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Creative Learning and Innovative Teaching

Final Report on the Study on Creativity and Innovation in Education in the EU Member States

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Preface

This report is the final report of a project on 'Creativity and Innovation in Education and Training in the EU27 (ICEAC)' carried out by the Institute for Prospective Technological Studies (IPTS) under an Administrative Agreement with DG Education and Culture, Directorate A, Unit A3. This project aims to provide a better understanding of how innovation and creativity are framed in the national and/or regional education objectives and applied in educational practice at primary and secondary school level. It collects and analyses the present state of affairs in the Member States as regards the role of creativity and innovation in primary and secondary schools. The project started in December 2008 and the following methodological steps were taken:

- A scoping workshop (held in Seville on 23-24 February 2009);
- A literature review on the role of creativity and innovation in education by IPTS;[1]
- A report on the analysis of curricula by empirica;[2]
- A report on a teachers' survey conducted by IPTS and European Schoolnet and analysed by IPTS with the support of the University of Seville;[3]
- Interviews with educational stakeholders by Futurelab and IOE;[4]
- A report on good practices by Futurelab and IOE;
- A validation workshop (held in Seville on 1-2 June 2010);
- This final report.

More information on the project can be found at:

http://is.jrc.ec.europa.eu/pages/EAP/iceac.html

More information on current and past projects on ICT for learning can be found at:

http://is.jrc.ec.europa.eu/pages/EAP/eLearning.html

The studies and results of the IPTS Information Society Unit can be found on the Unit website:

http://is.jrc.ec.europa.eu

1 http://ftp.jrc.es/EURdoc/JRC52374_TN.pdf
2 http://ftp.jrc.es/EURdoc/JRC61106_TN.pdf
3 http://ftp.jrc.es/EURdoc/JRC59232.pdf
4 http://ftp.jrc.es/EURdoc/JRC59833_TN.pdf

Executive summary

The importance of creativity and innovation in addressing the economic, environmental and social crises has been recognized in policy discussion in Europe. Recent policies call for the strengthening of Europe's innovative capacity and the development of a creative and knowledge-intensive economy and society through reinforcing the role of education and training in the knowledge triangle and focusing school curricula on creativity, innovation and entrepreneurship. It has been recognized that schools and initial education play a key role in fostering and developing people's creative and innovative capacities for further learning and their working lives.

Notwithstanding the intensive policy discourse in this area, there is little research or evidence on the status, barriers and enablers for creativity and innovation in compulsory schooling at a European level. This report aims to fill this gap by collecting evidence on creativity and innovation in education in schools in the EU27. Evidence comes from a literature review, a survey with teachers, an analysis of curricula and of good practices, stakeholder and expert interviews, and experts workshops. This report elaborates and synthesises the data and results gathered from each phase of the study.

It is argued that creativity, in the educational context, should be conceptualized as a transversal and cross-curricular skill, which everyone can develop. Therefore it can be fostered but also inhibited. This report proposes five major areas where effort and improvement is needed to enable more creative learning and innovative teaching: namely, curricula, pedagogies and assessment, teacher training, ICT and digital media, and educational culture and leadership.

Curricula: The study shows that the terms 'creativity', and 'innovation' and their synonyms are mentioned relatively often in the EU27 curricula. Many teachers and education experts however, feel that the curricula in their countries do not, as yet, sufficiently encourage creativity and innovation, mainly because they are not clear how creativity should be defined and how it should be treated in learning and assessment. Furthermore, curricula are often overloaded with content, which reduces the possibilities of creative and innovative learning approaches in practice. This study highlights the need for the revision of curricula, so as to provide a consistent definition of creativity, and better guidance on how teachers should develop creativity and innovation in practice and encourage development of cross-curricular competences. Consultation and dialogue with all educational stakeholders, including parents or their representatives, in revising curricula may be a benign and participatory form of promoting debate and reflection on a shared understanding of quality and vision in education where creativity and innovation are encouraged.

Pedagogy and assessment: In terms of pedagogical practices, the teachers who participated in this study have highly positive views about the importance of creativity and innovation in education. They claim to encourage learning activities which are likely to allow students to be creative and also aim to foster skills and abilities that enable creativity and innovation. Despite such claims, it has been observed that conventional ways of teaching related to teacher-centred methods, frontal teaching and chalk and talk prevail in a good majority of schools in the EU27. Primary level teachers were more likely than secondary teachers to promote creative learning skills and abilities and active learner-centred learning approaches in class. While teachers' lack of skills and confidence is one of the main reasons for creative practices, other factors - namely, tight timetables, overloaded curricula, lack of support in the class, too many pupils per teacher and a school culture that does not support new methods - were also highlighted. Teachers tend to be isolated and lack support and hence seem to prefer

to encourage convergence and discipline instead of divergence because it is easier to handle in class.

The process of assessment comes up throughout the study as a major issue which affects school practice and culture, as it is both an enabler and a barrier for creative learning and innovative teaching. In most countries, grades and summative assessment are the main type of assessment, especially in secondary schools. However, examples of more versatile ways of assessing students, such as assessment through presentations, group work, peer feedback and portfolios, were also noted. There is resistance to changing the traditional assessment practices, as parents, teachers, and even students often consider grades as the most significant way of giving feedback about learning. This highlights the importance of dialogue and networking with all the educational stakeholders in order to support children's learning in creative and innovative ways. Furthermore, the study stresses the importance of accompanying curricula reforms with the revision of national exams and the principles of quality assessment for schools. Changes in learning objectives cannot be implemented in practice if assessment for pupils and schools remain the same.

Teacher training: In order to develop creative learning approaches, it is crucial that teacher training prepares new teachers to become reflective practitioners able to discern how a teaching method or activity can stifle or trigger creativity in their students. Results from this study show that teachers who were trained on creativity held more positive views about its relation to education. Similarly, teachers who had received training in ICT were more likely to sustain that new technologies are important for learning. This study also shows that teachers with most interest for innovation and changing pedagogic methods were those who have already some years of experience of teaching practice after the initial training. This suggests that while major improvement in Initial Teacher Training (ITT) is needed in the EU27, as only a quarter of the teachers surveyed considered that they had learnt how to teach during ITT, it is also important that more effort is dedicated at understanding teachers' life histories and trajectories. Teacher training programmes must be reviewed and revised to ensure that they promote diverse and innovative teaching methods, digital competence and teaching cross-curricular competences with plenty of hands-on classroom practice and efficient guidance. In addition, facilitating professional development of confidence and capabilities in enabling teachers to take creative risks within traditional and cautious systems is also important. The potential of the internet as a space where peer learning and interaction with outside experts could take place should be further exploited and existing European networking activities such as eTwinning should be more effectively promoted among all schools and teachers.

ICT and digital media: This study highlights the potential of Information Communications Technology (ICT) in enabling innovative and creative school environments. Technologies play a crucial role in learners' lives and can act as a platform to foster creative learning and innovative teaching. However, for ICT's potential for change to be realised, a policy drive is needed. Teachers who responded to the survey mostly use the Internet for retrieving information and for downloading or preparing resources. Only half of them used the Internet for collaboration and networking. Technologies are far from exploited for creative and innovative purposes in the classroom. Furthermore, despite the increase in the numbers of computers in schools, our survey results show that hands-on access for pupils remains very low. Allowing students to play with the tools could enhance pupils' motivation to think, understand and learn in innovative ways. There is a need for personal and pedagogical digital competence for both teachers and students.

More research should be undertaken on how technologies are appropriated by teachers, in order to support them in developing more efficient pedagogical and innovative usage of the technologies for learning. Results from this study also demonstrate that the potential of new technologies for creative learning and innovative teaching cannot be exploited unless teachers' proficiency in using ICT and the quality of ICT in schools is improved, software in different languages is provided and more space for interaction between teachers and students is allowed. There is a strong need for pedagogic training which empowers teachers with the required ICT skills to help their students become digitally competent on the one hand, and for guiding students towards more exploratory and creative interaction with ICT tools on the other hand. Results from the best practice examples also show that enabling interaction between teachers and outside experts could be highly beneficial in terms of learning in innovative and creative way.

Educational culture and leadership: It becomes clear from the study that major changes are needed in the overall educational culture towards more creative learning and innovative teaching. People outside the classroom, such as school leaders, national policymakers and pupils' parents should also be involved in this change. Creativity and innovation are often perceived to be present in the school culture, however, they are often not a priority. Therefore, innovative teachers' personal classroom practice is not necessarily aligned with the culture they experience as their working context, nor is it rewarded or appreciated by school leaders. This highlights the importance of school leadership in supporting and appreciating teachers' efforts in implementing innovative pedagogic practices and experimenting with them. There is a need for a holistic strategy for implementing change towards more creative learning and teaching, taking into account curricula, assessment, teacher training, and funding, with joint dialogue between all stakeholders. The European Year 2009 of Creativity and Innovation had visible effects in most of the countries studied and similar European and national awareness raising events should be organised.

Throughout this report, it has been argued that educational actors have the power to unlock the creative and innovative potential of the young. However, they require substantial support, especially in terms of training, revision of curricula and assessment, and institutional change. There is a growing need for action at both national and European level to bring about the necessary changes required for an open and innovative European educational culture based on the creative and innovative potential of its future generations.

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1 Introduction

"To be at the forefront of this new world, Europe needs to become more creative and innovative … The need for change and new initiative is urgent. Europe and its Member States must give full attention to creativity and innovation now in order to find a way out of the current stalemate."

Manifesto of the European Year of Innovation and Creativity (2009)

This is the final report of a study "Innovation and Creativity in Education and Training in EU27 (ICEAC)" launched by JRC Institute for Prospective Technologies in collaboration with DG Education and Culture. The study contributes to the debate on creativity in European education and training launched during the 2009 European Year of Innovation and Creativity.

The objective of the study was to provide a better understanding of how innovation and creativity are dealt with within the Member States learning objectives and practices of education and training (E&T) at primary and secondary level. The main research question of the study is: "How are creativity and innovation framed in educational objectives and practices in the EU27?" The question was approached through a variety of methods and the involvement of different stakeholders. This was done in collaboration with several researchers and research organizations. This introductory chapter describes the study context, outline and methodology. The following chapters provide the main results and messages arising from the study.

1.1 Policy context

Creativity and innovation in particular have played an important role in the European policy discussion for growth and jobs during the last decade, and recently their importance has been highlighted even more for addressing the economic, environmental and social crises in Europe. Spring 2008 European Council recognized that a key factor for future growth is the full development of the potential for innovation and creativity of European citizens, built on European culture and excellence in science (European Council, 2008). Year 2009 was declared as European Year for Creativity in order to promote awareness and promote research and policy debate on the importance of creativity for the development of knowledge society (European Parliament and the Council, 2008). Recently published Europe 2020 strategy (European Commission, 2010b) sets several flagship initiatives such as "Innovation Union", "New Skills for New Jobs", "Youth on the Move", and "Digital Agenda", where creativity is playing an important underlying role. These three major roles (source for innovation, key transversal skill and strategic educational challenge) are explored below.

1.1.1 Creativity as a source for innovation

Creativity is seen by the European policies as the prime source for innovation, which in turn is acknowledged as the main driver of sustainable economic development (Council of the European Union, 2008b, 2009b). It is recognized as a process of generating ideas, expressions and forms, in essence as a process that can amplify knowledge and lead to new ways of using the knowledge. Innovation is understood as a successful exploitation of these, and as a process that develops new products, services, ways of businesses, or new ways of responding to social needs (Council of the European Union, 2009c). European policies call for strengthening Europe's innovative capacity and the development of a creative and knowledge-intensive economy and society (Council of the European Union, 2009a) through reinforcing the role of education and training in the knowledge triangle (Council of the European Union, 2010) and focusing school curricula on creativity, innovation and entrepreneurship (European Commission, 2010b).

1.1.2 Creativity as a key transversal skill for work and lifelong learning

The EU Key Competences Framework for lifelong learning (European Parliament and the Council, 2006) introduces 8 key competences and highlights the role of cross-cutting skills such as critical thinking, creativity, initiative, problem solving, risk assessment, decision taking and constructive management of feelings in all of them. Report of the progress of ET2010 (Council of the European Union, 2010) suggests that particular efforts are needed for the transversal key competences that are crucial for more creativity and innovation, and for success in the labour market and society at large. These transversal key competences include, for example, digital competence, learning to learn, social and civic competence, sense of initiative and entrepreneurship, and cultural awareness. Also other policy documents recognise that there is a growing demand from employers for transversal and cross-cutting skills, such as problem-solving and analytical skills, self-management and communication skills, linguistic skills, and more generally, "non-routine skills" (European Commission, 2008). All of these also contribute and are linked to creativity, its development and expression. Creativity through lifelong learning is recognized both as a driver for innovation and as a key factor for the development of personal, occupational, entrepreneurial and social competences, and the well-being of all individuals in society (European Parliament and the Council, 2008).

1.1.3 Creativity as a strategic challenge for education and training

Enhancing creativity and innovation, including entrepreneurship, at all levels of education and training has been named as one of the four strategic objectives of European Education and Training 2020 (Council of the European Union, 2009b). The Conclusions of the Council on developing the role of education in a fully-functioning knowledge triangle encourages education and training institutions to ensure that curricula as well as teaching and examination methods at all levels of education incorporate and foster creativity, innovation and entrepreneurship (Council of the European Union, 2009a). Member States have been invited to consider how to foster greater synergy between knowledge and skills on the one hand and creativity on the other, as well as how to best promote, monitor and assess creativity and innovative capacity, at all levels of education and training (Council of the European Union, 2008b). They should encourage teachers to develop their roles as learning facilitators and promoters of creativity, and help teacher education institutions to respond to the new demands of the teaching profession. At the same time, it is recognized that fostering creative abilities and attitudes within schools also requires the support of an organizational culture open to creativity and the creation of an innovation-friendly environment in general.

1.1.4 Creativity in the digital economy and society

Digital Agenda for Europe (European Commission, 2010a) emphasizes the importance for digital skills both for the purposes of work and for participation in the society, and requests that all European citizens should be made aware of the potential of ICT for all kind of professions. Communication on the Youth Strategy (European Commission, 2009) recognized that technology offers today's 'net-generation' new opportunities for learning, creating and participating, while it also brings challenges regarding privacy, internet safety and media literacy. Since an increasing share of learning occurs at the workplace, in non-formal contexts and in leisure time – often through new ICT-based learning tools and methods – the development of creative and innovative capacities has relevance for all aspects of lifelong learning (Council of the European Union, 2008b). This emphasizes the important role of schools in nurturing these capacities already from the first levels of education. People must be equipped to express their creative and innovative potential through digital media and technologies. Furthermore, these provide opportunities for implementing learning approaches

that foster creativity. Education and Training 2010 progress report (Council of the European Union, 2010) pointed out the potential of new technologies for enhancing innovation and creativity, new partnerships and for personalizing learning needs to be better exploited.

1.1.5 Crucial role of schools in nurturing creative and innovative capacities

Schools and initial education in general play a crucial role in fostering and developing capacities of the people. The recommendation by the European Parliament and the Council (2006) on Key Competences for Lifelong Learning asks Member States to ensure that initial education and training offers all young people the means to develop the key competences to a level that equips them for adult life, and which forms a basis for further learning and working life. The Council of the European Union (2008a) recognized that "schools have a duty to provide their pupils with an education which will enable them to adapt to an increasingly globalised, competitive, diversified and complex environment, in which creativity, the ability to innovate, a sense of initiative, entrepreneurship and a commitment to continue learning are just as important as the specific knowledge of a given subject". Specifically, they invited the Member States and the commission to promote creativity and innovative capacity in and through school education.

The Council of the European Union (2008b) invites for more dialogue, co-operation at different levels, research and evidence for developing learning environments especially conducive to creativity and innovation. The Commission has been invited to support relevant research and analyse and exchange data, at both EU level and among the Member Stats – in cooperation with European and international research institutions – on the promotion and development of creative and innovative skills through education and training. The ICEAC study was launched by IPTS in collaboration with DG Education and Culture with the aim to contribute to this policy context. The study provides evidence, data, examples of good practices and policy options for developing creative capacity at schools, which are in a critical position for preparing children and young people for further learning.

1.2 Methodology of the study

The ICEAC study took place between December 2008 and December 2010. Given the complex nature of studying how creativity and innovation are framed in education, a mixed methods approach was employed. Table 1 describes the methodological framework which guided the study, and outlines the sub-research questions that have shaped the choice of methods and participants. The scope of the study was to focus on obligatory schooling (primary and secondary) within EU27.

Table 1: Structure of the Study

Phase	Objective	Method	Timing
How are creativity and innovation conceptualized in the educational context?			
1	To understand the implications of creativity and innovation in education	Literature review	Dec 08 – April 09
2	To validate methodological framework, focus and operation of the study	Scoping workshop	23-24 Feb 09
How creativity and innovation are explicitly dealt with in the Member States' learning objectives?			
3	To assess the role and relevance of *creativity* and *innovation* in the national learning objectives (curricula) of Member States	Analysis of the Curricula	Jul 09 – Aug 10
What is the level of creative learning and innovative teaching taking place in school? ***What is the link between educational policies on creativity and innovation and the practices?***			
4	To assess teachers' opinions and practices on creativity and innovation in each country at school level	Teachers' survey	Jul 09 – Jul 10
5	To assess the relevance of creativity and innovation in education at national level	Stakeholders' interviews	Nov 09 – Jul 10
What are good practices of creative learning and innovative teaching in Europe?			
6	To identify good practices of creativity and innovation in education in Europe	Good practices (Case Studies)	Nov 09 – Jul 10
What are the main results and policy options?			
7	To validate the results of the study	Validation workshop	1-2 Jun 10
8	To synthesize the main results of the study and develop policy options	Final report	Jun 10 – Oct 10

1.2.1 Methods and approaches of the study

In order to get a better and a vast understanding of how creativity and innovation are framed in education, the study has employed a mixed-method approach so as to gather different insights from varied sources. Data was gathered from a wide spectrum of respondents who are in one way or another involved in creativity and innovation in education.

At the beginning of the project, an overview of the theoretical foundations for creativity and innovation in the context of education was provided through a **literature review**. The review covered systematically scientific literature, policy documents, research reports from international organisations and recent projects relevant for creativity in learning and teaching. Through an analysis of the reviewed literature, *enablers* were identified, describing circumstances or support mechanisms that facilitate creative learning and innovative teaching.

These enablers were clustered into eight thematic areas, namely: assessment, culture, curriculum, individual skills, teaching and learning format, teachers, technology and tools. For each area, the literature describes conditions that can encourage a creative environment. These enablers were used as a scaffold in designing the instruments of subsequent methods, in particular the survey and the interviews. In the analysis of curricula, enablers related to that area allowed to have a critical understanding of the distribution of frequencies. In the survey, using these enablers gave us the possibility to gather teachers' views on how they foster or hinder creativity without explicitly mentioning creativity and thus, lowering desirability bias. In the interviews, the eight thematic areas of the enablers were used as a topic guide.

Workshops have been used as a way of gathering insights from different experts in the field. Two workshops were organised during the project, one at the beginning and another one towards the end. For the workshops, a total of **32 education experts from 16 nationalities** have been consulted. The aim of the first workshop was to gather experts' insights on the role of Creativity and Innovation in the educational systems of their respective countries and to validate and discuss the proposed methodology of the study. The objective of the second workshop was to present the major results of the different phases of the study and allow experts to question and discuss these results. Both workshops aimed at active participation and contributions from experts from different fields, varying from presentations, joint discussion, group-work and feedback about the study.

In order to understand the state-of-the-art of how creativity and innovation are framed in school curricula in EU27 a **content analysis** of curricula document was conducted. This work was conducted by empirica (Heilmann & Korte, 2010) on behalf of IPTS, in collaboration with European Schoolnet and National Correspondents in each EU Member State. In total, **37 countries and/or regions** were studied, the latter included the following: Wallonia, Flanders and the German speaking community for Belgium; Bavaria, Lower Saxony and Saxony for Germany; Andalucía, Extremadura and Madrid for Spain; England, Northern Ireland, Scotland and Wales for the UK. In total, around **1,200 curricula documents** were identified and analysed using the search terms "Creativity" and "Innovation" (and their stems creativ* and innovat*) and five synonyms of these terms. The analysis was carried out in the language of origin of each document. In this respect, the researchers have consulted national correspondents for their expertise on the terms. The software tool WordSmith was used to carry out this analysis. The frequency of use of the terms was analysed according to the category of the text where the terms appeared, i.e. primary or secondary school documents and type of subjects.

An **online survey** with teachers was conducted as part of our consultation with experts and practitioners of education. The questionnaire was designed together with European Schoolnet and was based on the enablers recognized in the literature review. It contained 29 close-ended questions containing 94 items divided into three major sections: demographics and factual items, teaching practices and opinions about creativity for learning. It was translated from English into 22 other languages of the European Union and was available online on the eTwinning platform[5] from 15 September 2009 until 15 October 2009. The survey was advertised through various European and national channels (national Lifelong Learning Agencies, Ministries of Education, and national EU permanent Representations among others). It was open to anyone and was answered by teachers on a completely voluntary basis. It took around 20-30 minutes to complete. In total, **12,893 teachers from 32 countries**

[5] eTwinning is a project which connects schools around Europe. It aims to encourage schools in Europe to collaborate on joint projects using Information and Communication Technologies (ICT): www.etwinning.net

responded to the survey.[6] The first analysis of this data, conducted in collaboration with European Schoolnet was based on responses solely from the EU27. This resulted into a brochure which was presented at the ending conference of the Year of Creativity and Innovation (Cachia, et al., 2009). The scope of the analysis for the ICEAC study was limited to responses from teachers teaching in obligatory schooling (ISCED levels 1 and 2) in the EU 27. **In total, 7,659 responses were analysed** (Cachia & Ferrari, 2010).

Semi-structured **interviews** were also utilised to consult educational stakeholders who are directly involved at a national or international level in the fields of education practice, education policy or teacher training. This work was carried out by Futurlab (Banaji, Cranmer, & Perrotta, 2010b) on behalf of IPTS, in collaboration with the Institute of Education (University of London). For this study, **81 interviews have being carried out with educational stakeholders from the 27 MS,** 3 interviews per country except in very rare occasions. Identification of interviewees was based on different strategies through a mapping of policy-makers, stakeholders and academic discourses on creativity in education. Interviews were conducted mostly via Skype and digitally recorded. The duration of the interviews varied between 30 and 75 minutes. Most interviews were conducted in English, unless the interviewee could not speak English well and requested to be interviewed in another language. The topic guide of the interviews was elaborated using the *enablers* from the literature review and thus mirrored and complemented the teacher's survey.

In order to address discrepancies between what the official documents on education state, what educational stakeholders think, and what actually happens in schools, educational practices which exemplify good models of creative learning and innovative teaching from compulsory schooling in EU 27 were analysed by Futurelab (Banaji, Cranmer, & Perrotta, 2010a). Ten **good practices** were identified and analysed according to fair geographic and age distribution, variety of domains of knowledge, variety of scope and scale of the initiative and variety of examples that consider the different facets of creativity. These good practices showcase examples of a variety of ways to foster creative learning and innovative teaching and to implement creativity and innovation at different levels in school.

The present **final report** brings together the results of the different parts of the study and merges perspectives in a critical manner. As the different parts of the study were based on cross-cutting themes or thematic area of the enablers identified in the literature review, this report is built on a comparison of the different results per each thematic area. The analysis presented in this report is based on the data of each phase of the study and not on the reports that came out from each phase.

1.2.2 Limitations

Given the vast amount of empirical data gathered throughout this study and evidence from 27 countries which are all very different from each other, some methodological limitations must be acknowledged. This study is exploratory in nature and its aim is to offer a skin-deep overview of the relevance of creativity and innovation in compulsory education in Europe. As such, the study does not claim to provide an exhausting account of the role and amount of creativity and innovation in each Member State's education and training.

As the scope of the study was extremely wide – considering all EU27 Member States for both primary and secondary education and teacher training – choices had to be made. It was for instance decided not to include pupils and students among the stakeholders' consultations (survey and interview), as the efforts, time and precautions needed to collect students' – and

[6] EU 27, plus Croatia, Former Yugoslav Republic of Macedonia, Iceland, Norway and Turkey.

in particular pupils' – opinions for all Member States would have gone beyond the time and financial possibilities allocated for the study. The reader should therefore be aware of the missing voice of children and young people from this report. Moreover, the study mainly focuses on compulsory education and gives just some hints on the role of creativity and innovation in teacher training. A more systematic analysis of the content of programmes and curricula for Initial Teacher Training (ITT) and Continual Professional Development (CPD) would therefore be useful.

Regarding the data that have been collected, a limitation can be found in the number and type of stakeholders that have been consulted – both teachers and educational experts. Although the study collects data from all Member States, the data cannot be considered as being representative of the whole of Europe. This is because respondents have not been sampled and, in the case of the interviews and for some countries of the survey, the limited number of respondents asks for cautions in the interpretation of the data. Moreover, the differences between and within countries in terms of curricula, teacher training, educational culture and traditions and general organisation of the school establishment should be kept in mind when reading the report, as education in Europe is certainly not homogenous.

Moreover, each phase of the study holds its peculiar limitations. For an overview of these limitations, the reader is referred to the specific reports of the different phases of the study.[7]

Despite these caveats, it has to be noted that it is the first time that such a high number of opinions, insights, evidence and data are collected on the topic of creativity and innovation for education in Europe. This report and this study should therefore be considered as the first step towards an understanding of the creative and innovative potential of European schools.

[7] All reports can be downloaded from the project website http://is.jrc.ec.europa.eu/pages/EAP/iceac.html

2 Main messages from the different phases of the study

As mentioned before, the ICEAC study consisted of several phases. In this section, the main results of each phase will be presented in brief. Readers interested to read more about any of the different parts of the study are kindly suggested to visit the project website (http://is.jrc.ec.europa.eu/pages/EAP/iceac.html) where all the reports of this project may be found.

2.1 What literature says

The IPTS literature review provides the theoretical grounding for creativity and innovation to thrive in a school environment and proposes a series of central factors which can support the shift towards a more creative and innovative education (Ferrari, Cachia, & Punie, 2009). In this review, creativity is conceptualised as a *skill* for all and it is argued that educational actors have the power to unlock the creative and innovative potential of the young.

The report emphasises the need to encourage the development of students' creative and innovative potential for several reasons. Creativity is a form of knowledge creation, therefore stimulating creativity has positive spill-over effects onto learning, supporting and enhancing self-learning, learning to learn and life-long learning skills and competences. The report also develops the notions of *creative learning* and *innovative teaching*. Creativity is defined as a product or process that shows a balance of originality and value. It is a skill, an ability to make unforeseen connections and to generate new and appropriate ideas. *Creative learning* is therefore any learning which involves understanding and new awareness, which allows the learner to go beyond notional acquisition, and focuses on thinking skills. It is based on learner empowerment and centeredness. The creative experience is seen as opposite to the reproductive experience. *Innovation* is the application of such a process or product in order to benefit a domain or field - in this case, teaching. Therefore, *innovative teaching* is the process leading to creative learning, the implementation of new methods, tools and contents which could benefit learners and their creative potential.

The literature shows that creativity is conceptualised in different ways by different people: either as art-centred or as relevant to any domain of knowledge; either as the quality of some geniuses or as a skill that anyone can develop. A common understanding of what creativity is for education and what it entails is therefore the first envisaged step for a creative and innovative education. Moreover, research recognises several factors that could create a nourishing and creative environment. Teachers, for instance, are key figures in constructing a creative climate, but they need support from both policy-makers and institutions. In particular, curricula and assessment are key areas to be addressed in order to allow creativity in the classroom.

The report also highlights the important role of technologies in learners' lives and how they can enable educational change towards an innovative and creative school environment. Both teachers and learners must acquire critical skills in their use of technologies to be able to benefit from them in an effective, innovative and creative way. Educational systems should also take into account the empowerment culture brought about by new technologies, putting the learner at the centre of the learning process. Otherwise, there is the risk that education policies and systems become irrelevant for students' real and future needs.

These requisites were clustered into eight thematic areas or enablers, which are the circumstances or support mechanisms that make creativity and innovation more likely to thrive. These different factors contributed to the preparation of the scoping workshop (see section 2.2) and were finalized taking into account the perspectives of the experts and their

contributions. These are: assessment; culture; curriculum; individual skills; teaching and learning format; teachers; technology, tools. The co-existence of several of these positive factors per each area would give rise to an enabling environment where creative learning and innovative teaching could blossom. If enablers are not present, creativity will be less likely to flourish. If, on the other hand, all enablers are in place, it is still not possible to deduce that creativity and innovation are happening, as teachers and students will still have to actively engage in the creative and innovative process. Enablers are therefore indicators of the kind of environment which could nourish creative learning and innovative teaching.

2.2 What workshop participants say

Two workshops took place during the study, one at its beginning – scoping workshop, February 2009 – and one towards the end – June 2010. The aim of the scoping workshop was to gather experts' information on the role of Creativity and Innovation in the educational systems of their respective countries and to validate and discuss the proposed methodology of the study. The definition of creativity and how it should be measured was one of the major topics discussed in the workshop. Experts highlighted the need for a working definition of creativity which works with as many stakeholders as possible. The need for a change in assessment which enables teachers to measure creativity as a process, and not just as a product, was raised.

A major issue that came out of the discussion is that the term creativity may have different meanings and connotations in different countries. Stakeholders also discussed the balance required from teachers between ensuring basic skills and encouraging creativity or whether the two should be integrated. Learning from pre-primary schools where creativity is highly triggered was suggested. Participants also suggested that we need to be clear with what we value, support and assess in education systems, including risk taking and resilience. It was highlighted that policy makers and practitioners need to demonstrate courage, and allow time for fun and flow[8] also in times of economic crisis.

In the experts' view, a creative learning environment involves less teacher-centred practice, and making creative processes and collaborative ways of working more explicit. In order for change to take place, teachers need to be aware of the different aspects of creative learning and able to understand creative learning development. In parallel, curricula should allow integrated and flexible ways of working for innovative models of learning that can be transferred across other curriculum areas/domains.

During the workshop, it became clear that ICT is not that present in the discourse on creativity and innovation in education systems in Europe. Young people are ICT literate but they often lack the critical skills to be creative and innovative with new tools. Teachers nowadays do not have to teach information but how to use information to get knowledge. In this way, ICT should play the role as an enhancer. Students should be allowed to have technology in their own hands, so as to learn how to make meaning from these tools. Teachers, on the other hand, should be trained to be able to understand how the tools can shape the creative process. What makes digital technologies highly interesting from an ecological point of view is their multiple ability to connect or bridge processes between and within systems. It is in this sense that technologies can be seen as "catalysts" for change – by opening up new possible bridges and connections.

[8] With the term 'flow', Csíkszentmihályi (1990) refers to a state of total absorption and involvement in an activity. The pleasure and concentration derived from this state are necessary for a creative moment.

In the final workshop, workshop participants were asked to validate the major results of the ICEAC study and to provide concrete actions for policy makers. The methodological approach to the ICEAC study was discussed at length and various experts provided varied feedback. The major themes identified as needing policy actions were curricula, ICT and teacher training. The suggestions provided by the workshop participants have been taken into account in this report.

2.3 What curricula documents say

In order to get a better understanding of how creativity and innovation are framed in EU27 at the policy level, the learning objectives/school curricula on compulsory education were analysed (Heilmann & Korte, 2010). The terms Creativity, Innovation and some selected synonyms were searched in curricula documents and their frequencies analysed according to the level of school (primary/secondary) and the subjects groups (Arts, ICT, etc.) where the terms appear. This analysis shows therefore how often creativity, innovation and some synonyms are mentioned in curricula for compulsory school of each Member State.[9]

The main findings of the study demonstrate that the term *creativity* is relatively frequently mentioned in school curricula in many European countries. In comparison, the term *innovation* hardly occurs at all in school curricula. As can be observed in Table 2, eleven countries and regions show high, seventeen medium and only eight countries and regions rather low relative occurrences of the search terms in compulsory education school curricula (general curriculum documents and subject curricula).

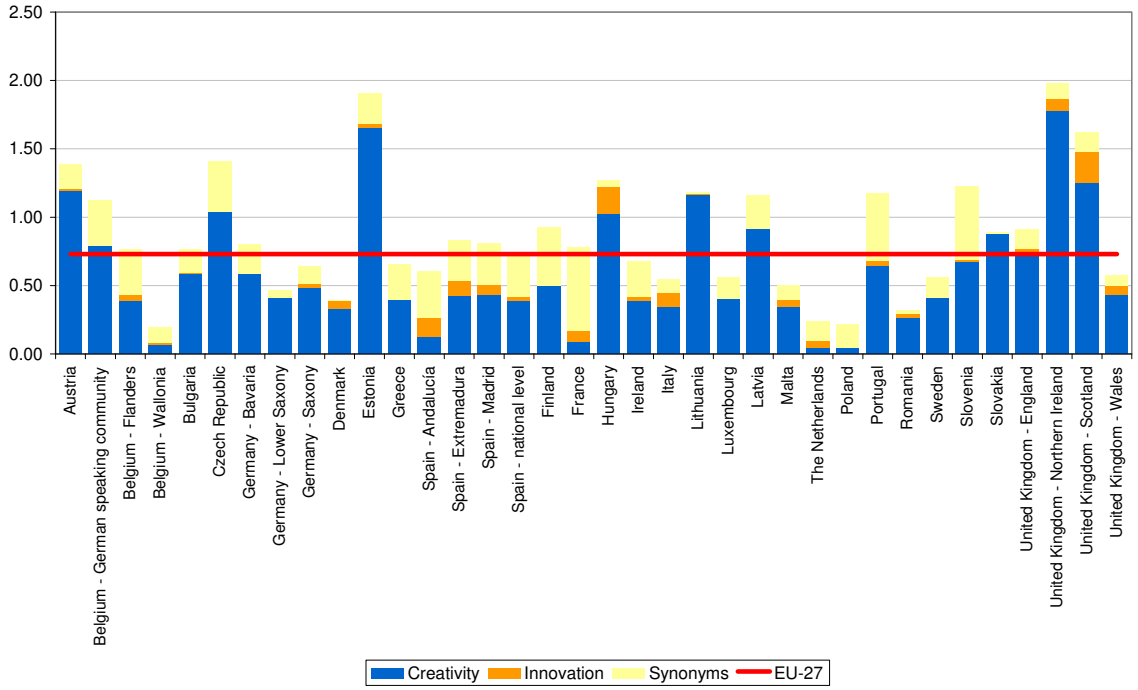
Table 2: Relative occurrences of the search terms and synonyms in primary and secondary school curricula in EU27: country groupings

High (Relative occurrence >1.0)	Medium (Relative occurrence >0.5 - <1.0)	Low (Relative occurrence <0.5)
Austria	Belgium - Flanders	Belgium - Wallonia
Belgium (German speaking community)	Bulgaria	Germany - Lower Saxony
Czech Republic	Germany - Bavaria	Denmark
Estonia	Germany - Saxony	Italy
Hungary	Greece	Malta
Lithuania	Spain - Andalucía	The Netherlands
Latvia	Spain - Extremadura	Poland
Portugal	Spain - Madrid	Romania
Slovenia	Spain - national level	
United Kingdom - Northern Ireland	Finland	
United Kingdom - Scotland	France	
	Ireland	
	Luxembourg	
	Slovakia	
	Sweden	
	United Kingdom - England	
	United Kingdom – Wales	

[9] Cyprus was the only Member State where this analysis could not be conducted due to major ongoing curricula reform.

As can be observed in Figure 1, the term *creativity* is mostly prominent in the curricula of Northern Ireland (1.78), Estonia (1.65) and Scotland (1.25) and the least found in The Netherlands, Poland (both at 0.04) and Wallonia (Belgium) (0.07).[10] There are only few exceptions like in France, Andalucía (Spain), Netherlands and Poland where synonyms are more frequently used than *Creativity*. *Innovation* as a term only plays a minor role and is most prominent in Scotland and Hungary, but even there it remains at a very low level with a relative occurrence of only 0.23 and 0.20 respectively.

Figure 1: Relative occurrence of Creativity, Innovation and their synonyms in school curricula in Europe (EU27)



In the curricula analysed, creativity is generally used broadly and considered as a skill, as for instance, 'creative thinking' or 'creative problem solving'. It is seen as an integral part of the learning process to help children and young people to be successful learners, confident individuals, responsible citizens and effective contributors. Creativity is thus seen as a required skill that should be encouraged and developed in most subjects. There are also instances where it is used more narrowly and in relation to Arts subjects referring to 'artistic' creativity. Only in a few cases and in the context of a few subjects (e.g. Handicrafts, Metalwork) creativity is conceptualised in relation to working with materials.

In terms of subjects,[11] *creativity* and its synonyms are mostly prominent in the subject group 'Arts' followed by the subjects groups 'ICT' and 'Physical Education'. In some countries (e.g. especially in Northern Ireland, Scotland), *creativity* and the synonyms are frequently mentioned in all subject groups. However, the term hardly appears in any of the subject groups (including Arts) in other countries (e.g. in Wallonia, Lower Saxony, Denmark, France,

[10] These figures represent the per mil percentage of occurrence of the terms, i.e. how often the terms occur per thousand curricula words.

[11] Due to the vast number of school subjects and to the differences between countries, subjects were clustered into eight subject groups, namely: Arts, ICT, Languages, Mathematics, Natural Sciences, Physical Education, Social Sciences and Other.

Netherlands, Poland). Little difference may be noted between primary and secondary school curricula, in relation to how frequent the terms appear, with 0.68 relative appearances of the terms (creativity, innovation and synonyms) in primary school and 0.69 in secondary schools.[12]

Mentioning of ICT is rarely connected to Creativity. Sometimes ICT is referred to indirectly in the curricula using expressions like 'computer', 'new media' and 'media competence' and referred to as a tool to be used throughout the teaching and learning process. In terms of ICT as a subject, there is no overall clear pattern, or relationship with creativity. In several countries ICT is seen as cross curricular issue and included in general introductory documents (e.g. Wales, England, Northern Ireland, France, Luxembourg) where it is sometimes linked to Creativity, while in other countries and regions dedicated regional plans and programmes are referred to which are in place to promote the use of ICT in schools in general.

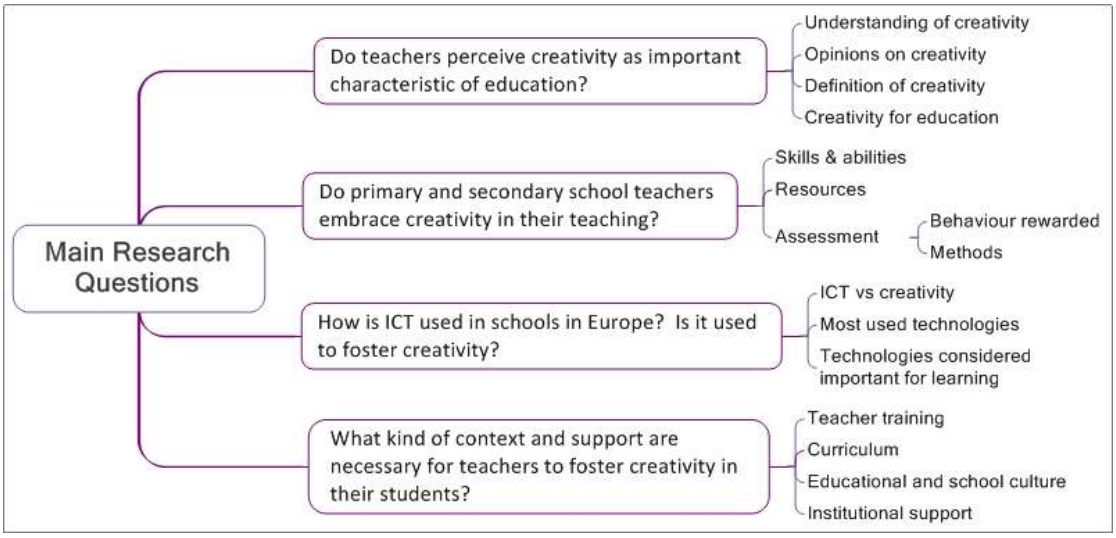
This analysis shows that *creativity* is referred to in school curricula in all countries and is already part of the educational political discourse in most European countries. Nonetheless, it is important to bear in mind that national curricula serve different purposes in different countries. In some countries they are statutory, formal and prescriptive; in others they only constitute a general framework to be filled with content and be further refined by the schools themselves. The legal status of school curricula varies between countries, which poses further limitations to their direct comparison. In many countries national school curricula are supplemented or re-interpreted by regional, local, school and teacher / class curricula or schemes of work. In addition, although the terms and synonyms occur in official documents it is no guarantee that practice in schools will coincide with official intentions, even if statutory. Conversely, low appearance of the search terms in policy documents does not mean that creativity and innovation are not present in the country. In some countries, the curricula is less prescriptive than in other countries, and hence, the low appearance of the terms creativity and innovation is because they are written in a way to allow teachers to be more free in choosing how they want to teach, hence, allowing them to be creative and innovative.

2.4 What the teachers say

There is a widespread consensus from varied educational stakeholders that understanding teachers' perception of creativity and their current teaching practices is essential for any development of policy lines on creativity and innovation for education in Europe. Therefore, as part of the ICEAC project, a specific consultation in the form of an online survey was arranged to reach the classroom teachers in the European countries. This survey was carried out in collaboration between IPTS and European Schoolnet and resulted into a overview brochure of the preliminary results (Cachia, et al., 2009) and a more detailed report on the survey results considering only respondents who teach in compulsory education (Cachia & Ferrari, 2010). The online consultation aimed to explore the perceptions of teachers in Europe about creativity for learning and their reflection on their own teaching practices. Particular emphasis was given to ICT, so as to get a better understanding of current ICT practices and the potential of ICT applications to foster creativity in students. In addition, the conditions necessary for the nurturing of creativity at schools have also been analysed. The main research questions are presented in Figure 2.

[12] Analysis refers to the analysis of curricula directly referring to school subjects and excluding any general and cross curricular document.

Figure 2: Research questions for Teacher Survey



As a consequence of the scope of the study, this report focuses on 27 Member States of the European Union and compulsory school (ISCED levels 1 and 2), amounting to a total of 7,659 responses (see Table 3). It is important to mention that results are not representative of the teacher population in Europe. Results show that teachers in our survey have an encompassing view of creativity. Teachers' opinions on creativity in education are stronger than their practices Almost all the surveyed teachers believed that creativity could be applied to every domain of knowledge (98%) and that creativity could be applied to every school subject (96%). The majority of the teachers surveyed were active in promoting creativity in their teaching, with three quarters of the respondents sustaining that thinking skills were developed (83%), and that active and participative learning (80%) and learning how to learn (73%) took place. However, only less than half of the respondents claimed that play (46%) and multi-disciplinary work (41%), which are as instrumental for creative learning, took place in their classrooms. This implies that there is a lot of room for improvement in the way creativity is fostered in schools. While more training is required on how creativity could be fostered at school, we argue that creative practices should be institutionalised. Creative practices are often not allocated enough time and space because of other educational priorities.

Table 3: Demographic data

		N = 7659	
		#	%
Gender			
	Female	5848	77.2
	Male	1727	22.8
	Total	7566	100%
Age			
	Under 25	91	1.2
	26-35	1,519	19.9%
	36-45	2,723	35.7%
	46-55	2,653	34.7%
	55+	649	8.5%
	Total	7,635	100%

The way creativity should be assessed is often not addressed in educational objectives and policies. Our data shows that only half of the respondents (50%) agree that creativity can be assessed. Formal testing remains the predominant way of assessing students in Europe (76%), although other methods of evaluation may also be observed. Innovative ways of assessment, such as portfolios and allowing students to test and give each other feedback, are still under used. More effort should be dedicated to encouraging teachers to combine different methods of assessment, including self and peer assessment by students.

There is clear evidence that a vast majority of teachers agree that ICT has improved their teaching (85%) and that it could be used to enhance creativity (91%). Although usage of ICT remains largely related to more traditional technologies a shift to new tools is slowly picking up. The technologies that teachers agreed were important for learning may be divided into three main clusters: conventional technologies, interactive technologies and more social technologies, with the first receiving highest preference from teachers and the latter the least. This suggests that the potential of social technologies for learning is somehow still unclear for the teachers surveyed.

Teachers tend to combine different resources in their teaching, with more than two-thirds claiming to use various modes of ICT. Opportunities brought about by ICT, especially by social computing applications, could be instrumental in enabling teachers to create their own material and resources and share them with their fellow teachers. Notwithstanding the wide access to the Internet across Europe, only a quarter of the respondents claimed that the quality of ICT in their schools was excellent. This suggests that while access to ICT is an important focus for policies, ensuring that the ICT provided is of good quality and continuously maintained is equally important.

Developments in pedagogy training should be addressing more specific needs arising from our societies. More than half of the teachers in this survey (58%) claim that they have not received any teacher training on how to use ICT in the classroom. There is a strong need to provide basic ICT training and also digital competence training so that teachers become confident and critical users of ICT. In terms of creativity, training should focus on eradicating recurrent myths about creativity and on offering a direct link with educational practices,

enabling teachers to reflect and discern which of the activities that take place in the classroom are more likely to encourage creativity.

2.5 What the educational stakeholders say

Another part of the ICEAC project was to gather insights on creativity and innovation in education through in-depth interviews with education experts from different fields of education, namely: the academia, teacher training institutions, inspectorate boards, curricula development agencies and ministries of education (Banaji, et al., 2010b). This work was conducted by Futurelab, in collaboration with IOE, London. The main objective of this study was to identify enablers and barriers for creative learning and innovative teaching throughout EU27. Notwithstanding the diversity of education systems in EU27, analysis of the interview shows a series of common trends.

Experts made various references to instances where different factors in education are connected. For instances, changes in curriculum will not be effective unless changes in assessment take place. They also suggested that school curricula should be inspiring and flexible documents. These documents were harshly criticised for not allowing space and time for teachers and learners to think, imagine, create and deviate from what is prescribed.

Educational institutions are in many cases resilient to change. Education in Europe has a strong ethos of control, disciple and often favours hierarchical relationships. This contributes to an environment which stimulates conformance and discourages divergence, thus hindering potential for creative learning and innovative teaching. Constraints also come in the way that school space is organised architecturally.

Several interviewees recognise that traditional methods are still common in many countries, with frontal teaching, teacher-centred interactions and chalk and talk continuing to be widespread educational practices. Pockets of innovations have been observed but the challenge is to sustain and upscale them. Moreover, in many countries, strong emphasis on traditional assessment methods, based on factual recollection and knowledge acquisition is limiting creative potential. How to assess and monitor learners' performances and progress remains a delicate area of disagreement between teachers, parents, students and policy-makers.

ICT facilities are available in many countries but more training is needed. While provision of ICT tools is widespread there is an urgent need to provide training on how such tools could be instrumental in fostering creative learning and innovative teaching. Interviewees claim that interactive white boards (IWBs) and projectors are often exploited through frontal teaching, letting aside their interactive potential. The most innovative usage of ICT experts have seen is when students were allowed time and space to explore ICT tools. Too many teachers assume that they need to be more competent than their students in order to use technologies in class, whereas interviewed experts do not think this is the case, as teachers could work in partnership with students.

A shift in the culture and mindset of teachers and other educational actors is asked for: a consensus and debates on the importance of creativity in education which include parents and students is important. Also, ITT and CPD are key for a change in teachers' mentality and practices. Teachers need support in terms of training to be up-to-date with innovative teaching practices. They also require more hands-on training which allows teachers to put their knowledge into practice once they are in the classroom.

2.6 What the cases say

In order to learn from examples of good practices, a small study was launched in which ten good practices exemplifying good models of creative learning and innovative teaching in EU 27 were identified and analysed (Banaji, et al., 2010a). The good practices analysed are listed in Table 4.

Table 4

	Good Practice	Country
1	FUNecole®	Cyprus
2	Summative Project	Denmark
3	Open Air Classrooms	Estonia
4	Digital storytelling – Historia do Dia	Portugal
5	Can we "see" the Sound?	Greece
6	Value in the Valley	The Netherlands
7	Authors and Poets	Malta and Scotland
8	Project Maths	Ireland
9	Swedkin	Sweden
10	Queensferry High School Cross-curricular Projects	UK-Scotland

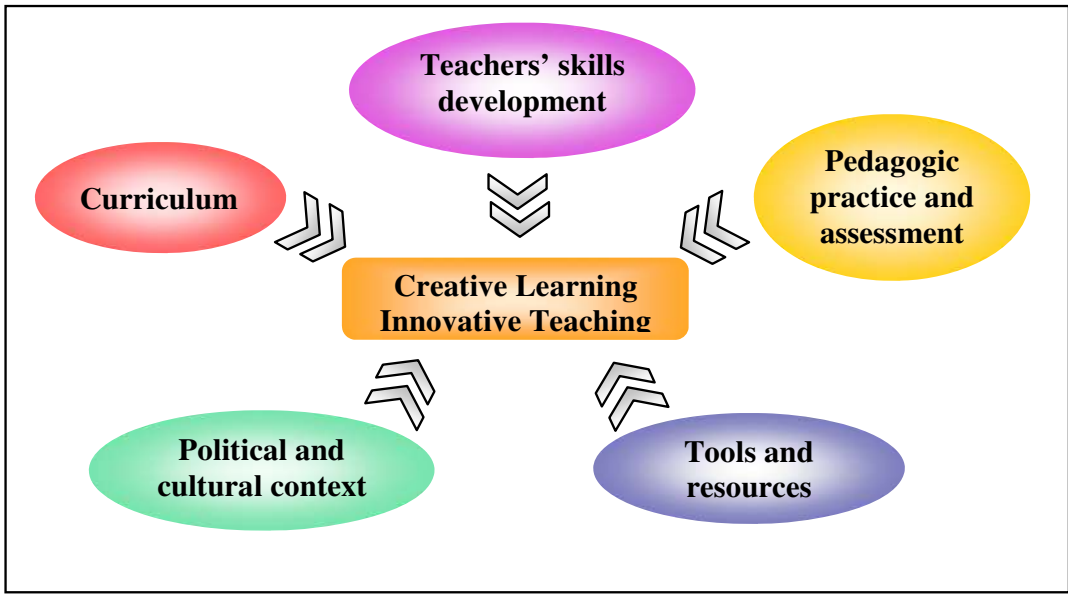
From the analysis of the good practices, we can observe that creativity is understood as collaborative and individual, distinctly linked to cross-curricular practices but also embedded in the skills of specific subjects and disciplines. Teachers involved in these projects were able to appreciate the spill-over effects of creativity on learning. It was observed that motivation of teachers and students was one of the major keys for success or failure of projects. A major recommendation of this report is that summative testing, unrealistic staff targets and fact-based, overloaded curriculum need to be thoroughly revised because they are systemic barriers for teachers' motivation. Summative testing, as opposed to diagnostic and formative testing, aims to judge – and grade - pupils' achievements at the end of a programme of work, in contrast to analyzing students' progress (NACCCE, 1999).

The analysis of these successful stories brings to the surface major recommendations that need to be taken into account. There is ample space for more innovative and creative learning for students even when resources are limited in their schools. More physical and mental space to develop innovative ways of delivering the curriculum is required by teachers. Assessment which takes into account not only the final product but also the creative process should be integrated in formal education objectives. As we have learnt from these good practices, there are various initiatives which describe how creativity and innovation are practiced in education. However, more effort needs to be addressed in fixing time-tabling and allowing more space for imagination and interaction with different tools and resources across different school levels.

3 Major results for creative learning and innovative teaching

This chapter brings together the results of the main areas recognized and developed during the study to be considered by the policy makers. It must be acknowledged that even though each topic is described as a standalone issue, the areas are highly intertwined: curricula and assessment both have high impact on actual pedagogic practices, which also depend on resources and deployment of ICT, teachers' skills and training, and overall educational culture in the country and at school, as illustrated in Figure 3.**Error! Reference source not found.**

Figure 3: Main areas influencing the development of practice for creative learning and innovative teaching



3.1 Framing of creativity in curricula

Results from this study demonstrate that despite the diversity of curricula in Europe, when it comes to nurturing creativity and innovation, some cross-cutting aspects could be improved. In the literature review, it has been argued that offering learners the right chances to develop their cognitive and creative potential should be a priority in the design of school curricula, because as Runco (1990) affirms the thinking capability of children at all levels is significantly influenced by the opportunities they are given. Adopting a democratic definition of creativity, what is referred to in the literature as "little c" (Beghetto, 2005; Sharp, 2004) in education is fundamental, recognizing the potential of all students to be or to become creative (Esquivel, 1995).

In this study, creativity is understood by both teachers and educational stakeholders as beneficial for education. It is mentioned in all the curricula analysed. A high majority of teachers believe that **creativity plays an important role in the curriculum**. Teachers in Italy and Latvia, United Kingdom and Cyprus (72%) were the ones mostly agreeing or strongly agreeing with this statement. Some cases where **creativity is poorly mentioned in the curricula, but albeit highly present in schools** have also been observed. A case in point is the Netherlands. In the curricula analysis, we found that the term creativity was one of the lowest when compared to EU27. In contrast, experts' consultation and data from the survey

show that creativity is highly practiced in Netherlands schools. When asked which activities take place during their lessons, the teachers in the Netherlands (92%) were the ones across EU27 mostly engaged in activities which are understood to foster creativity. The discrepancy in the data could be interpreted in terms of the status of the curricula in this country. Schools follow the principle of Freedom of Choice in the way how they are run and how the curriculum is interpreted. There is a distinction between 'what do children learn?' and 'how do they learn?' The latter is the responsibility of schools. Results from this study show that creative learning is often taken into account in the way they implement this responsibility. An important highlight is that **what is specified in the curricula is not necessarily reflected in practice.**

While the presence of creativity in European curricula cannot be contested, the **definition of creativity is often inconsistent** and as various education stakeholders reiterated there is neither consensus nor guidance on how to actually develop creativity in practice. In the school curricula analysed for this study, the term *creativity* is often used broadly. In some cases, it is considered as a required skill which should be encouraged and developed, as for instance, 'creative thinking' or 'creative problem solving', as well as an integral part of the learning process to help children and young people to be successful learners, confident individuals, responsible citizens and effective contributors. In other cases, it is used more narrowly, in relation to Arts subjects, more linked to 'artistic' creativity.

Similarly, while most teachers believe that creativity can be fostered in all schools subjects, they seem less convinced that it is not the preserve of the arts alone. Almost all the surveyed teachers believed that creativity could be applied to every domain of knowledge and that creativity could be applied to every school subject. However, a lower percentage agreement was observed to the statement that creativity is not restricted to visual arts, music, drama and artistic performance. In some countries, as for instance Czech Republic, creativity is still associated with Arts, while in others, as for instance in Denmark, it has gradually been de-linked from the arts and is now considered as cross-curricular skill. Irrespective of the different situations in these countries, in the curricula analysis, the relative occurrence of creativity, innovation and their synonyms was highest in relation to Arts subject in both countries.

Another barrier for creativity in education identified by stakeholders was that in most curricula, **subjects are still addressed separately** and are hardly ever connected with each other. As discussed in the literature review, the division of school time in subjects does not allow for the promotion of several skills, such as learning to learn and thinking skills. Setting aside some time for a holistic view of knowledge and for the development of skills that are not subject-specific is a way of ensuring that creativity is promoted in all curricular areas, across different subjects because creativity is not subject-related. In addition, as highlighted by the Robinson Report we should try to aim for a balance between the different subjects in the curriculum so as to allow that every student is able to develop his/her abilities in every possible field (NACCCE, 1999).

Balance is also needed in relation to the amount of content teachers are expected to cover during a school year. Too much content could detriment the development of creative activities in the classroom, as it does not allow space for other activities which allow the development of deep understanding and transversal skills (Craft, 2005; NACCCE, 1999). More than half of the teachers for 15 out of the 27 Member States[13] think they have to cover too much

[13] These are Bulgaria, Cyprus, Estonia, Finland, France, Germany, Ireland, Latvia, Luxembourg, Malta, Portugal, Romania, Slovakia, Slovenia, and Spain.

content with Malta, Estonia and Bulgaria ranking as the highest. Education experts claim that **overloaded curriculum content** does not allow time and space for flexibility, risk or innovation.

Various educational stakeholders also highlighted that, while the curricula in their countries clearly define what teachers should teach, they rarely specify how it should be taught. Interviewees also contend that although what the curricula explicitly mentions is important, as yet, it is often up to the teacher and to other school stakeholders to nurture creativity and discern when it takes place. Data from our survey suggests that education in Europe is still perceived as a disciplinary institution and certain behaviour such as discipline tends to be preferred in schools, in contrast to play and risk-taking.

Many countries are currently undergoing curricula reforms towards more competence-based approaches. In various countries, curricula revision is being consulted with different stakeholders, varying from teachers to children and parents, for instance by engaging them in the debates on how learning can be broadened and enhanced. An example is the project: How Good is Our School in Scotland.[14] This kind of feedback mechanism between ministries, teachers, students, parents and other educational stakeholders is considered beneficial as it promotes debate and reflection on a shared understanding of quality and vision of education.

In such reforms, it may be observed that countries are placing new emphasis on the importance of developing creativity and innovation within the curriculum, as for instance priority for individualisation and personalisation in Czech Republic, allocation of time for creative classroom projects and multidisciplinary teaching in Greece and a shift from teacher-centred curriculum to a learner-centred one in Hungary. In Scotland creativity in learning is at the heart of the new curricula promoting four core capacities, namely success as learners; confidence as individuals (in a wide range of contexts); effectiveness as contributors; and responsibility as citizens. Similarly, promoting creative approaches which can be initiated by the child through emphasis on *learning by doing, active involvement* and *experiential learning* can be observed in Wales. The new national curriculum in Slovakia and Greece specifically requires teachers to explicitly think about and prepare for creativity.

Education stakeholders suggested that **more effort should be addressed in incorporating new cross curricular skills** in the reformed curricula. Many curricula are still short of addressing skills needed for today's societies, such as digital competence and multicultural learning. As suggested by one of the Scottish interviewees, creativity should be embedded in the thinking behind and approaches to education policies and national vision. Curricula and other educational policy documents need to raise awareness on the benefits not only of creativity for learning, but also of linking teaching practices and methods with creative outcomes.

As curricula and education policy documents are not always easily accessible, **a common European modular framework could enable a coherent view** of what European educational policies state. Such framework could be part of a portal where each Ministry could easily upload their most recent curricula according to specified section (as for instance, General Introduction, section by subject, division between school levels). In this way, all European curricula could be made available form one single site. Eurydice already provides detailed and updated 'National summary sheets on education systems in Europe and ongoing reforms'.[15] While these documents are essential for any country review on education, the original text of the curricula of EU27 is still absent on a common open repository.

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[14] http://www.hmie.gov.uk/documents/publication/hgiosjte3.pdf
[15] http://eacea.ec.europa.eu/education/eurydice/eurybase_en.php#description

The **legal status of the curricula, as well as how often the curricula is updated or changed** are also important details to be taken into account when conducting cross-curricula analysis. It is often the case that such data is not provided within the curricula. It is often difficult for any educator or researcher from another country to understand the remit of the curricula. In addition, some countries are implementing practical manuals and guidelines for curricula implementation and these are heavily used by teachers, who rely more on them than the actual curriculum text but this is nowhere mentioned in the curricula.

Finally, **curricula cannot be effective if there are no supportive structures**. No matter how well creativity is framed, if teachers are not trained on how to allow creative approaches from learners, identify creativity when it happens and take into account transversal competences in their assessment things will remain unchanged.

3.2 Pedagogic practice and assessment for creativity

As shown by the literature, specific pedagogies and assessment methods tend to foster creativity while others tend to inhibit it (Craft, 2005; NACCCE, 1999; Runco, 2003). Furthermore, assessment arises in practically all study elements as a major issue impacting school practice and culture, being **both an enabler and a barrier for creative learning and innovative teaching**. This puts the teachers in a key role in developing creative learning of their pupils through innovative teaching in the daily classroom practice. In general, teachers seem to be positive for fostering and valuing creativity.

A majority of teachers surveyed in the study (95%) believed that creativity is a fundamental skill that should be developed at school. However, only 70% believed that creativity could be taught and only 50% thought it could be assessed. Also expert consultations supported the view that **the positive attitudes towards creativity do not necessarily transfer to the actual teaching and assessment practices**. The study results show that schools in Europe use different methods for evaluating their students, nonetheless, **preference to conventional assessment and testing prevails**. It has been recognized for example by the Joint progress report on E&T2010 (Council of the European Union, 2010) that most current assessment methods have a strong emphasis on knowledge and recall and do not sufficiently capture the crucial skills and attitudes dimension of key competences.

The classroom **pedagogies are typically not regulated, but are influenced by the educational policies anyhow**. Based on Eurydice data (Eurydice, 2009), in all EU countries, the schools have full autonomy in choosing the teaching methods, and full or limited autonomy for setting the internal assessment criteria and systems for pupils. Also expert interviews in the study confirmed this. Therefore, although the teachers do not necessarily have a say in determining the content of compulsory curriculum, they have freedom in daily education activities, such as choice of teaching methods and textbooks, groupings of pupils for learning activities and internal assessment. However, expert consultation revealed that in many countries external national examinations play a major role, and especially **secondary schools often gear their teaching and assessment to prepare pupils for the national examinations**. Furthermore, expert consultations suggest that even though curricula and schools may invite teachers to implement creative approaches for learning, they often do not provide guidance about how to take it into account assessment, and the **national assessment systems do not directly take into account creativity.**

Many interviews suggest that **teachers often revert to "default" teaching style**, because they lack skills and especially confidence to implement new learning methods and approaches, which could support creativity more. Based both on the expert interviews and teacher survey, most of the countries seem to deploy mostly traditional teacher-centred

learning methods with uni-directional knowledge transfer. 86% of survey respondents claimed that "teacher explaining" was an activity which often or always took place in class. Combined with the finding that 79% of respondents often or always fostered "discipline" in their students, the survey results support the view that the conventional ways of teacher-centred teaching still prevail in teaching practice. Also teaching resources used in teaching are mostly the traditional ones, books, notebooks etc. However, as raised in some interviews: you **can be creative with any resources, or use new resources in a very traditional way**. The latter is confirmed by the ICT Test Bed project, which found that ICT is often used by teachers to support existing pedagogies and traditional practices (Somekh, 2007).

Summative assessment prevails in most of the countries as the main type of assessment in the classroom. When asking how teachers assess their students, 76% of survey respondents claimed that they often or always use formal tests for assessment. However, experts from many countries also described **advances in implementing formative assessment practices** and different forms of assessment through presentations, group work, portfolios etc. Teacher survey revealed that a good share of teachers are assessing pupils (in addition to the formal tests) in ways which give more room for considering creativity, such as assessing students without giving them a mark (63%), asking students to reflect on their own learning and progress (56%), using portfolios (39%) and asking students to test each other and give each other feedback (31%). In general, experts suggested that **traditional testing was more common in the secondary school level, while formative assessment was more common in primary schools.** There are exceptions however, such as Austrian schools, where currently all assessment across all levels is formative.

Although the traditional approaches dominate, also other types of learning approaches are exercised in the school classrooms that can support creativity in different ways. In terms of activities taking place in the classroom, a great majority of teachers surveyed claim to encourage always or often learning activities which are likely to allow students to be creative, such as developing thinking skills (73%), active and participative learning (80%) and learning how to learn (73%). Teachers in primary schools (81%) were more likely to foster such activities than teachers in secondary schools (74%). In general, the study showed that the **pedagogic practices vary greatly between schools and also between different teachers in school**. However, the expert interviews support the perception that there is a general trend of having **more varied and active pedagogic practices at primary than secondary school level**. Many interviewees suggested that this could be due to the pressure that teachers and learners alike feel from the centralised and often knowledge-focused testing and grading system of the secondary schools.

Literature reviewed in the study gives several examples of how **specific teaching, learning and assessment formats can enable creativity**, such as giving value to creativity and engagement, supporting student-centred approaches and creative processes. The teacher survey showed that many **teachers aim to foster skills and abilities that can be seen to enable creativity** in pupils: ability to think (96%), communication skills (91%), ability to learn (90%), motivation (89%) and curiosity (86%) amongst others. **Teachers also aim at rewarding behaviours that foster a creative attitude.** Survey respondents claimed that they often or always reward behaviours such as motivation (91%), ability to come up with something new (89%), ability to connect issues learnt on the lesson with topics in other subjects (87%), curiosity and exploration (89%), and imagination (87%). However, traditional values such as effort (94%) and knowledge (93%) still scored the highest among the issues being rewarded by teachers. Again, teachers in primary schools (92%) were more proactive in fostering skills and abilities connected to creativity than secondary school teachers (81%). As an example of the difference in promoting creativity related skills on primary and secondary

level, 63% of primary school teacher respondents claimed to always or often foster critical thinking, while the respective figure for secondary school teachers was only 47%.

Assessment was often mentioned as a barrier for changing learning approaches and objectives – as a workshop participant put it, you cannot "teach students how to run and then test how they jump". Experts consulted in the study suggested that national examinations were often felt to be used as an accountability tool that measure the quality of schools and teachers, and therefore preparing for them becomes more important that variety of learning provided for students. Therefore, although in theory teachers have freedom to select pedagogic approaches, in practice they feel pressured by the performative school culture to achieve the content objectives in the school reality with tight timetables for different subjects. Expert interviews raise that very **often teachers lack time and support in class,** which is crucial to better consider the needs of individual learners, active learning methods and creativity. It is often mentioned in the interviews that "creative students are harder to handle", which again pressures teachers from encouraging divergence towards convergence and discipline in learning methods and assessment.

Experts in practically all countries also mentioned **resistance towards changing traditional educational assessment systems**. Grades and summative assessment are often considered by parents, teachers, and even students as the important and concrete way of giving feedback about learning. Divergent thinking, which is essence of creativity, is often not encouraged, especially at secondary school level. Furthermore, experts mentioned that the parents are not necessarily supportive of new learning approaches that they are not familiar with. Many interviews highlight that the reigning attitude to schooling is "acquiring factual body of knowledge and testing it through tests and exams". This is expected by the majority of policy makers, parents, teachers, head teachers, and pupils alike. However, it is also important to mention that international comparative studies like TIMSS and PISA are also having important degree of influence on the policy debate and general discussion on assessment. At national levels these studies play an important role in the policymaking related to assessment.

Expert interviews did bring up several concrete examples of how creativity is fostered in pedagogic practices at schools. For example, a Finnish interview revealed that they have schools that use methods such as "touch and feel, see images and talk, show your ideas and discuss, use symbols and language so that all children have an equal chance to learn". In Estonia, open air classrooms are a frequent resource in schools – they have a board set up and students go there perhaps to work on biology or geography project, to collect samples, analyse them etc. There were also several concrete examples where assessment takes account of creativity and even invites it, both in summative and formative assessment contexts (as an example, see the box on 'Denmark: compulsory summative project'). For example, in Wales there are said to be schools where pupils share their learning outcomes and objectives; there is 'talk for learning', peer and self assessment, where pupils know how well they are doing and what they need to do to improve.[16] Many countries also mentioned problem-solving tasks where assessment takes into account the process and not only the final outcome. For example, in the context of science it is possible to evaluate the strategies employed by a student when trying to solve a specific problem and reward logical consistency of the approach even if the final result would be incorrect.

[16] See for example the website http://www.excellencegateway.org.uk/page.aspx?o=protocolskillswheel

Denmark: compulsory summative project	
Participants and objective	Framework provided by the National Ministry of Education for secondary schools to use cross-curricular projects as a part of final assessment at lower secondary school. Applied across Denmark.
Age of pupils	Secondary school – 15 years old
Activities	- The project work takes place over the course of a single week of intensive data collection, technology use and collaboration starting on Monday and ending on Friday - During these projects students can use materials or technology to produce new knowledge, innovative solutions to problems or an innovative product with real-world applications - Pupils receive input from teachers in different subject areas and across disciplines while being supported by the class tutor throughout
Potential for creativity	- An internationally viable method of incorporating and assessing creative learning within the more common frameworks of end of school examinations. - The carefully structured week gives opportunities for innovation, creativity, skills assessment and new knowledge - The method allows for teachers to assess both process and product and for students with non-traditional backgrounds

3.3 Teachers' skills development

One of the most suggestive evidence in our study for major improvement is teacher training. Training has been recognised as a key element in the Lisbon agenda for the creation of a well functioning 'knowledge triangle' of education, research and innovation (Council of the European Union, 2010). As explored in the literature review in this study, teachers are critical in enhancing or inhibiting the creative potential of their students. Behaviour and attitude of teachers is largely dependent on the skills and experience they have acquired and the support they receive for their work. **Teacher training is thus one of the most important areas**, where more effort is needed.

More than three-fourths of teachers (77%) surveyed have undergone ITT. **Situations vary substantially across countries when it comes to provision of training on creativity and innovation.** Education experts insist that **not all existing teacher training emphasise pedagogic practice.** Indeed, only 23% claim to have learnt how to teach during ITT.

New requirements for teaching, such as ICT and other cross-curricular competencies, like creativity and innovation, are not yet taken into account in ITT. According to education experts, while in some countries creativity, innovation and ICT are now taken into account in ITT, in general, they are more likely to be covered in CPD courses. In some countries, they are not covered at all. In other countries, new Masters Degrees are emerging to train teachers in these specific areas. Less than half (44%) of the teachers surveyed claim they have received training on creativity. Nine out of 10 respondents (90%) would like to receive such training. On the other hand, more than half of the teachers (57%) claimed they had received training in innovative pedagogies. As education experts reiterated, inappropriate training is often leading

to situations where new teachers are not prepared for the reality in the classroom. While enhancing CDP in these cross-curricular competences is fundamental, **the need to integrate such cross-curricular competences in ITT** is a major step still to be taken in European education.

Data in our study shows that **training on creativity had an impact on teachers' conceptualisation of creativity**. Respondents who stated that creativity was not covered in their training hold more biased and negative views of creativity. In comparison, those who had received training on creativity were more positive on the applicability of creativity in every domain of knowledge and the belief that creativity is a fundamental skill to be developed in school. It is of utmost importance that educational actors have **clear vision, awareness and understanding of creative processes** and how they can be enhanced and evaluated, as has already been suggested in the section on assessment. This implies that while the majority of teachers have clear notions of creativity in education, there is still ample space for improvement in way teachers attempt to nurture creativity in their practices highlighting the need for more focused and hands-on training to extirpate deep-rooted myths on creativity.

From the interviews, we have understood traditional teaching methods are still predominant in most countries. At the same time, the analysis of best practices shows that there are pockets of innovation. Hence, we are faced with the challenge to sustain and upscale such sporadic efforts. Training in various countries remains fragmented and there is no common framework which ensures that teacher training is centralised and covers all the required expertise needed by teachers. Differences in approaches regarding teacher training should be analysed at a European level, promoting good practices from the forefront countries and providing support in the countries where it is needed.

Various experts highlighted the need for teacher training which provides **more practical guidance and less theory**. An interesting suggestion in the final workshop of this study for enhancing teacher training methods was that teachers should be trained to teach other teachers, so that training is continuous. For these experts, training was not limited to institutional training but also exchange between teachers on an international level. In fact, according to these experts, **more training opportunities should be given to teachers to be mobile across countries**, whereby expertise knowledge could be exchanged and applied in different national contexts. Training could also be provided onsite, but also online. These results are supported also by the OECD Talis survey (OECD, 2009), which found that the types of professional development considered to have most impact by teachers surveyed were "individual and collaborative research", "qualification programmes", and "informal dialogue to improve teaching". Education conferences and seminars were considered as having least impact.

More than half of the teachers in this study (58%) had not received any training on how to use ICT in the classroom. OECD Talis survey found that, actually, 68-70% of teachers in the EU (depending on their subject) would like to have professional development on ICT skills for learning (European Commission, 2010c). This is important, because, data from this study shows that teachers who had received ICT training were more likely to select interactive and social computing applications as technologies important for learning. This suggests that teacher training has positive impact on the take-up of new technologies by teachers. In countries where provision of ICT training is available, **little effort seems to be devoted to creative pedagogy with ICT**. This suggests that the potential of ICT to enable educational change towards an innovative and creative school environment is far from exploited.

Experts in this study claim that while a large number of teachers are ICT literate, only few teachers are able to use ICT for teaching across the curriculum in innovative ways. The

impact of ICT use on students is highly dependent on the teaching approaches adopted (Law, Pelgrum, & Plomp, 2008). There is a **need for pedagogic training which empowers teachers with the required ICT skills** with which they can enable their students to be come digitally competent on the one hand, and to guide them towards more exploratory interaction with ICT tools through which creative and innovative practices may be fostered. Rapid changes characteristic of ICT tools mean that policies and systems dealing with **pedagogic training focused on ICT should be modular** taking into account the development of enhanced and new ICT tools and applications ensuring that teachers are able to transfer their knowledge across different subjects, as well as aligning their knowledge with students' real and future needs.

Although CPD training it is not compulsory in many EU27, 87% of teachers surveyed have attended such training. This is aligned with the results of OECD Talis survey (OECD, 2009), which found that on average, 89% of lower secondary school teachers surveyed in 23 countries in 2007-2008 had engaged in professional development activities during the preceding 18 months. Experts in this study highlighted that not all the teachers would like to have CDP, but those who do, would like to have better training opportunities. Again, Talis survey confirms this, with its results revealing that more than a half of the teachers surveyed identified a need for more professional development than they had actually received (OECD, 2009). Interviews suggest that teachers attending CPD courses are often the self-selected group of highly motivated and driven teachers. **Encouraging teachers of all ages to engage in life-long learning activities is a priority** which needs to be addressed.

In some countries, courses on creativity and ICT are perceived as *luxury* courses and hence, **little funding** is dedicated for such courses. This suggests that in some countries, there is still an implicit understanding that some subjects are more important than others. This misconception leads to an underestimation of the potential of creativity in other domains of knowledge. Time seems to be another important factor when it comes to teacher training. In some countries, teachers are required to attend training in their free time due to tight schedules imposed by the curricula and the school syllabus. In other countries, training is provided only few days before the scholastic year, for instance, five days per year. Most teachers and education experts emphasized that **more time should be allocated for teacher training and professional development**.

Last but not least, teachers need to feel they are treated with respects in order to be able to flourish during their work. Data from this study shows that in various countries **the teaching career is often underestimated**, especially in relation between the time spent dedicated to the job (as for instance, teacher training, preparing lessons or marking students' work) and the low salary and recognition of teachers in some countries. Expert interviews suggest that in some countries, teachers are so poorly paid that they typically need to have two jobs, which makes it impossible to dedicate extra time for developing new learning approaches or to participate in training outside school working hours. Furthermore, teachers get often blamed in the press etc, which reduces their motivation to carry out additional work in order to develop pedagogic practices. The **lack of prospective career advancement** is considered a barrier for better educational outcomes and a major reason for not undertaking teacher training programmes.

3.4 ICT and Digital Media

Over the past decade there have been various efforts in Europe to provide **access to technology**, especially at school level. Literature suggests that technology is endowed with a potential to innovate education (Blandow & Dyrenfurth, 1994; Ruiz i Tarrago, 1993). According to the education experts consulted in the study, aalthough insufficient availability

of computers is still a problem in some countries, the majority of European schools are equipped with PCs, interactive whiteboards (IWBs) and Internet connection. In some countries, technology laboratories, laptops and wide-area networks through which pupils and teachers may interact are also available.

However, when it comes to the **quality of ICT in schools**, the results show that there is ample space for improvement. More than half of the teachers' surveyed disagree or strongly disagree (57%) that the quality of ICT in their school is excellent. Some education experts allege that due to pressure from the European Union, their countries have bought various technology tools, however, a good number of teachers still do not know how to use them and hence, they simple use them as extension of traditional tools. IWBs are often used as a replacement of blackboards and PowerPoint presentations to replicate what is written in a text book. The hefty cost of IWBs and the way they are used has prompted various respondents to question their relevance for innovative teaching, the importance of these tools in various education agendas and the lack of teacher training on how to use such new tools. It is important that strategies are sought on how to evaluate the use of new technology, so as to ensure that such tools contribute to personalise learning by enabling students and teachers to do creative and innovative things with such tools and not simply replace traditional tools.

Teachers' proficiency in using technology is indeed one of the major concerns related to how technology can enable creative learning and innovative teaching. The majority of teachers in our survey contend that technology has improved their teaching (85%) and that ICT can be used to enhance creativity (91%). Here it is important to highlight that survey respondents of this study were all equipped with at least basic ICT skills, as the survey was conducted online. As yet, as observed by interviewees, in some countries, teachers are uncomfortable and reluctant to show their lack of expertise in using technologies for fear that this will compromise their authority in class. It is worrying that for example, STEPS study (Balanskat, 2009) found that only 56% of primary school teachers rate themselves as very or fairly confident with ICT in creating a presentation with text and images, such as PowerPoint.

Enabling interaction between teachers and outside experts, such as artists, technicians, graphic designers could lead to interesting projects through which both teachers and students could use technology to learn in a more innovative and creative ways, for example the project Digital Storytelling: Historia Do Dia undertaken in Portugal (see following box). Teachers use stories to conduct a range of imaginative literacy activities with their students, encouraging them to model their own digital stories or to podcast stories for other children.

Portugal: Digital Storytelling: Historia Do Dia		
Objective	Collaboration between digital technicians and educators to prepare and publish a new digitally broadcast story in Portuguese and in English every day.	
Age of pupils	Primary School – 7-10	
Potential	- Simple but innovative and highly imaginative - Collaboration between authors, illustrators and educators in a digital environment	
Barriers	- Creative use of the site as a resource is large dependent on the innovative ideas of the individual teachers.	
Website	http://www.historiadodia.pt/pt/index.aspx	

Teachers in our survey mostly use the Internet to access information to update their knowledge for use in their lessons, to prepare handouts and material and to search for teaching material. Only less than half of the teachers surveyed agree that mobiles, digital games and social technologies (such as social networking sites, podcast, bookmarking and tagging sites) are important for learning. According to education experts, a **good number of teachers would prefer tailor made resources** which are more specific towards the tasks they would like to achieve with their students, as most teachers confess that they do not have the time or the ability to investigate different modes of specific technological tools.

Various education experts remarked that despite the increase in the numbers of computers in schools, **hands-on access for pupils remains low**. Indeed, only half of the teachers (53%) declared to let their students use a wide range of technologies to learn (videos, mobiles, cameras, educational software, etc). A good proportion of teachers in Europe still prefer to stay in control of the technologies used in the classroom. Allowing students to play with the tools can enhance pupils' motivation to think, understand, learn and conceptualise in innovative ways as has been observed in the Greek good practice: *Can we "see" the sound?* covered in this project. Through the combination of different subjects, pupils were engaged in identifying commonalities and patterns through unusual and out-of-the-box thought processes shared by music, physics, mathematics and ICT. Education inspectors claim that the nicest lessons they have attended were the ones in which students were given access to use the technology.

Greece: Can we "see" the sound?	
Objective	To provide pupils with the support and the tools to liberate their creative potential and imagination. Using computer-based recording and editing of sounds, the project offered new learning opportunities in the teaching of music, physics and mathematics.
Age of pupils	10-12 year olds
Potential	- Clear pedagogical vision inspired by Montessori Method. This method assumes that children need to be involved through a range of communication styles and sensory stimuli which go beyond the textual or verbal dimensions, usually favoured in schooling. - Hands-on activities, aimed at the creation of simple hand-crafted instruments, and in the use of sounds and music to introduce pupils to complex topics in physics and science.
Barriers	- Cost of technology
Website	Nil

Research clearly demonstrates that **if we want children to be creative with technology, they have to be taught or led to understand both basic and innovative usage of tools**. When students are not provided with adequate understanding of the affordances of technologies, there is a high probability that they will replicate familiar forms and ideas using the new tools, as opposed to using the new tools to explore new connections and different ways of fashioning (Loveless, 2008).

Interviewees referred to a wide array of examples, in which teachers are innovative with technology and willing to allow their students to explore new ideas with different tools. Almost two-thirds of our respondents (59%) in the survey, indeed maintain to have found relevant support and examples to combine ICT and creativity through contact with other teachers/colleagues. While computers are still not as commonly used for mainstream subjects, the use of Google Maps in Geography was an example mentioned by various respondents, which show that things are slowly shifting. Other more innovative practices mentioned include: use of mobile phones in class for finding maps, facts and locations and for capturing data outside the class; allowing students to build their own computer games and share them with classmates amongst others; and mobile devices used to measure things like lung capacity, oxygen in the air for biology or geography.

Another recommendation that emerges from our analysis is that when it comes to technology **more space for informal interaction between teachers and students**, whereby both can learn from each without the pressure of limiting themselves to curricula content, is needed. It is unfortunate that in many schools in Europe these spaces of 'flow' (Csikszentmihalyi, 1996), whereby students and teachers are totally engaged in a process of combining previous knowledge and technique with creating something new is rare and in many cases, perceived as a loss of time.

Lack of technical support, sporadic maintenance of software and hardware and slow connection speeds are some of the **major barriers** mentioned by both teachers and education stakeholders in relation to ICT take-up. For instance, in some countries poor connections restricts what students and teachers can access online. More than three fourths of the teachers surveyed (78%) claim they need more technical support. Language is also another major barrier. Most off-the-shelf digital products are in English, and hence, not all teachers are able to use and as a result, schools are not interesting in buying the equipment. Interviewees also mentioned that teachers are often not compensated for the extra-time needed to integrate ICT in their teaching.

In the final workshop of this project, the need for a **European online resource and sharing platform** was highlighted, whereby European teachers can share learning resources in different languages and where academic results about education could be posted, so as to address the current gap that exists between academic research and school practice. Unless teachers are involved in research, it is highly unlikely they will come across findings from the academia. On the other hand, the knowledge of hands-on practitioners is very important for education researchers. Creating such a link between research and practice would indeed benefit both parties. It is important to highlight that there are already various initiatives and projects which are already fulfilling some of such gaps. For example European eLearning portal (elearningeuropa.info) provides some of the desired functionalities, but does not provide specific support for linking classroom practitioners and the ones developing projects and research results for them. eTwinning (www.etwinning.net) on the other hand links together classroom practitioners through different learning and school projects and the Learning Resource Exchange (http://lre.eun.org) already provides a portal for finding resources.

As mentioned by some of the education experts, **one can be creative and innovative with any resources**. Replacing traditional tools with technologies does not automatically lead to creativity or innovation. Combining technology tools with existing ones will allow more space for experimentation for both the teachers and the students. Currently, various European schools use Moodle, wikis, blogs and most schools have their own homepage where they share information about their school. The study data shows that almost three-fourths of teachers (72%) use the Internet to download teaching material though textbooks remain the number one resource used in classrooms (85%). Teachers in Bulgaria and Lithuania were the ones mostly like to use textbook as resources, as opposed to teachers in the United Kingdom who were the least like to do so. Experts also mentioned that in some schools in their countries various technologies were replacing some textbooks. Their only concern was that the textbooks that are still being used are often already dated and this is why teachers spend a lot of effort looking for digital resource to supplement the available books. According to some experts, some books are out-of-date before they are published.

In some specific countries, a good number of schools have developed their own digital systems whereby communication with parents, assessment and homework for students on the one hand and different support, such as material and resources for teachers are managed, as for instance the e-school system by Tiger Leap Foundation in Estonia.[17] In UK, collaboration between universities, government and a private software company has led to a training resource bank which all teachers could use to share resources. According to experts, such kinds of platforms already exist on national levels, but these are often only used by young teachers. **Encouraging teachers across all ages to make use of such tools** is fundamental in the current context of technological change. Such technologies are based on notions of

[17] www.tiigrihüpe.ee

networking allowing teachers to develop collaborative forms of learning, which they could pass on to their students.

3.5 Political and cultural context for learning and teaching

Cultural context for education can be very different in different places, affected by the economical, social and political development and history of the country and region. Overall context includes the regulations and cultural framework for schools, which then create their own local cultures and traditional practices for teachers and learners. These **cultures affect which type of learning is considered valuable and encouraged, which types of teaching is expected and supported and whether people and schools are open-minded to try and develop different ways of learning and teaching**. Therefore, although the main actors in the classroom are teachers and learners, they are affected by policies, traditions, and cultures, created and maintained partially by people outside the class, such as school leaders, national policymakers and pupils' parents.

The context can affect either negatively or positively practices for creativity. The expert consultations repeatedly pointed out that **there is a need to change existing culture and perceptions of educational stakeholders in order to value more creativity in learning practices and objectives**. It is unavoidable that it will take a lot of time to change the culture and ethos at schools and on different levels of educational actors. Strategic leadership at schools and in decision making on regional and national levels becomes very important in promoting and supporting this desired change to take place. STEPS (Balanskat, 2009) survey of European Ministries of Education found that **national policies usually aim to improve infrastructure and teachers' digital competence, but are less frequently focused on the supply of digital learning resources, pedagogical reform or leadershi**p. Expert interviews also suggested that the decision makers do not sufficiently interact with and take into account the suggestions from educational research and even their own educational support institutions. Furthermore, it was suggested that the **regulations do not always support schools to collaborate and share** in developing educational approaches, as put by an interviewee: "Government encourages competition and target setting culture rather than collaboration between schools, which puts them in opposition, not mutually reinforcing."

When considering the content of teaching, interviews suggest that the **culture of education in many countries emphasizes the role of grading and marks, and learning the single correct solutions**. Furthermore, the cultural and contextual pressure makes teachers to be very concerned to give students, parents and stakeholders evidence of how they bring results. This requires having 'publishable' results at any point, which might not be possible with creative learning methods and risk-taking processes where developing learning results requires iterations. Also other 'cultural' aspects often contradict in practice with the issues recognized to enable creativity in learning and teaching. Especially, transformation from primary school to secondary school seems to make a difference in the expectations for both pupils and learners. As put by an interviewee: "It can be quite difficult to introduce more active and creative teaching methodologies at this level. People tend to feel that it’s all very fine at primary, but you’re down to the serious business now!”

Culture and context for education seem to be more often mentioned as limiting factors than as enablers for developing creativity in learning and teaching. However, as an example of an effective policy measure, there were interviews bringing up that the **2009 European Year of Creativity and Innovation had had visible effect in their country in raising political awareness and commitment for creativity and reforms in education**. This is also a good example of how European level activities can benefit the nationally independent educational systems. Awareness raising campaigns and specific networking initiatives of the European

Year were said to have created connections and yearly practices that are expected to promote developing creative and innovative practice at schools in the coming years. An important aspect in developing and changing culture is to promote dialogue between all stakeholders involved, in order to reduce the misunderstandings and resistance towards new learning objectives and teaching approaches.

Some **specific cultural barriers** were mentioned in the interviews: strong fear of failure in front of others which drives to memorizing specific answers, a perspective that learning must require sacrifice and cannot be fun, seeing learning and solitary work and achievement which cannot be collaborative, etc. Some interviews mentioned as a major barrier the fact that **many teachers are used to working in isolation and are not willing to open up their practices** and developing new ones in collaboration with others. Online networks of teachers were considered useful for supporting new practices and learning of teachers, but only a few interviews were bringing up these activities as something that is participated in by many teachers in the country.

Many interviews suggest the necessity to change existing cultures and practices, which is often not easy to accomplish. **Parents can be very traditional and suspicious to changes in teaching and assessment, they expect their children to learn and get grades the way they did.** Teachers and pupils can themselves be resistant to changes, not willing to consider innovations but stay in the traditional knowledge transfer practices, which are also simpler to implement for both parties and require less work and thinking. Furthermore, politicians and teacher unions are not necessarily in favour of changes in the established systems. However, it was suggested in an interview that at the highest decision-making levels there often is commitment to change, but the problem is in the middle level decision makers.

The **school culture as a working environment for both teachers and students is decisive in the development and implementation of educational practices**. It is impacted by the overall educational culture and context, but can vary greatly depending on the leadership, openness and general 'spirit' of the school. **In many countries, schools have strong or partial autonomy in issues that allow them to develop the quality of education.** This was raised often in the expert consultations and is supported by Eurydice as well (Eurydice, 2009). However, the expert consultations revealed that in some countries, strong autonomy of schools was seen as a barrier for creativity, while in other countries, high central regulation was considered as a barrier. Autonomy makes it difficult to ensure awareness and implementation of new approaches in all the autonomic units, but on the other hand a central management has plenty of inertia for change because of the size of the system.

The school culture was studied by asking the surveyed teachers about their perceptions of their school. **Some discrepancy in how teachers claim to foster creativity and innovation and how the school culture addresses creative learning and innovative teaching has been observed**. When asked about factors valued at their school environments, 73% of teachers believe that creativity is fostered at their school, but only 57% agreed that the school fosters divergent thinking and other thinking skills. Moreover, 80% of teachers surveyed thought that the schools they work for foster discipline and 78% said the schools reward effort/perseverance (78%). The least fostered items at school, as perceived by teachers surveyed, were students' initiatives (55%), mix of academic work and play (51%), and risk-taking (35%). These least fostered items are the ones that have been recognized to foster creativity in the literature. This shows that teachers' **classroom practice is not necessarily aligned with the culture they experience as their working context**. For example, 96% of teachers surveyed said they foster pupils' ability to think, and critical thinking skills (83%) in their own classroom practice. This suggests that more dialogue, and participation in decision

making at schools might be beneficial for all, as teachers seem to be open and interested in fostering creativity related skills more than they feel is supported by the school context.

School leadership is important for enabling teachers to implement practices that can promote creativity. For example, expert consultations brought up that in some schools there are practices established at school level for developing personal learning plans for the pupils, dedicating school-wide time for cross-curricula work etc. Furthermore, the opportunities provided for teachers to develop their skills and to get knowledge about and support for implementing new learning and teaching approaches are very important. SITES study (Law, et al., 2008) found that the most important school-level factors contributing to the development of 21st Century Skills, which include also creativity, were the principal's vision for ICT use to support lifelong learning, technical support for ICT use and the principal's priority for leadership development. STEPS (Balanskat, 2009) found that reliable technical and inspiring pedagogical support for teachers is often missing.

It is worth noting that some expert interviews suggest that the **teachers with most interest for innovation and changing pedagogic methods are those who have already some years of experience of teaching practice** after the initial training. They have knowledge and interest to challenge the system, and correctly timed and aimed training and support for them could result into productive and sustainable innovations in the practice. They could become a great resource in enhancing creativity and innovative teaching approaches, as Eurydice data shows that currently the most strongly represented age groups of teachers in primary education are 30-39 year-olds and 40-49 year-olds. Their experience and ideas would be very valuable in developing school level practices and culture. Shared decision-making followed by professional collaboration were also found by SITES (Law, et al., 2008) to be positive predictors of pedagogical ICT use at schools.

In order to encourage teachers to develop innovative teaching approaches, the school culture and leadership needs to support and appreciate their efforts. Feeling of loneliness in their efforts by many teachers can be seen reflected in the survey response where 74% of respondents said they need more institutional support, and 36% agreed strongly with the statement. Furthermore, interviews raise that at schools there may be little incentive for teachers to develop innovations. Teachers get nothing for teaching better, improving their pedagogic practice etc. They may have personal satisfaction from the additional work they have done, but no systemic reward. This is supported also by the OECD TALIS survey of 23 countries, where three-quarters of teachers reported that they would receive no recognition for improving the quality of their teaching or for being more innovative in their teaching (OECD, 2009).

Interviews brought up examples about how the existing culture and contexts, and beliefs about them, can be at odds with the objectives for developing creative learning and innovative teaching: "In a recent study on Creative and Cultural Education in England, many teachers overtly revealed they felt that their innovative practices and creative teaching was somehow problematic. One teacher interviewed repeatedly referred to the fact that 'One day Ofsted will catch up with her' doing creative things with children sharing her believe that she would then be in trouble." Another expert interviewed said that they have evidence of teachers not really believing that they have the permission of the authorities to do interesting, active, child-centred and creative activities with students. However, expert interviews did also bring up effective examples of school leadership and support for teachers. For example, in Slovenia they use different forums for approaching and recruiting teachers who then become champions in their schools in the area of creativity or ICT. Some interviews (e.g. Hungary, Estonia) mention pedagogic advisors, centres and support organisations on national level,

which aim to support the curriculum implementation and pedagogic practices at schools. Some countries also develop guides and gather examples of best practices regularly that they publish to schools in order to support the teachers and to give practical examples how to implement new curricula and new learning approaches. The Irish good practice example shows a national project that supports creativity in a specific subject (in this case, mathematics).

Republic of Ireland: Project Maths

Participants and objective	NCCA (National Council for Curriculum and Assessment) provides schools with support and advice on innovation in maths learning, from September 2010 onwards all schools in Ireland will implement the project.
Age of pupils	Secondary school
Activities	- Providing lesson plans and guidelines which place great emphasis on understanding of mathematical concepts by relating mathematics to everyday experience - The project offers a range of tools, resources and support to teachers.
Potential for creativity	- Creativity in mathematics is not easy to define and operationalise. Project Maths tackles this issue by encouraging teachers and learners to "rephrase" the language of mathematics, often abstract and de-contextualised, in original and creative way.
Website	http://www.projectmaths.ie/default.asp

4 Policy options and recommendations

This chapter summarises the options and recommendations for policy makers at different educational levels: local, regional, national and European, highlighting opportunities for collaboration and support. Five major areas for improvement are identified, as described in Figure 4.

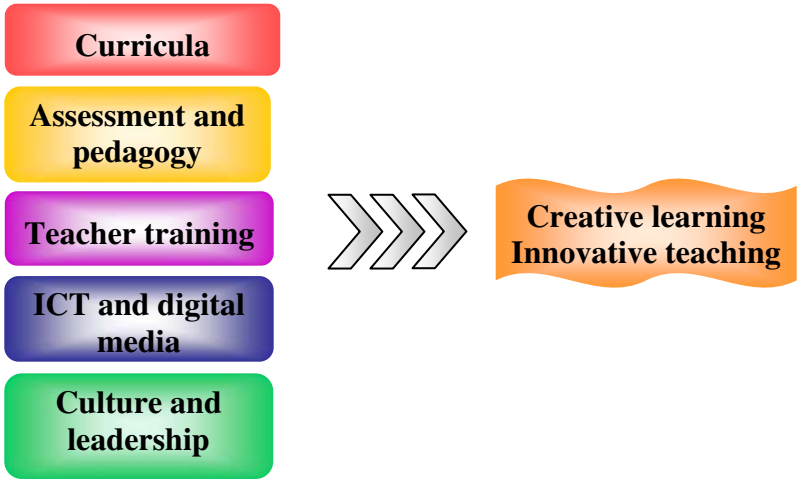

Figure 4: Policy areas that need to be addressed in order to support creativity and innovation at schools

4.1 Curricula

- Curricula and learning objectives should provide a definition of creativity which is consistent and takes into account the broad nature of creativity in all curricular areas and across different subjects. Networking on European level could help in finding effective solutions to conceptualise and operationalise creativity and in exchanging best practices.
- National or regional curriculum development bodies should ensure that current curricula provide sufficient flexibility and time and space for creativity and innovation in learning objectives.
- Curricula content should be regularly reviewed and updated, taking into account the changing learning needs. Current revisions should take into account transversal, cross-curricular, intercultural and digital competence as key competences for the 21st century society and economy.
- Documents about learning objectives should be complemented by providing teachers with guidance documents on how to develop creativity in practice. These documents need to raise awareness of the link between teaching practices and creative outcomes, making it clear that creativity and innovation are not subject-related and can be fostered in all students.
- Revision of curricula should be developed and consulted with different educational stakeholders, as well as with relevant public and private organisations. Feedback

mechanisms and piloting approaches should be used in the take-up phase in order to develop a shared understanding of quality and vision.

- Member States should aim to provide all regulatory and guiding educational documents with a clear and comparable structure and make them available online, for the benefit of educational actors within the country as well as for interested experts and researchers from other countries. These documents could be linked to Eurydice database which would then provide an extensive and updated picture of the EU27 educational policies for all decision makers to study and find best practices in creative learning and innovative teaching.

4.2 Assessment and support for creative pedagogies

- National education authorities should ensure that curriculum reforms are accompanied with the revision of central and national exams, as well as the principles for school inspections and quality assessment. Changes in learning objectives cannot be implemented in practice if assessment for pupils and schools remain the same.
- More formative type of assessment of students and pupils should be used as a tool for teachers and learners to understand what needs to be improved, which skills need to be developed and what cognitive areas are to be fostered.
- When introducing new elements to the curriculum, such as the move towards more competence-based approaches, attention should be paid to providing guidance and best practices for assessing the new learning objectives in ways, which do not only focus on the final outcome but also on the creative and innovative learning processes. This is a common challenge for many countries and European collaboration can enhance finding effective solutions.
- Specific measures should be taken to raise awareness about creative and innovative approaches in assessment practices for policy makers, head teachers, teachers, parents and pupils themselves. Effective approaches and events from European Year of Creativity and Innovation could be renewed regularly, for example in European or national theme weeks on innovative learning and assessment approaches for transversal skills and creativity.
- Decision makers should allocate investment in improving the quality of learning and teaching at schools. Large class sizes have been a major problem and now when the number of young pupils is lowering in most of the countries, this opportunity should be used for improving the conditions for creative learning and innovative teaching, rather than reducing school budget.
- Traditional practices seem to be most rooted in secondary level. Member States and European co-operation activities should enable secondary schools in developing and transforming their practices to incorporate more critical thinking, creativity, collaboration and other key competences for 21st century. National assessment practices play a key role in guiding their transformation.

4.3 Teacher education and professional development

- Teacher training programmes should provide all prospective teachers with guided development of classroom teaching practice as part of their initial training. Hands-on experience with guidance is crucial to prepare new teachers' to face the reality of the classroom and to develop innovative and creative teaching methods.

- Member States should develop guidelines for creative learning and innovative teaching in teachers' training and benefit from European level networking when doing it. ITT programmes should address teaching a variety of learning-centred pedagogies and assessment approaches, in particular creativity and innovation as cross-curricular competences, as well as embedding digital competence and tools in all learning
- Information about relevant online networks and collaboration opportunities, such as eTwinning,[18] should be highlighted and incorporated as part of the teacher training, in order to support teachers' participation and informal peer learning in them. Training opportunities should be provided to allow teachers to be mobile within and across countries and to have more exchanges between teachers of different nationalities about innovative learning practices.
- Funding should be allocated to address specific teacher training needs targeted at different teacher groups. CPD courses should be provided free of charge for teachers of all ages to engage in lifelong learning and updating skills which are crucial for creative learning and innovative teaching. CPD should be defined as part of teachers' work tasks with time allocation for courses, and participation should be systematically supported and incentivised.
- Both personal and pedagogic digital competence need to become a priority in both ITT and CPD, because lack of ICT skills and understanding of its benefits is a major obstacle for many teachers. There is need for training which is modular taking into account rapid technological development. Teachers need to be able to enable their students to become digitally competent and also be able to guide them towards more exploratory interaction with ICT, in which students are able to express their creativity and innovation with technologies.
- In those countries where teacher profession is not valued, national and regional educational authorities should develop a strategy to render the teaching career as more attractive.

4.4 ICT and digital media

- More research and data gathering is needed on national and European levels in order to assess the status and level of technology use by teachers. For developing educational strategies, it is important to study whether technologies and tools are used effectively for creative learning and innovative teaching and what barriers can be recognised.
- Authorities responsible of technology investment should establish a system to regularly review technology maintenance and internet connections. Lack of technical support has also been recognized as a major barrier for efficient ICT use for learning and teaching.
- Teachers across the spectrum should be more supported to integrate technology in their teaching in creative and innovative ways by setting up a national learning resource centre, which would provide access to some tailor-made digital learning resources in local languages as well as facilitate exchange of teacher created resources and peer discussion platforms.
- Establishing a common European level portal for providing a link and meeting place between research and education practitioners on national and international level would

[18] http://www.etwinning.net/

enhance educational research, new teaching practice implementation, and related decision making. This portal should also link with national learning resource portals and provide integrated search functions for learning resources in all languages.

- The potential of technologies could be used for supporting the interaction between teachers, pupils and parents. Through online platforms parents could be provided with access to pupils' learning materials and tasks, which helps them to understand new learning approaches and support their children at home with schoolwork. At the same time this would reduce parents' need for traditional grades in order to know how children are progressing at school.

4.5 Educational culture and leadership

- Educational authorities should develop a holistic strategy for revising school education, taking into account new curricula, new assessment and new teaching and learning practices and digital tools and media for creativity and innovation at all levels of compulsory schooling. National representatives should consider benefiting from European level collaboration and exchanges in developing their strategies.
- The implementation approach for changes in schools should be realistic, combining well-established useful elements from traditional approaches (e.g. having some exams with grades) with new ones such as embedding ability to solve problems, divergent thinking etc, to the systematic assessment practices during the school career. It should be supported by systematic networking and dialogue between all stakeholders, including classroom teachers and parents.
- It should be ensured that all school leaders participate in training about strategic leadership for school development towards transformation in learning and teaching, and that they are aware of the objectives of curriculum revisions and the importance of technologies in supporting creative learning and innovative teaching.
- The school leaders should encourage school culture that nurture creativity and innovation, by making visible and rewarding development of good practices for creative learning and innovative teaching. National and international collaboration could be encouraged by rewarding sharing and networking activities in schools' assessment and inspection systems.
- Specific attention in terms of training, salary incentives, new types of work profiles or other models should be paid to encourage interested senior teachers to become champions in developing and sharing innovative learning approaches for the benefit of all school and for other teachers and setting a new culture.
- Schools should encourage collaborative projects between pupils from different countries through the opportunities of ICT, for instance through eTwinning. Fostering intercultural dialogue and cross-curricular skills could enhance creative learning and facilitate more innovative projects across Europe.

5 Conclusions

In this study, we set out to explore how creativity and innovation are conceptualised and practiced in obligatory schooling in the EU27. We analysed explicit attempts to deal with creativity and innovation in the Member States' learning objectives and the level of creative learning and innovative teaching taking place in schools, according to teachers and educational experts. Finally, we also looked at existing examples of good practice in creative and innovative teaching in Europe.

Research and literature in the field suggest that creativity should be conceptualised as a skill, which everyone can develop, and therefore, which can be fostered or inhibited in education. In this study, creativity is understood as a product or process that shows a balance of originality and value. Creative learning is therefore learning that involves understanding and new awareness, which allows the learner to go beyond notional acquisition. Innovative teaching is the process leading to creative learning, and the implementation of new methods, tools and content which could benefit learners and their creative potential.

Education stakeholders consulted in this study emphasise the importance of creativity and innovation for modernising and improving education. There are various practices and projects which aim to foster creative learning and innovative teaching in various countries taking place. However, there is ample room for improvement: in some places, such practices and projects still do not exist, and where they do, they need to be sustained and upscaled. This study has identified five main areas where major improvements are called for: i.e. curricula, pedagogies and assessment, teacher training, ICT and digital media, educational culture and leadership.

In terms of **curricula**, the analysis shows that in more than half European curricula, the terms 'creativity' and 'innovation' and their synonyms are relatively frequently mentioned. The term 'creativity' is often used as a broad objective and is generally linked to Arts subjects, but the study has also found instances where it is referred to as a skill, which should be encouraged, and as an integral part of the learning process. It has also been observed that creativity is more linked to the ability to produce something original, and less to the ability to produce something of value. The study highlights the need for learning objectives which address knowledge in a more holistic way and encourage development of competences which are not subject-specific. Effort should be made to integrate more cross-curricular skills, vital in our societies, such as digital competence, collaboration skills and intercultural understanding. Creativity and innovation should be embedded in the thinking behind and approach to education policies and national visions and they should be promoted in all curricular areas and across different subjects.

This report shows that no matter how excellent a curriculum is, it will be ineffective if there are no supportive structures that enable its implementation. There is a need for education policies which not only raise awareness of the benefits of creativity for learning, but also link teaching practices and methods with creative processes and outcomes. Though there are some reformed curricula and specific guidance documents provided for curricula implementation, few Member States specifically address how creativity and innovation should be developed in practice and how it could be addressed in education. Moreover, curricula should be more holistic and concise. Overloaded content curricula restrict opportunities for active and exploratory learning and informal interaction between teachers and students, which are important for a creative learning environment.

While **pedagogic practices** vary greatly between schools across the EU27, in general, teachers tend to have a highly positive view of the importance of fostering and valuing

creativity and innovation. However, positive attitudes towards creativity do not necessarily transfer to the actual teaching and assessment needed for creative learning. Most of the teachers surveyed claim they encourage learning activities which are likely to allow students to be creative. They also claim they foster skills and abilities that enable creativity and innovation. Primary teachers were more likely to promote creative learning skills and abilities than secondary teachers.

Conventional teacher-centred methods, frontal teaching and chalk and talk still prevail in the good majority of schools in the EU27. Repetition, copying of factual information and rote learning remain common in many schools. While teachers' lack of skills and confidence is one of the main reasons for such practices, other factors, namely tight timetables, overloaded curricula, lack of support in the classroom, too many pupils per teacher and a school culture that does not support new methods were also highlighted. Teachers are very often isolated and lack support and hence prefer to encourage convergence and discipline instead of divergence, because it is easier to handle in class.

Assessment comes up throughout the study as a major issue that affects school practice and culture, as it is both an enabler and a barrier for creative learning and innovative teaching. Though schools in the EU27 do in fact deploy different methods for evaluating their students, nonetheless, there is still a preference for conventional testing. Grades and summative assessment constitute the main type of assessment in most Member States. This is especially the case in secondary schools, which are often more focused on preparing students for national exams. There is also resistance to changing traditional assessment practices, mainly because parents, teachers, and even students still consider grades as an important and concrete way of giving feedback about learning and of benchmarking students' performance. Furthermore, in many EU27 countries, traditional national examinations are used as a tool to measure the quality of schools and teachers. This suggests that unless central examinations are revised, teachers will not be motivated to change their learning practices.

However, a slow shift to more versatile ways of assessing students, such as assessment through presentations, group work, peer feedback and portfolios, amongst others, can be noted. Promoting a range of assessment methods which measure not only end results but also support creative learning processes is important. The study highlights a strong link between fostering a creative and innovative school culture and changing assessment tools and the reward processes for creative learning.

In order to develop creative learning approaches, it is crucial that **teacher training** prepares new teachers to become reflective practitioners, able to discern how a teaching method or activity can stifle or trigger creativity in their students. This study revealed that only a quarter of the teachers surveyed claim to have learnt how to teach during ITT. Training in various countries remains fragmented and there is a strong need for more practical guidance which teachers can apply in the classroom. Furthermore, new requirements for teaching, such as ICT and other cross-curricular competences, like creativity and innovation, are not sufficiently covered in ITT.

Encouraging teachers of all ages to engage in life-long learning activities, like for instance CDP, should be a priority at both European and Member State level. The study showed that training on creativity had an impact on teachers' conceptualisation of creativity. This highlights the importance of embedding a clear vision, awareness and understanding of the creative and innovative process into teacher training approaches. This study also argues for providing different types of training, including informal learning with peers. Exchange between teachers on an international level provides opportunities for teachers to learn from each other and exchange and adapt expertise and knowledge to their own working context.

Results from the best practices also show that enabling interaction between teachers and outside experts could be highly beneficial in terms of learning in an innovative and creative way. The potential of the internet as a space where training could take place should not be underestimated and existing European networking activities such as eTwinning should be more effectively promoted and used by all schools and teachers.

The potential of **technologies** for creative learning and innovative teaching cannot be ignored. Although the teachers surveyed are technology conversant and use the internet extensively in their work, they still claim to need more training in ICT. Technology tools are far from fully exploited for creative learning and innovative teaching in the classroom. The potential of social technologies and media for education remains untapped. Research is needed on how teachers appropriate new technologies, in order to help them use technologies for pedagogical purposes more efficiently and innovatively. Despite the increase in the numbers of computers in schools, our survey shows that hands-on access for pupils remains limited. Allowing pupils to play with and explore new tools could enhance their motivation to think, understand, learn and conceptualise in creative ways. Initiative shown by students, which are closely linked to risk-taking and divergent thinking, especially in the use of technology, should be taken in to account in assessment.

There is a need for **personal and pedagogical digital competence for both teachers and students.** The potential of new technologies for creative learning and innovative teaching cannot be exploited unless teachers' proficiency in using ICT and the quality of ICT in schools is improved, software in different languages is provided and more space for information interaction between teachers and students is allowed. This study shows that teacher training in ICT had positive impact on the take-up of new technologies by teachers. However, in many countries where provision of ICT training is available, not enough effort seems to be devoted to using ICT for creative and innovative pedagogies. There is a strong need for pedagogic training which empowers teachers with the required ICT skills so that they can help their students become digitally competent, and also guide them towards more exploratory and creative interaction with ICT tools. This study calls for modular pedagogic training which takes into account the rapid development of ICT tools and applications and which ensures that teachers are able to transfer their knowledge across different subjects, and also aligns their knowledge with students' real and future needs.

The cultural context and leadership for education is built on several levels and is reflected in regulations, school leadership and general cultural attitudes. These interlocking cultures affect which type of learning is considered valuable and encouraged, which types of teaching are expected and supported and whether people and schools are open to trying and developing different ways of learning and teaching. This study also clearly shows that major changes are needed in the overall educational culture of people outside the classroom, such as school leaders, national policymakers and parents. Awareness campaigns, networking initiatives and dialogue between all stakeholders involved have been shown to have a positive effect in promoting the development of creativity and innovation in schools. The 2009 European Year of Creativity and Innovation (2009) had a visible effect on most of the countries studied and similar European and national awareness raising events should be organised.

The school culture as a working environment for both teachers and students is decisive for the development and implementation of creative and innovative educational practices. Though teachers perceive that creativity is often present in their school culture, they do not see it as highly appreciated. Therefore, innovative teachers' personal classroom practices are not necessarily aligned to the culture they experience in their working contexts. This highlights the importance of school leadership and culture which support and appreciate teachers' efforts

in implementing, and experimenting with, innovative practices that can promote creativity. In many schools there are few incentives for teachers to put their personal efforts and time into developing creative learning and innovative pedagogic practice.

In conclusion, the study has found extensive potential for creative learning and innovative teaching within the European school system. It also demonstrated that education is based on different interlocking structures and unless changes take place at different levels, it will not produce the desired results. Offering the right chances to develop students' creative and innovative potential and effort in reducing barriers and improving the presence of enabling factors for creativity and innovation should be a priority for schools, so as to support the shift towards a more creative and innovative education in Europe.

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Title: Creative Learning and Innovative Teaching: Final Report on the Study on Creativity and Innovation in Education in EU Member States

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Abstract

EU policies call for the strengthening of Europe's innovative capacity and the development of a creative and knowledge-intensive economy and society through reinforcing the role of education and training in the knowledge triangle and focusing school curricula on creativity, innovation and entrepreneurship. This report brings evidence to the debate on the status, barriers and enablers for creativity and innovation in compulsory schooling in Europe. It is the final report of the project: 'Creativity and Innovation in Education and Training in the EU27 (ICEAC)' carried out by IPTS in collaboration with DG Education and Culture, highlighting the main messages gathered from each phase of the study: a literature review, a survey with teachers, an analysis of curricula and of good practices, stakeholder and expert interviews, and experts workshops. Based on this empirical material, five major areas for improvement are proposed to enable more creative learning and innovative teaching in Europe: curricula, pedagogies and assessment, teacher training, ICT and digital media, and educational culture and leadership. The study highlights the need for action at both national and European level to bring about the changes required for an open and innovative European educational culture based on the creative and innovative potential of its future generation.

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