able to use ICT appropriately in all areas of their knowledge*". According to the P1 is very important the **budget** in education at political level: "*teacher training has to be compulsory and continuous, more hours of training should be spent within the working hours of the teaching staff (...), but the totality of the change does not have to fall on the teachers, but in educational institutions, providing all those resources that we do not currently have or have lost, that is to say, a budget increase in education is necessary.*"

2.2- Development of the deepening interviews

The deepening interviews has counted with five experts in the education ICT policy area, duly numbered to carry out the following analysis.

Participants have been chosen based on their **profile** and extensive professional experience in the ICT and education sector. A semi-structured interview, designed based on required objectives, was conducted by each interviewee, during the month of March.

Once the interview over, all information has been **transcribed** and the most relevant and significant information have been extracted and summarized below.

2.2.1- Analysis of the interviews

a) Digital challenges for national education system

In the interviews is highlighted the need to update the educational institution in the new needs of society in the twentieth century and to "*overcome (by all agents) completely outdated structures and dynamics, the main educational challenge is **to adapt** to the new needs*" I1 (Interviewed 1) and "*transforming educational processes benefiting from the possibilities offered by **technology**" (I4).

For this adaptation "*ICTs have to be facilitators of this change and integrate into learning activities by providing equal added value as they do in other aspects of everyday life*" (I2), however, as the I3 pointed out "*ICTs by themselves do not provide a solution to the current school, but it cannot be ignored that without this technology education cannot be given in the times in which we live.*"

As a summary, some challenges highlighted by the interviewees are **the change of educational paradigm** "*From the industrial society to the network society*" (I3), fostering competences increasingly needed, such as critical thinking, problem solving, learning to learn, communication and collaboration, digital and information literacy, local and global digital citizenship (I2).

Another one is the need to move **from a teacher-centered school to a student-centered one** (I2); move **from content to knowledge creation as** technology is the basis in the educational innovation process (I3); **focus on dynamic, participatory, collaborative methodologies** to take advantage of technology in the classroom in a productive way to improve education (I2); and to **educate the technology**, rather than to technify the classroom, because Society is digital, everyone is connected and needs ICT. The school cannot be left out of this fact and therefore ICT, today, are indispensable in any educational process (I3). In this sense, ICTs have to be facilitators of this change, and integrate into learning activities by providing added value as it does in subtracting facets of everyday life (I5)

As the interviewees point out, in the current digital society, where everyone is connected, everyone needs ICT and therefore "the school cannot be left out of this fact (...) ICT are indispensable for any Educational process"(I3), although it is important to know how to integrate them in the educational process.

b) Evolution of national policies for ICT in education

All the interviewees cited the **1x1 programs** implemented in Spanish and Catalan (School 2.0 Program, Educat 1x1, Educat 2.0), highlighting the impact they have had on the integration of ICT in school and assessing its consequences.

As the I2 points out "*ICT education policies have been directly influenced by the country's economic situation, going from a program that invested many economic resources to a situation where economic resources have been reduced*" and there has been "*an **erratic process of educational policies**, which have been improvised if they have an integrated project in which ICTs are part of the transversal support of the entire teaching / learning process*" (*I3*).

In this sense, there are especially critical opinions on the 1x1 programs implemented in Spain, such as the one from the interviewed 1 that considers the 1x1 programs at Spanish level "***a failure**, promoted so that publishers, technology companies and banks have an economic benefit*". According to this interviewee the investment of the Catalan Department of Teaching has been reduced "outrageously, and the only initiatives of some scope are those developed by MSchools (...) to the detriment of small educational networks (LaceNet, ACTE, Espiral...)", affected by the lack of investment and the rise of multinational companies like Google, Apple or Samsung.

As summarized by the I2, there has been a broad policy for all to focus efforts on some specific lines as an impulse to the integration of mobile technologies in **mobile Learning** type educational centers and "*it is not good to adopt partial solutions or In the short term, it is necessary to be ambitious and to set open medium and long-term scenarios, which requires consensus at the highest level (among students, teachers, families, schools, administrations and industrial and educational sectors) of application of ICTs in education*" (*I4*).

The main limitations in the promotion of educational policies with ICT indicated by the interviewees have been:

- **Lack of economic resources.** The educational policies have suffered the cuts applied in Spanish territory (I2). The economic cuts in the Spanish and Catalan contexts, and the lack of funding by the

governments in the 1x1 programs, have paralyzed or provoked an irregular activity of the educational policies with ICT.

- **Lack of a firm commitment to turn technology into an ally of the new educational model.** Erratic process, which has been improvised without having an integrated project in which ICT forms part as a transversal support throughout the teaching / learning process (I5). Until recently, the focus was mainly on the availability of technology, mainly devices, in the classroom. Recently the focus has been on devices and has increased in other aspects, such as connectivity, teacher training, availability of digital educational resources, and finally the digital transformation of the educational center (I2).

- **Lack of teacher training, adapted to new learning models.** The main limitation is the formal structure and a totally outdated teacher promotion system that rewards seniority (I1). Deep digital literacy is required to acquire a digital teacher composition, both instrumental and pedagogical (ICT + LKT). Working with ICT to do the same that is done with ICT is expensive, incongruent, inefficient and tires the teachers (I3). There's a shared idea that there is a lack of a consistent and regular national or regional plan for forming ICT experts

- **Lack of clear educational policies.** Policies too broadly focused on certain specific lines such as the impulse to the integration of mobile technologies in "Mobile learning" (I3). After the 1x1 programs there is a gap between the schools and many teachers and teachers who freely explore new methodologies (I5).

According to I5, after the 1x1 programs there is a gap between the schools and many teachers who freely explore new methodologies, provoking a clash in the **attitudes** of those in favour of ICTs and those who opposed resistance. For the I5, after all, the important thing is "*to spread skills that foster the ability to effectively design and implement **learning situations** with the same resources (ICT or non-ICT) and that fit each need and context (type of students, objectives ...)*".

As I3 points out, "*erratic educational policies need to be eliminated in the implementation of ICT in the classroom. It is necessary to start from a **modern Education Law** and consensuated by the whole parliamentary arch that necessarily contemplates the implementation of technology as a transversal tool throughout the educational process. You can't change these policies according to the colour of the government of turn that leads to large investments that involve huge economic efforts with a very insignificant impact*". In this sense, the I2 affirms that these actions, initiatives or educational policies must be thought out setting medium and long term scenario, posing a process of continuous revision.

In order to favour these shortcomings, it is proposed (*I3*) to reach the **educational policy of excellence**, "*taking into account the voice of the protagonists (teachers, families and other social agents involved in the day to day of education) and Politicians are also digital competent to understand that a country that is progressing is a country in which ICTs are part of all walks of life, including politics and education*". Also " encourage **good practices**, not necessarily in an economic way, and encourage **professional exchanges**, stays in other centers of reference (...) *Therefore, each center would have to have a larger staff in order to allow a teacher to make specific exchanges*" (I5).

DECODE

Co-funded by the
Erasmus+ Programme
of the European Union

c) Innovative practises and role of ICT

The interviewees have cited several projects, although some of them have respect in saying that they are innovative. In relation to these practices "*ICTs play a fundamental role when they add value to these practices, that is, they allow them to do things that without them it is not possible*" (*I2*).

- One of the outstanding practices of the *I1*, managed from the LaceNet [2]network with the name World Mobile City Project, a collaborative project of georeferencing and mobile technology with more than 70 educational centers in Catalonia and the Valencian Country, and more than 5000 children and Young people, involved. This project consists of an activity aimed at young people, which allows them to know how to locate any point in the city by combining the classic media (cards, maps ...) using the latest technologies (Internet mobile, geolocation, QR codes, augmented reality ...) applying cooperative work in small working groups (World Mobile City Project, 2017).

- Other outstanding practices are (*I3*) a globalized work of external proposal of the Institut Quatre Cantons of Barcelona, that offers a totally contextualized way of learning in which the technology is invisible.

- Another outstanding practice is a global innovation project of the SINS Cardener in which ICTs are supported, as they allow a closer look at the concept of inclusive and personalized education, as it "*more efficiently addresses the educational needs and learning rhythms of students* ". This is an especially interesting experience as it addresses issues beyond ICT such as inclusive education.

- The I2 mentions a public school, Domingo de Algete in Madrid that uses ICT intensively to the point that in primary school they no longer use textbooks since the digital educational materials are produced by the students themselves under the supervision and organization of the teacher.

- A project that pretends to have relevance in Catalonia is the one of Escola Nova 21, that is defined as an alliance of entities and schools that have like objective to grow actions in the educational change, and that is not well valued by the participants, For "having few mentions to ICT and all that digital" (P3).

ICTs in innovative educational projects are effectively synthesized by *I4*: "*ICTs allow for the extension and diffusion of some of the objectives of education in the field of personalisation of learning, the carrying out of student-centered educational activities, learning based on challenges, and above all collaborative work, which can benefit greatly from the application of technology*".

Another area in which ICTs play a fundamental role is in **bringing education closer to the real world**, extending education beyond the classroom and including other areas of the student's life such as his family or personal interests or social circles (I4).

---

[2] LaceNet is an association of professionals of the education of the region of the Bages, interested in the educational use of telematics. Since 1995, it offers telematic projects to schools (LaceNet web, 2017).

d) Teachers' training and accreditation

There is a complete consensus that **teachers have to be competent** in the instrumental and methodological use of ICTs. In this sense, *I2* indicates that teachers "*should be part of the learning process of students from transversal and meaningful learning situations that promote problem solving, communication or creativity*". In addition, I1 points out that "*the main competence, with a good interdisciplinary cultural base and educational methodological skills (necessary in any profession), would be the ability to work in online teams"*.

The I3 clearly summarizes the main competencies that teachers have to have in the digital age related directly to ICT ar these ones related to "*encourage students to become producers of their own content and not a passive agent, become digital competent and integrate the technology in the active methodologies, promote teamwork, encourage respect and tolerance towards others, be in continuous training: **lifelong learning**"*.

To sum up, I3 proposes some lines of competence training that teachers would have to focus on:

- Instrumental use and methodological use of ICT.
- Promote its active role in the production of teaching contents.
- New active methodologies that enhance student learning in collaboration and projects.
- Be able to actively involve students in their training.
- Empowering the participation of families
- To give the bases to be formed throughout the life of autonomous form.

According to I2, "*training must have objectives in the development of information management skills, cooperation and collaboration, content creation, security management and digital identity, and the ability to exploit digital resources for problem solving concrete issues that arise in education*".

According to E3, "*teacher training should not be oriented towards the mere training in the use of digital tools, but mainly towards the learning of educational techniques that can benefit from the use of ICT in the classroom*" . In this sense, this interviewee presents the Internal Training Center (**FIC**), whose purpose is to contribute to the methodological updating of the teaching staff of the centers, giving value to their experience and knowledge, to favor the increase of educational success of the student.

Other proposals in ICT training indicate that it would be necessary "*to move from teacher training in ICT to lifelong training where ICTs were not the focus of learning but integrated to achieve good teacher*" (E2) competence. According to I5 it would be necessary to have a much more educated teacher in methodologies, classroom management and use of ICTs and, therefore, **lifelong learning** "is very necessary".

According to I5, it would be necessary **to move from a training of teachers in ICT to a permanent formation** "*in which ICTs were not the focus of learning but were integrated to achieve a different objective that is a good teaching competence. It is accredited with certificates of attendance, and it would be interesting to think about a teaching career and job categories (junior, senior ...) in which the promotion was not the seniority but the periodic evaluation of the teaching activity*".

In relation to **accreditation**, I3 criticises that "*the form of accreditation in ICT of the teachers is based more on the 'assistance' than on the 'use'*, with very standardized courses, many hours and decontextualized. Several of

the interviewees point to the lack of a clear accreditation system, noting that "it's necessary to create mechanisms for the accreditation of these competences that allow the teacher to demonstrate that they have reached a set of established levels, appropriate to each task, and that for this reason they are used and valued in the processes of selection and promotion for educational tasks to be performed " (I2).

For E1, ICT training, specifically distance and **asynchronously**, has gradually degenerated and "*more personalized training is needed, taking into account the point of departure of each teacher, their context (type of students, center, etc.)*". This E1 proposes, as an example, a training that combines the use of MOODLE (although there are certain criticisms of the interviewees in the saturation and poor design of this platforms) with videoconferences.

This participant uses this **synchronous** line form of training in order to coordinate the group of trainers in ICT + C of the ICE (Institute of Education Sciences) of the University of Barcelona, and according to their assessment "*the results are interesting and the assessments of the teachers enrolled very good*".

The I3 proposes **nano courses** or pills "*that respond to the need for a basic knowledge of methodologies and tools, which will be compelled with peer education, training according to preferences and training in the center, depending on projects and needs, previously diagnosed by the cloister or by the management team*".

e) Teacher's professional development and ICT policies

Regarding the changes in teachers' professional development as a result of their participation in national policies on ICT and innovative education, there are diverse opinions among the interviewees.

The main one, common for most of the interviewees, is the debate that has generated this **type of policies between teachers and the different educational agents**, and that seems to be a constant argument "*in some centers this debate is quieter than in others, due to the inhibition of the Administration in the process of change (...) between immobile sectors and sectors that are in favour of the change*" (I1). For example, I2 proposes, instead of certificates of attendance, "*to think about a teaching career and on job categories (junior, senior ...) in which the promotion was not seniority, but the periodic evaluation of the teaching activity*".

Besides educational policies, this result many times "*are a consequence of the will to change schools that have been able to create a situation suitable to move towards **a new model of center** through collaboration between different members of the community Education that share a clear vision*"(I2). Also, as *I4* indicates, in "***communities of practice**, in which teachers support each other to be more effective and move forward*".

At the personal level, "*the mere fact that a teacher decides to participate in actions related to the preparation and implementation of educational actions with the use of ICT is already an indication of their future preparation to address the necessary changes*" (I4).

The I2 clearly summarizes the different opinions indicating that "*changes in educational institutions are a consequence of the will to change schools that have been able to create a situation suitable to move towards a*

*new model of center **through collaboration** between the different members of the educational community who share a clear vision.*"

For the I5 the priority educational policies for the integration of ICTs would have to start with centers with **good technological infrastructures**, teachers capable of **promoting the skills of the 21st century** and **guidelines** with management and leadership skills.

3) Conclusions

From the review of the national context regarding the educational policies that integrate ICT in the school and the opinions of the interviewees and the discussion groups, a series of **conclusions** have emerged, which help to draw a map of the present and future state of ICTs In educational policies, innovative practices and education.

As indicated at the beginning of the report, beyond the Spanish context, the focus of interest in the Catalan context has centered largely because it is the closest context and have its particularities in terms of policies and laws.

The **Spanish and Catalan educational laws** have been gradually incorporating ICT in their objectives and curriculum. In LOGSE, approved in 1990, there was no direct mention of information and communication technologies; in the LOE, approved in 2006, it was begun to consider the knowledge in using information and communication technologies as one of the future objectives of education and the need to provide support in this sense; and finally in the LOMCE, current law approved in 2013, a whole point of the preamble is dedicated to consider the use of ICT as one of the main challenges of education, as well as starting including the subject "Information and communication technologies" elective courses in compulsory secondary education. In the current educational law (LEC) ICT are explicitly cited and are considered as a main objective to train students for the critical analysis of the use of new technologies. In this sense, the Department of Education favors initiatives for the development of pedagogical and curricular innovations in relation to the use of information and communication technologies in learning, therefore, the government is becoming increasingly aware of the relevance of the use of ICT for the development of the citizen of the 21st century.

Regarding educational policies, the eruption of the national **School 2.0** program has been a turning point in the integration of ICT in school. As seen in the interviews and focus group, the consequences of this 1x1 policy have generated debate and some controversy. While most participants consider that this kind of programs, have been an obvious technological bet, one of the most repeated criticisms is that the 1x1 projects (as Escuela 2.0 or Educat) should be accompanied by training focused on the **methodology**, in order to explore and implement all the possibilities that the technologies allow us. **There is a feeling that this lack of methodological and pedagogical perspective has led, in some cases, to an inefficient implementation of these technological resources.**

However, the suspension of "School 2.0" **left without support and institutional coverage** the development of the 1: 1 model in all the Autonomous Communities and, as Area et al (2014) states, since that time there has been no alternative policy or program to the Escuela 2.0 designed to promote the processes of integration of ICT in the Spanish school system in a coordinated way between the Autonomous Communities. From here, other policies such as MSchools or the different approaches to the Digital Competence concept (INTEF, PICCD) have been promoted, although **there is a feeling that there have been a lack of coordinated, clear and economically supported regulations, laws and policies that give solution to the adoption of ICT in school, since in many cases the continuity of these types of policies has depended on the teachers and centers with the involvement of families.**

According to Area et al (2012), **the 1x1 environments, rather than acting as an engine of change, have made possible the sustainability, reflection, optimization and improvement of teachers' teaching practices**. In this sense, the concept of ICTs is repeated as a **transversal educational element**, which does not have to be incorporated no matter what, but should be incorporated in an integrated way, responding to pedagogical and methodological objectives. As one of the interviewees summarized, ICTs play a fundamental role when they add value to educational practices, that is, when they allow them to do things that without ICT wouldn't be possible

Another possible way for introducing ICT in the classroom efficiently is through the definition of basic skills in the digital field. That is why in order to address this point,, two documents were published by the Government of Catalonia for the identification and deployment of the basic competences of the digital field, both at primary (2013) and secondary (2015) education. These documents have helped to establish digital competencies, and with them the use of ICT, as one of the basic and main competences in present and future society. In Catalonia, the normative deployment of LEC (Law 12/2009, of July 10, on education), regulated the acquisition of basic skills in the digital field that students of the Catalan Education System have to acquire. According to what is established in articles 58 and 59 of this law in both primary and compulsory secondary education, the skills necessary for the use of new technologies must be developed at an appropriate level.

In relation with **digital competences**, the European Commission, and the Spanish and Catalan Administration have designed, or adapted, a framework for defining the digital competences of all the actors involved in the educational process (students and teachers), although it is necessary to implement them in schools and in classrooms, as well as standardise their evaluation. The framework of reference for addressing digital competence has been the Digcomp (European Commission, 2013) which has been the basis for the Common Framework for Teacher Digital Competence (INTEF, 2012) at the Spanish level and the Project of Digital Teaching Competence (PICDD, 2014) and the certificate that accredits Digital Competence, issued by the Government of Catalonia in Catalonia ACTIC (2008) in Catalonia.

According Area et al (2012), an official discourse has emerged prior to the 1x1 programs, that advocates the slow disappearance in the classrooms of paper textbooks and their replacement by the platforms of digital educational contents, the incorporation of tablets in the classroom instead of mini laptops or PCs and in some Autonomous Communities, the **BYOD** (Bring Your Own Device) model is introduced for access to technologies. In this sense, as was pointed out by the interviewees, the different educational agents have the need **to adapt quickly and effectively to the current technological and cultural reality** and give answers to the needs of the XXI century society.

As it can be seen in the national report and interviews, there are various and interesting **initiatives** that integrate ICTs and foster digital competences, many **innovative practices** that have emerged from the public sector (as Mobilitzem la Informàtica), private (as mSchools Toolbox) even from teachers or students (as World Mobile City Project or Tecno 12-18), and a wide range of **digital applications** that simplify and reinforce educational practice (as Kahoot! or Evernote) . These projects and initiatives have focused on motivating and arousing students' curiosity, using ICT and the digital means and possibilities for fostering the teaching-learning process. A featured aspect that these initiatives have in common is the collaborative element they present; like the design

DECODE

Co-funded by the
Erasmus+ Programme
of the European Union

between teachers, the activity of learning between students or the educational community that is formed between students and teachers.

From the triangulation between the answers of the interviewees, participants in the focus group and the analysis of the national context, some results have emerged. The strengths, weaknesses, risks or opportunities in teacher training for the enhancement of their digital skills will be clarified in the next SWOT analysis:

Strengths	Opportunities
Most of centers are equipped with minimum technological material and ICT (Wi-Fi, computers), largely due to 1x1 programs as the School 2.0 program in Spain or Educat in Catalonia. Teacher training in ICT as a consequence of the participation in the 1x1 programs. Many centers have believed in the TAC plan and the role of the coordinator by establishing internal guidelines for ICT training center for teachers. Appearance of communities of practice of teachers, in which they support each other in order to be more effective, advance and learn. Many innovative initiatives using ICT are born of internal initiatives of the centers and others are promoted by the centers themselves (Summem.cat, Tecno 12-18 ...)	Learn from students: students as producers of their own content and discoverers of digital competences and new practises in ICT. Establishment of TAC coordinators and leadership in ICT (through a TAC plan) in the educative centers. Digital competence is defined in the educational field and guidelines are given to implement it in the curriculum for students. Training of teachers will soon take place. This gives an opportunity to the training of students and teachers in this competence facilitating a comprehensive introduction of ICT. The promotion of scientific and technological vocations (STEMCat) is associated with teacher training in ICT.
Weaknesses	**Threats**
There is a lack of pedagogic/methodological training in the use of ICT for teachers.	Proliferation of self-regulated learning initiatives created by non-educational entities (eg MOOCS).

DECODE

Co-funded by the
Erasmus+ Programme
of the European Union

Resistance of some teachers in using ICT in an innovative way.	Lack of budget, or policies with economic support, in training in digital competencies of teachers.
The fact that the definition of the TAC Plan and coordinator is voluntary and is not advised how to do it. There are centers that do not apply it.	The form of accreditation in ICT of the teachers is being based more on the attendance to courses than in the acquisition of contents.
The implementation of innovative activities on ICT is usually done by the internal initiative of some teacher. There is a lack of leadership.	Lack of systems for the recognition of professional experience in the use of ICT in the classroom.
Due to the investment cuts in equipment, these will become obsolete, unless, as some centers are doing, the educational community invests in them.	System of professional development with specialization of ICT very heterogeneous and poorly defined.
Since ICT training among teachers is heterogeneous, their level of ICT competence is also heterogeneous.	

As one of the interviewees pointed out, one of the points that may help to overcome the weaknesses presented is an **excellent educational policy**, in which the voice of the protagonists is heard: teachers, families, and other social agents involved in the day to day of education.

Beyond the individual initiatives, which are always well received, the true effect of the integration of ICT in education can only be fully realized if it is carried out in the educational center **in a generalized way**, thanks to a schools' project including the availability of materials and resources, adequate preparation of teachers, evaluation practices and internal cooperation with other centers, promoted by a management team that includes a clear and decisive mission and cooperates with the rest of agents, especially with the families of the students.

One main conclusion is that it **is necessary to end erratic educational policies** in the implementation of ICT in the classroom. It is necessary **to join efforts between educational centers and public administration**: in proposals, to work collaboratively, to add initiatives, experiences and inter-institutional projects that will have to be led by the educational administration with the collaboration of universities, companies and institutions working in the field of education, new methodologies, networking and technology. Therefore, it would be necessary to make it much easier for schools to manage **economic**, **human** and **technological** resources according to their needs and their center projects, giving them much more autonomy and funding.

In relation to the system of **teacher promotion**, it is necessary to encourage innovation and professional excellence, above rather than seniority. In this sense, there is a clear need, and willingness by the teachers, of training, in order to be able to carry out innovative practices. Regarding **good practices**, it is necessary to create circuits and exchange synergies: define policies of generalization of these practices that are initiative of a teacher to an entire center and later to several centers. Reference teachers cannot remain locked in the classroom and projects and dynamics that integrate ICTs and help in educational processes must be encouraged.

In conclusion, educational policies for the integration of ICT in Spain have been **discontinuous**, although **necessary** to digitize schools and educational institutions. Moreover, there is a complete consensus that teachers have to be competent in the instrumental and methodological use of ICTs, and not only be in disposition of computer and digital material, but also know how to use it for pedagogical and educational purposes. For this reason, clear educational policies at national and regional levels seem to be necessary, with a strong economic support and stable over time, that can be complemented by more local initiatives and innovations that may appear in the technological market. This type of educational bet can be an inspiring and motivating element for the different agents of the educational sector.

At the level of **teacher training** in the use of ICT, it would be necessary for this training to be more methodological than instrumental in order to become digitally competent. Training initiatives should be based on collaboration among teachers, as for example with the creation of communities of practice of teachers or the participation in innovative projects.

An approach to the 1x1 environments, "one computer per child", from the experiences and perceptions of the students of secondary education in the framework of the information society (Cristina Alonso Cano Tree, Pablo Rivera Vargas, Montse Guitert i Catasús Árbol, 2013)

https://dialnet.unirioja.es/servlet/articulo?codigo=5144568

Contents of the ACTIC competences (Government of Catalonia, 2016)

http://actic.gencat.cat/web/.content/01_informacio/documents/arxius/Continguts-ACTIC-ordre-2016-canvis-ressaltats.pdf

Common Framework of Digital Competence for Teachers 2017 - INTEF

http://blog.educalab.es/intef/2016/12/22/marco-comun-de-competencia-digital-docente-2017-intef/

Department of Education of the Generalitat de Catalunya

http://ensenyament.gencat.cat/ca/inici/

EduCAT 2.0: digital instruments at the service of the classroom

http://ensenyament.gencat.cat/web/.content/home/noticies/documents/roda_premsa_090611.pdf

Evaluation of policies and educational reforms in Spain (Ester García Sánchez, 1992)

https://books.google.es/books?id=FZ2sSZ_GDOcC&pg=PA153&lpg=PA153&dq=Proyecto+Atenea.+Una+propuesta+para+la+integraci%C3%B3n+racional+de+las+nuevas+tecnolog%C3%ADas+de+la+informaci%C3%B3n+en+la+ense%C3%B1anza+b%C3%A1sica+y+media&source=bl&ots=YF2ARUpU1B&sig=vkLT9XBZ7Aq2fKdXgwWWUvdPR3w&hl=es&sa=X&ved=0ahUKEwi-k7XtpsLTAhUB7hoKHRsQB_YQ6AEIMTAD#v=onepage&q=Proyecto%20Atenea.%20Una%20propuesta%20

para%20la%20integraci%C3%B3n%20racional%20de%20las%20nuevas%20tecnolog%C3%ADas%20de%20
la%20informaci%C3%B3n%20en%20la%20ense%C3%B1anza%20b%C3%A1sica%20y%20media&f=false

Good practices in the integration of ICT in education in Andalusia (Ángel Boza Carreño, 2011)

https://www.uv.es/aidipe/congresos/Ponencia_VIICongresoVirtual_AIDIPE.pdf

Guide of the council, Government of Spain, 2012

http://femp.femp.es/files/566-1152-
archivo/GUIA%20DE%20CONCEJALIA%20DE%20EDUCACI%C3%93N.pdf

Ict in education law and secondary centers (article). Maria Josep Grau Garrigues, 2013

http://atlante.eumed.net/tic-ley-educacion-centros-secundaria/

Interdepartmental project of digital teacher competence, Government of Catalonia, 2014

http://portaldogc.gencat.cat/utilsEADOP/PDF/6759/1384369.pdf

LaceNet website

http://www.lacenet.org/joomla/

LOE (Organic Law of Education)

http://www.boe.es/boe/dias/2006/05/04/pdfs/A17158-17207.pdf

LOGSE (Law of General Management of the Spanish Educational System)

http://www.boe.es/buscar/doc.php?id=BOE-A-1990-24172

LOMCE (Organic Law for the Improvement of Educational Quality).

https://www.boe.es/diario_boe/txt.php?id=BOE-A-2013-12886

Ministry of Education, Culture and Sport of Spain website

https://docs.google.com/document/d/1hYcywcp3quw-8Gmhy9cmDIErcwvl-9kEs1o6DINw3Lk/edit#

"Mobilitzem la informàtica" project website

http://agora.xtec.cat/formacio/form004/moodle/course/view.php?id=2

MSchools website

http://toolbox.mobileworldcapital.com/

One computer per student: reflections of the teachers of Catalonia on the 1x1 environments (Cristina Alonso Cano, Montse Guitert Catasús, Manuel Area Moreira, Teresa Romeu Fontanillas, 2012)

http://diposit.ub.edu/dspace/bitstream/2445/34202/1/Alonso.pdf

"Summem.cat" project website

http://www.summem.cat/

Teacher perceptions of the time factor in One Laptop per Child (Montse Guitert and Azucena Vázquez, 2013)

http://www.raco.cat/index.php/eLearn/article/download/272015/359969

Teaching of computers in primary, secondary and high school (Pedro Meseguer, Jesús Moreno, Juan José Moreno, Katzalin Olcoz, Ernesto Pimentel, Miguel Toro, Ángel Velázquez, Eduardo Vendrell, 2015)

http://www.scie.es/wp-content/uploads/2015/05/Inform%C3%A1tica-Primaria-ESO-Bach.pdf

Teaching practices mediated by environments 1x1: a case study in compulsory education in Catalonia (Cristina Alonso, Alejandra Bosco, Franciele Corti y Pablo Rivera, 2014)

http://www.ugr.es/~recfpro/rev183ART6.pdf

"Tecno 12-18" project website

http://www.tecno12-18.com

The eduCAT1x1 project (Government of Catalonia, 2010)

http://csda.gencat.cat/web/.content/home/consell_superior_d_avalua/pdf_i_altres/static_file/eduCAT1x1.pdf

The educational centers facing the challenge of digital technologies (Juan de Pablos Pons coord, 2015)

https://dialnet.unirioja.es/servlet/libro?codigo=580166

The environments 1x1 in Catalonia. Among the expectations of educational policies and the voices of teachers (Alonso, C., Guitert, M. and Romeu, T., 2014)

http://www.raco.cat/index.php/Educar/article/viewFile/287067/375316

The ICT educational policies in Spain after the Program School 2.0: trends that emerge (Manuel Area Moreira, Cristina Alonso Cano, José Miguel Correa Gorospe, María Esther del Moral Pérez, Juan de Pablos Pons, Joaquín Paredes Labra, José Peirats Chacón, Ana Luisa Sanabria Mesa, Angel San Martín Alonso and Jesús Valverde Berrocoso, 2014)

http://relatec.unex.es/article/view/1473/959

The Spanish Athena project (Government of Spain, 1991)

https://books.google.es/books?id=Be05DAAAQBAJ&pg=PR1&lpg=PR1&dq=el+proyecto+atenea+espa%C3%B1ol&source=bl&ots=cUI9KSa8_b&sig=P9hn-rSzjR4LpTJZoqXGqGe-5F0&hl=en&sa=X&ved=0ahUKEwibmbbJjvTTAhXBuRoKHRINBaUQ6AEINTAC#v=onepage&q=el%20proyecto%20atenea%20espa%C3%B1ol&f=false

Twenty five years of ICT integration policies in schools in Catalonia (Josep M. Mominó and Carles Sigalés, 2007)

http://www.uoc.edu/in3/pic/cat/pdf/pic_escola_capitol2.pdf

"World Mobile City Project" website

http://www.wmcproject.org/?lang=es