

## 23. ICT as a driver for creative learning and innovative teaching

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### Abstract

*This chapter argues for the necessity of creativity and innovation in educational sets. It focuses on three interrelated enablers for change: technologies, culture and pedagogy. Technologies are already accepted by the young generation, who are appropriating ICT tools and in particular web 2.0 applications in new creative ways. New pedagogies have to take into account what it means to be educated in our times, as the overwhelming presence of technologies in our lives brings about a change in the way young people and children learn and understand. A cultural shift is also required in order to promote values, that are not always recognised in a school environment, such as risk-taking, uniqueness and originality. Teachers are key figures to implement change, but they need support to understand and accept creativity in their practices.*

### Introduction

Creativity is often seen as a talent, or as a characteristic of eminent people. Distinctive personality traits have been identified to exemplify a creative mind. At the same time, a number of studies recognise that creativity can be enhanced and cultivated. How well are educational systems enhancing this transversal skill and promoting students'

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creativity? Are schools creating the conditions for creativity to flourish? And, most of all, why should school address creativity?

In this paper it will be argued that creativity in education is not just an opportunity, but a necessity. First, several emerging trends entail an alteration in the way young people learn and understand (Redecker, 2008). The generation of the 'New Millennium Learners' is characterised by multitasking, short attention spans, gaining information in non-linear ways (Pedró, 2006). Teachers have to attract their interest and attention in a new way, and as a result the development of creative approaches is called for (Simplicio, 2000). Secondly, the current and forthcoming cohorts of learners are growing up surrounded by video games, mobile phones, and other digital media. This overwhelming spread of technologies brings a new understanding of communication, information retrieval and meaning-making. The gap between the school and home digital environment is thus affecting learners' expectations (Pedró, 2006), building up a perception of the current educational framework and format's inadequacy (Selinger, Stewart-Weeks, Wynn, & Cevenini, 2008), asking therefore for a creative and innovative approach to learning and teaching. Third, creativity has been seen as a form of knowledge creation (Craft, 2005); it is hence necessary to understand what creativity is and how it can benefit learning.

Given the advantages of creativity for society and individuals, one would expect to see a wide spread of creative practices in education (Beghetto, 2005). However, though there has been a growing interest in the relevance of creativity for teaching and learning since the 1990s (Craft, 2005), it seems that attempts to bring this issue to centre stage have been overshadowed by other efforts, and demands on teachers' and students' schedules and priorities (Beghetto, 2005). It seems clear that the importance of creativity for education has to find the consensus of educational stakeholders, including policymakers, in order to be implemented, and also the favourable conditions for thriving. An enabling environment is necessary for the fostering of creativity, but several conditions are to be met for this environment to prosper. These favourable conditions will be called here 'enablers', by which we mean all the support mechanisms and conditions facilitating the kindle of creativity in education. If these enablers are not present, creativity will be less likely to flourish. On the contrary, if all enablers are positively 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.

This paper will address what creativity entails for education and focus on a selection of enablers that constitute a fostering environment where creativity can flourish, paying particular attention to the opportunities offered by ICT.

## **Addressing creative learning and innovative teaching**

Two different trends can be distinguished in the research on creativity: these have been called 'big C' and 'little c' creativity (Craft, 2005). The first, big C creativity (or BCC), refers to the creativity of the genius, seen in people such as Mozart, Picasso, and Einstein. Their creative achievements are exemplary and comprise novelty and excellence in their domain, as well as social recognition and valuation. Little c creativity (LCC), on the other hand, is not for the gifted and talented and does not apply to creative and innovative outputs that have a strong impact on society. LCC could be seen as behaviour and mental attitude, or as the ability to find new and effective solutions to everyday problems. LCC is not for an extraordinary few. A similar distinction can be found in Shneiderman (2000), who differentiates between revolutionary creativity, imputable to Nobel laureates and geniuses, and evolutionary acts of creativity, which can include doctors making a diagnosis or an editor drafting a magazine.

LCC seems particularly suitable for the educational sector, where a priority is to encourage all students and pupils, who have not yet reached their intellectual peak, but who shows an over-abundance of original outputs, to achieve their full potential. Creative potential can be and is found in every child (Runco, 2003); it can be encouraged or inhibited (Sharp, 2004); and its development depends on the kind of training received (Esquivel, 1995). The first step towards the development of students' creative potential requires an understanding of what creativity is, what it requires and implies.

In education, the term creativity is often used but seldom defined. As Beghetto (2005) points out, teachers might ask students to use their creativity in the design of a project, or might refer to a student's response as creative, without explaining what they mean. A lack of definition of this concept might result in erroneous assumptions (Beghetto, 2005), leading educational actors (including teachers, students, parents and policymakers) to identify creativity only with talent, the arts and personal characteristics. As Runco (1999) suggests, everyone holds a tacit knowledge about creativity manifested in opinions and expectations, which are in sharp contrast with what the research is showing — and which can have detrimental effects on any attempts to foster creativity in schools. This tacit and shared knowledge builds up a series of 'implicit theories', which account for how ordinary people think about creativity. These theories differ from the ones held and scientifically tested by researchers, which Runco calls 'explicit theories'.

Figure 1 shows a series of implicit theories — or myths about creativity, as Sharp (2004) sees them — and the opposite findings of scientific research. The model presented in Figure 1 is an elaboration of Sharp (2004); Beghetto (2007a) and Runco (1999).



**Figure 1: Implicit versus explicit theories of creativity**

The figure shows that people usually see creativity as related to arts, as springing from natural talent, as being fun, as entailing originality, as needing no knowledge, as being a major breakthrough, as coming from free play and discovery. On the contrary, research shows that creativity applies to every subject (or domain), it depends on education and training, it can be fun but it also entails hard work, it requires good — if not excellent — field knowledge, and the development of thinking skills, it needs play and discovery — in the educational context — to be stimulated and guided by an expert.

What is then creativity for education? And what is creative learning? Creativity is currently defined as a combination of ‘newness and value’ (Sternberg & Lubart, 1999), which have to coexist in a creative outcome. The balance between the two concepts is important: something original which has no value could also have negative characteristics (Beghetto, 2005). The application of this definition to education — and to young people in particular — raises a series of questions about the suitability of ‘newness and value’ to learners’ development and achievement. It might be questionable to assume that young children and teenagers could have revolutionary breakthrough ideas that are both original and valuable for society. Originality and value have therefore to be understood in their everyday and mundane meaning (Runco, 2003), focusing on the potential of all individuals to be or to become creative (Esquivel, 1995). It is important therefore to consider each child at their stage of development (Sharp,

2004) and to allow for a wide spectrum of creative outputs. For instance, we would expect a greater depth of ability and knowledge in a 16-year old's drawing than in that of a five-year old (Craft, 2005). There is a shared agreement on youth's and children's creative potential (Malaguzzi, 1987; Meador, 1992; Robinson, 2006; Runco, 2003). The creative outputs of children are often original and valuable (hence creative) for the children themselves, but not in comparison with larger norms (Runco, 2003). At the same time, children's and youth's new ideas and ability to see things in a new perspective cannot be dismissed as 'non-creative'. It is thus necessary to rethink the concept of value. It has been recognised that the value of a creative expression should be judged by the learners themselves (Craft, 2005; Runco, 2003).

Another aspect of the emphasis on the process instead of the product (Sharp, 2004). If we look at products and achievements, children will seldom have an opportunity to be judged or to judge themselves creative when compared to adults (Runco, 2003). A similar point can be found in Malaguzzi (1993), who maintains that creativity is more visible when adults pay attention to the process and not to the product. Simplicio (2000) sees creativity as a method and an approach to thinking and living. The focus on the development of thinking skills can be understood as a priority of the process over the product.

While it has been proven that intelligence is not a necessary prerequisite for creativity (Sternberg, 1999), knowledge seems to be a necessary, but not sufficient, condition for creativity (Boden, 2001; Weisberg, 1999). It is, nevertheless, still unclear how knowledge proficiency shapes creative outputs, as research findings seem to be contradictory, stating on the one hand that extreme expertise will hinder creative outcomes (Simonton, 1990) and on the other that there is no limit to the amount of knowledge needed to be creative (Weisberg, 1999). Knowledge and expertise are unquestionable attributes of the creative eminent mind, regardless of the debate about the amount and the kind of knowledge needed (Scott, 1999).

As regards LCC ('little c' creativity) and education, two kinds of background knowledge are needed by learners. Students require first of all a know-how of creativity, i.e. knowing how to think and how to perceive things in a different way, or how to make unforeseen and unexpected connections. Secondly, they will need some subject or domain-related knowledge in order to be creative in a particular area.

Knowledge is of substantial importance to trigger a creative outcome; but the reverse is also true. Creativity allows for the making of connections across different areas of knowledge (Burke, 2007). This is an important point, as research shows that students, and especially young children, find it very difficult to transfer learning from one area to

another, or to apply former knowledge to a new topic (Sharp, 2004). They need to be trained and taught how to make connections and to build on previous understanding. In turn, this scaffolding allows an expansion of knowledge. The relationship between creativity and knowledge could therefore be seen as a virtuous circle, where creativity stimulates knowledge acquisition and new knowledge permits new and creative thinking paths. In addition, building a creative bridge between different domains results in a holistic approach to knowledge. Moreover, taking the individual as the reference for the originality and value of an outcome leads to an assumption of creativity as a model of understanding and of knowledge creation. Craft (2005) and Runco (2003) certainly support this view. Runco (2003) sees creativity as the construction of personal meaning and Craft (2005) views creativity as a form of knowledge creation.

Learning in a creative way is certainly a form of meaning-making. Constructivist approaches to learning involve understanding and making new and valuable connections between old and new knowledge. As Piaget (1973) had claimed, 'to understand is to invent'. Understanding is a form of meaning creation — just as creativity is. Therefore, creativity is an aspect of learning (Craft, 2005). Creative learning is hence any learning which requires understanding, invention, making new connections, seeing things in a different perspective. Non-creative learning, on the contrary, comprises all learning privileging memorisation over understanding; rote learning and learning of facts. Both creative and non-creative learning are important for education and should coexist. It is necessary to go through a certain amount of non-creative learning before being able to make any new connection or to embark on understanding a topic.

The notion of innovative teaching stems from creative learning. Innovation is the 'implementation' (OECD, 2005) or the 'intentional introduction and application' (West & Richards, 1999) of a novelty which aims to ameliorate a particular situation. Teaching can be seen as the implementation of methods and pedagogies, of curricula and contents. Any kind of teaching which addresses creativity and applies it to methods and contents can be seen as innovative teaching. For these reasons, this work addresses 'creative learning' and 'innovative teaching'. The first term refers to the possibility for learners to develop their creative skills and to learn in a new, creative way. The second term includes both the process of teaching for creativity and the application of innovation to teaching practices. Creativity is not only desirable but also necessary because it involves co-construction of meaning and promotes an active role of the learner. At the same time, it requires new methods, formats and approaches, thus asking for an innovative role of the teacher.

## An enabling environment

As many researchers found, one of the barriers to creativity and innovation in schools consists of teachers' overloaded schedules. The demand for creative learning and innovative teaching from policymakers has to be matched with a support mechanism, i.e. with policies and tools that help all educational actors to pursue creative and innovative paths. Besides, policies for creativity and innovation in education need to be in line with other policies and with what is demanded from teachers and students, as contradictory messages will increase uncertainty and confusion and further impede the adoption of necessary measures for a creative learning environment. The promotion of creativity and innovation needs to be articulate and coherent, as the issue is complex and multifaceted. Moreover, policies need to be mirrored by practices, for instance by establishing a nurturing school culture or by finding support in the availability of certain tools, in order to be applied in an effective way and to have a positive impact.

The fostering of creative learning and innovative teaching does not uniquely rely on the intention of educators and pupils, as there are several conditions to be met before a creative and innovative environment can be promoted. In this sense, policies, tools and common practices may provide the circumstances for creative learning and innovative teaching or, on the contrary, obstruct them. It is, therefore, interesting and necessary to examine which conditions can trigger creativity in order to support and allow them to spread. As Burke puts it, 'if creativity is difficult to define, one certain thing is that it is possible to create the conditions in which creativity is more likely to thrive' (Burke, 2007).

As demonstrated, the role of the teacher in formal educational environments is fundamental to bring about new pedagogies or to stimulate change (Ala-Mutka, Bacigalupo et al., 2008), but they need to be supported. An assessment of creativity and innovation in educational practices cannot rely on the fortuitous and incidental number of individuals with will and inspiration. It was hence decided to investigate and assess a number of 'enablers' for change, in order to understand the basic conditions for fostering creative learning and innovative teaching.

By 'enablers' we understand the circumstances or the support mechanisms that allow creative learning and innovative teaching to emerge or that facilitate creativity and innovation in education. As 'multiple components must converge for creativity to occur' (Sternberg & Lubart, 1999), it is necessary to 'prepare the ground' for creativity and allow for these components (or enablers), to convene. If all enablers are present, it is still not possible to deduce that creativity and innovation are happening, as it ultimately relies on the teachers and students to actively engage in the creative and in-

novative process. At the same time, if several conditions do not convene, it is unlikely that creativity and innovation will flourish. Enablers are therefore a measure of the possibilities for creativity and innovation, and not of the creative learning and innovative teaching that is actually happening in schools.

A twofold method was used to identify major enablers: a literature review and a scoping workshop. During the first phases of the literature review, special attention was paid to the gathering of the aspects that the literature pointed out as being relevant in allowing for creativity and innovation in schools. The results of this data collection were then clustered according to internal similarities or overlapping of purpose. A first draft systematisation of the enablers was then presented at a scoping workshop organised by IPTS in Seville, 23 and 24 February 2009, and attended by experts in the field of creativity and innovation in education. The workshop provided the second phase of the enablers' collection. Attendants were asked to think of the three major enablers for creativity and innovation in formal education. Their opinions were then collected, clustered and discussed in a post-it session. All enablers were then recollected to form some major categories, namely: assessment; culture; curriculum; individual skills; pedagogy; teachers; technology; tools. All these categories need to be addressed by policymakers and other educational stakeholders (in particular E&T institutions) in order to promote creative learning and innovative teaching. In this paper we will consider three enablers: technology, culture and pedagogy.

## **Technologies as an enabler for educational change**

The role of ICT in the debate for creativity and innovation in education has become an important one over the past decade. The rapid development of technology, mainly as a result of the Internet, has brought about an upsurge of technological tools which young people are appropriating in their everyday lives. As explored by the domestication theory, the arrival of ICTs in homes has brought the mobilisation of material resources, skills, cultural values and social competences and capabilities (Silverstone, 2006). The recent rise of social media is also having an influential impact on education. These applications have shifted the way users seek information, and create and connect knowledge. Evolution in communication practices suggests that developments for pedagogy need to address what it means to be educated in our times (Loveless, 2007), so as to avoid 'yesterday's education for tomorrow's kids' (Prensky, 2005).

In the past few years, the emergence of a new wave of technologies has been observed. The rapid uptake of these technologies, generally referred to as social computing applications, has also taken many by surprise. Social computing applications vary from social networking sites (like Facebook; MySpace); sharing of bookmarks (del.icio.

us; Citeulike); sharing of multimedia (Flickr; YouTube), online gaming (Second Life) and blogging to mention but a few. These applications offer new opportunities for people to express their creativity, make it available to a large audience and get feedback and recognition (Cachia, Compano, & Da Costa, 2007). As the analysis of creative people and artistic innovation demonstrates, scientific and artistic innovation emerge from collective effort, what is commonly referred to as *social creativity* (Fischer, Giaccardi, Eden, Sugimoto, & Ye, 2005). As discussed by Fischer et al., appropriate socio-technical setting can amplify creativity amongst a group of people by augmenting individual creativity but also social creativity.

Blogging is an example of how youngsters are using technologies to express their creativity and to be innovative. Creativity can be both at the individual level, as well as the collective level. These applications demonstrate variety of means of how *users learn how to learn*, which according to Rogers (1983) is a major component of creativity. The example of blogging shows that there are various ways in which children learn how to write for a public, how to link their work to other works, how to network with other bloggers and how to utilise the blog for their eventual career paths. Such activities show that users have understood the technology and hence are able to make new and valuable connections between old knowledge and new one. Writing becomes not merely a tool associated with homework, but also a tool which a student can utilise to network with other students, to share and co-produce material and to communicate with a wide audience with all its consequences. The processes involved in appropriating such new technologies suggests that users learn how to learn in new, creative ways. The potential of technology for creative learning and innovative teaching can also be exploited in schools.

Technological skills are important not only for children at schools but also for lifelong learning (European Commission, 2008). The different levels of interaction and collaboration characteristic of new technologies facilitate *personalisation of learning paths*: learners becoming active stakeholders who are 'empowered to shape their own learning spaces and resources' and *collaborative learning processes*: knowledgeable actors acting as scaffolding for the development of new abilities and competences by the learners (Ala-Mutka, Bacigalupo et al., 2008).

Continuous technological changes mean that learners today need to develop on the one hand positive attitudes towards change and, on the other hand, adaptability (Hinkley, 2001). As Hinkley argues, students in the future will endorse 'portfolio careers', moving through several careers and different jobs, including jobs that still do not exist today. Hence, it comes as no surprise that substantial pressure is being addressed towards schooling systems to acknowledge new creative and innovative ways of dealing with continuous rapid development of technology and knowledge. Young people are

growing up surrounded and immersed in technology and are often referred to as the *NetGen* or *Google Generation* (Herold, 2009). Appropriation of technological platforms requires new approaches for education. Creativity plays an important role in such a change. Technologies as tools of interaction can enhance knowledge creation, meaning-making and the provision of new connections. Technologies are also in many ways apt in addressing multitasking, short attention and non-linear behaviour.

There are different ways of how users interact with technology in learning processes (Loveless, 2008). Interaction with technology is primarily based on how users understand the capacity of technology. Loveless calls this level of learning 'active learning process'. Interaction with ICT provides users new ways of doing things: 'extend or enhance ability; novel ways of dealing with a task which might change the nature of the activity itself, or provide limitations and structure which influence the nature and boundaries of the activity' (p. 64). When learning to use a new technology, there are different ways users interact with it. As Loveless argues it is the interplay of human intention and activity which exploits the potential of a technology.

However, basic technology skills are prerequisites for creative learning. Without basic skills in writing, it would be unlikely for a child to write an essay or a poem. Literature in this area demonstrates that the digital generation, which is assumed to be totally proficient with technology, often lacks basic technological skills and IT knowledge (Herold, 2009). This shows that if we want children to be creative with technology, we have first and foremost to teach them how to use them. A longitudinal study carried out by the CIBER research team demonstrates that the Google Generation tends to rely heavily on search engines. However, they do not possess critical and analytical skills to assess the information they find on the Internet (Rowlands & Fieldhouse, 2008). This is a classic example which demonstrates how the potential of a medium is not exploited because students have not been taught basic skills and hence the level of meaning-making from searching information online is restricted.

Research about games has also demonstrated that when games are used in educational contexts, appropriation can take place on different levels. The distinction between diegesis<sup>2</sup> and non-diegesis, borrowed from film studies, explore the different experience of immersion in games and the other role of being outside the game. De Freitas & Oliver (2006) argue that, in educational contexts, learners need to be able to enter the world of the game, but also be critical about the process, so as to be able to reflect upon their relationship with the game when viewed from outside. This sug-

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<sup>2</sup> 'Diegetic', in the cinema, typically refers to the internal world created by the story that the characters themselves experience and encounter: the narrative 'space' that includes all the parts of the story, both those that are and those that are not actually shown on the screen (such as events that have led up to the present action) (definition retrieved from Wikipedia, June 2009).

gests that creative learning through gaming requires substantial effort from teachers, in order to achieve positive results. Research carried out by the European Schoolnet demonstrates that when teachers used games in their teaching, pupils' motivation and skills were increased (Wastiau, Kearney, & Vanderberghe, 2009).

Technology is endowed with an immense potential to innovate education (Blandow & Dyrenfurth, 1994; Ruiz i Tarrago, 1993). However teachers need to modify their teaching methods to accommodate the changed interaction and behaviour patterns. The effective use of new technologies requires innovative teaching skills. When students are not provided with an adequate understanding of the capabilities 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). A study conducted in primary schools to examine how students used online tools to communicate and participate in online communities highlights the same point (Turvey, 2006). Despite relative autonomy in virtual spaces, most children did not attempt to experiment the potential of the tools but rather followed predictable patterns of behaviour. This shows that provision of creative spaces and freedom for exploration does not necessarily lead to *creative learning*. The role of the teacher within and outside virtual spaces is important in coaching students how to be creative and innovative.

In order for innovative teaching to take place, teachers need to be aware of the available resources and how such resources may be useful. Teachers, who are not conversant with the technologies they use in their teaching, may not feel comfortable showing their lack of expertise in front of their students. As Shaffer (2006) argues, if a teacher cannot read, it would be difficult to identify whether a book is bad or whether their reading is inadequate to judge the book. When it comes to technology, similar behaviour is noted.

Teachers also need to be able to identify creative processes when they take place. An example given at a conference captures this point clearly. In the UK, it has been observed that one way of obtaining popularity in class between teenagers is to download music at home and then be the first one to share it with your classmates through a bluetooth application<sup>3</sup>. While for one teacher such an activity may appear frivolous or even a waste of time, for another teacher this activity may represent new ways of how youngsters are engaging with technology in a creative way. Teachers may call on their technical knowledge and try to integrate new ways of teaching using their students' technology. Another example could be integrating the downloading of e-books in classrooms or sharing of school resources for a language class.

<sup>3</sup> This example by presented by Leslie Haddon at the Cost Conference which took place in Copenhagen, 13–15 May 2009, during a session on New Media in the Hands of Young People: <http://conference2009.cost298.org/>

Different studies demonstrate that teachers face various difficulties in integrating ICT in their teaching (Borgnakke, 2006; Baek, 2008). In the latter study, six factors were identified in hindering teachers from using games in their teaching, namely: inflexibility of curriculum; negatives effects of gaming; students' lack of readiness; lack of supporting materials; fixed class schedules; and limited budget. An important result of this study, which also reflects findings from the study conducted by the European Schoolnet is the difficulty encountered by teachers in aligning games with the curricula (Wastiau et al., 2009). Other challenges mentioned in these studies are difficulties in locating useful educational games and parents' concern about the usefulness of games in the context of education. In this context, these limitations are important to discuss because they could also be hindering innovative teaching. This highlights that teacher ICT training is an important step towards innovative teaching. Teacher training, learning digital competences within context and innovative learning approaches have, indeed, been highlighted as enablers for pedagogical innovation in the context of ICT in an IPTS policy brief (Ala-Mutka, Punie, & Redecker, 2008a).

Emerging technologies, for example SNS (Social Networking Sites), are based on notions of networking. In the educational context, networking could enable people to develop collaborative forms of learning, however most school systems are still based on transmissive models (Bottino, Forcheri, & Molino, 1998; Noss, 1995). Within such systems, the role of the teacher is fundamental, in order for creative learning to take place.

Motivation is another huge factor in fostering creative learning. As argued by Prensky (2005), all students have something in their lives which is engaging, they enjoy doing and they are good at, 'something that has an engaging, creative component to it' (p. 62). This is often linked to technology and may vary between downloading songs, to playing video games or sharing resources through the Internet, such as pictures or videos. However, such engagement with technology is often ignored at school resulting in what Prensky calls students becoming 'enraged', as opposed to 'engaged'. Today's education is based on the notion that student 'must eat' what they are fed. This contrasts heavily with the reality offered by new technologies, whereby young users are empowered to choose what they want and to create their own personalised way of learning.

Over the past decade, the policies for ICT integration have been mainly focused on providing access to technology. However, the vast amount of money spent in placing computers at school has not yielded the expected results in pedagogical change. Bottino (2003) argues that schools have acted like organisations 'cramming' new technologies in their existing structures, as opposed to allowing the new technology to foster a new model, which would allow growth and change in how they operate. According to Bottino, the provision of ICT infrastructure and training does not necessarily result in 'effective pedagogical use of technology in schools'.

On the other hand, it is also argued that technology is endowed with a potential which could enable migration from the present interdependent curricular architecture of most schools to a more modular, student-centric approach (Christensen et al., 2008). Technological solutions could act as platforms which facilitate teachers to act as mentors and to build new and innovative ways of teaching and for their students to develop their creative skills and to learn in new, creative ways.

Lack of creativity and innovation in schools has also been attributed to technology design. Technologies are often designed for the market rather than for education. It is often the case that teachers are undertaken as consumers of preformed technologies. In this process, suppliers of ICT and teachers are separated. Literature about games also suggests that most games tend to be developed for commercial and leisure purposes (Wastiau et al., 2009). Allowing practitioners in the process of development could enable more innovative and useful products, which are specifically tailored for education.

Even when a real effort is dedicated to bring about change, by being creative and innovative, it is not always the case that such effort will yield positive results. In the UK, for instance, the government has dedicated GBP 350 million to creating a 'digital curriculum'. The idea was to have a game-based document, so as to engage the students. However, as Prensky (2005) argues they are 'struggling in this unfamiliar world'. According to him, creating engagement should be based on good ideas rather than fancy graphics. In the context of creative learning and innovative teaching the importance of extracting and identifying good ideas cannot be emphasised enough. Loveless (2008) proposes an analytical framework of how creative endeavour and outcomes in physical and virtual learning should be assessed based on: developing ideas; making connections; creating and making; collaboration and communication and evaluation. This suggests that in order for creative learning and innovative teaching to foster, assessment in schools should be adapted and appropriate for what we are trying to measure in terms of children's achievements.

The fact that most current education systems are still framed as 19th century institutions is another important discussion in the literature (Hinkley, 2001). Most of our schools are still based on the use of time as a means of control and the use of space as a monitorial system (West-Burnham, 2000). In this context, increased usage of technological applications at home puts pressure on educational institutions, to take into consideration the participatory culture of students outside the school and to bring learning closer to the everyday practices of the present student generation (Ala-Mutka, 2008). Curricula design rooted in subject content becomes easily outdated and irrelevant for students' real and future needs (Hinkley, 2001).

## A creative culture

Despite the assumption that creativity is the current icon of the educational world (Gibson, 2005), it is claimed that schools (Robinson, 2006) and educators (Malaguzzi, 1987) actually kill creativity. This is because in formal education there is a tendency to look for an 'answer that is known before the question is posed' (Malaguzzi, 1987), thus depriving pupils from investigating the issue by themselves. Unfortunately this caters for an academic, logical type of intelligence (Christensen, Johnson, & Horn, 2008), which does not involve all students and all abilities; and it is focused on imparting notions rather than skills (Robinson, 2001), on memorisation rather than understanding. Evidence shows that creativity is not always valued in schools, although creativity and knowledge acquisition can overlap. In an article on future middle and secondary teachers' preferences for students' responses, Beghetto (2007b) suggests that classroom discussion would be the ideal starting point for the promotion of creative thinking skills. A similar assumption has been made by De Bono, who wrote a textbook to be used in classrooms presenting various techniques to develop thinking skills during classroom interactions (De Bono, 1970). As Beghetto shows, there is a tendency among teachers to prefer standard answers to unique ones; as actual teaching culture does not value creative answers (Beghetto, 2007b). Beghetto also found a delicate balance between relevance and newness. Teachers place great emphasis on relevance, competence and the need to avoid mistakes — thus hindering newness and, with it, the opportunity to develop creative skills. In the context of the current technological developments and young children's rapid adoption of new technologies, this blurry balance becomes even more important. It is not always easy for a teacher to determine whether a new technology is relevant to one's teaching. However, it is also important to mention that this doubt is not only with the teacher but also with other stakeholders. For instance, to date we still are not sure whether the use of a social networking sites like Facebook, for instance, can enable creative learning, albeit the characteristic of this technology may be related to creativity, for instance, networking, creating a profile, etc.

Formal education has created a culture that often 'accepts only what is relevant' (Beghetto, 2007b). An aspect of creativity is its *value*, or appropriateness, therefore, its relevance, but originality is also important. In schools, newness is dismissed for the sake of contextual relevance. There is, therefore, a need for a paradigm shift, in order to accept and welcome new ideas into the classroom. It may be worth noting that maths secondary school prospective teachers held relevance as most important (Beghetto, 2007b). This could come as no surprise to many, but it has been elsewhere noted that creativity can play an important role in apparently non-creative subjects as maths. Cropley and Cropley (2008) report the differences in Japanese and German

or US teaching of maths as outlined in the TIMMS study. While German and American maths lessons are based on the presentation of a problem and on the memorisation of its resolution, reinforced by similar examples, the Japanese students are faced with an issue and asked to find and solve the problem.

The cultural component needed for creativity also involves the acceptance of certain personality traits: one which distinguishes creative people is the capacity and willingness to take risks (Davies, 1999). This quality is certainly hindered in a school environment, where the correct, standardised answer is the desired response.

The paradox of desirability is also reflected in the figure of the ideal student. The preferred learners have characteristics that are in sharp contrast with creative personality traits, such as 'conforming' and 'considerate' (Runco, 1999). Ng and Smith (2004) came to the same conclusion: teachers dislike personality traits associated with creativity. The more creative a class becomes, the less desirable their behaviour appears. In a similar vein, Westby and Dawson (1995) confirmed teachers' negative view of characteristics associated with creativity in students. On the other hand, research shows that creativity is valued by learners (Milgram, 1990). In her study, 500 students were asked what they valued more in teachers, and creativity came out as one of the most valued items. Moreover, it was found that creativity was linked to teachers' effectiveness (Milgram, 1990).

Teaching for creativity, or enhancing learners' creative skills, requires the practitioners to be creative themselves and to provide learners with an ethos and a culture that values creativity (Craft, 2005), which shall be promoted at all levels of education and by all educational actors. This implies a change of the system of values, a *valuation* of creativity (Runco, 2007), where teachers, parents, policymakers and institutions manifest that creativity is worth pursuing. Institutions and policymakers should therefore reinforce this view of creativity as an asset, by promoting creative learning and innovative teaching through policy documents, Initial Teacher Training and Continual professional Development, by allowing the recognition of the creative outputs and outcomes of students. Moreover, support in terms of resources should be provided to teachers, so that they can rely on a series of sources that include ICT, but also realia (i.e. real objects), manipulatives (i.e. resources that can be manipulated), and innovative resources (Simplicio, 2000), so to avoid to restrain lessons to textbooks.

As Wyse and Spendlove (2007) point out, teachers play an important role in triggering students' creativity as they represent the field of experts who are to judge the creative output, as in the Csikszentmihalyi triangle (see Chapter 26)<sup>4</sup>. Teachers are key components (Sharp, 2004) and builders of a creative climate conducive to crea-

<sup>4</sup> Csikszentmihalyi sees creativity as the interplay of a domain (a discipline where the creative person operates); a field (the set of experts in that domain) and the individual (who generates a creative output).

tive learning (Esquivel, 1995). They can make the cultural shift needed for creativity to move to centre stage in the educational sector, but they will need support from institutions, parents and policymakers. Teachers provide the balance between structure and freedom of expression and determine the triggering or hindering of students' creative output (Beghetto, 2005). They are the ultimate source of creativity and innovation: no matter how good policies are, they rely on teachers to implement them in class (Ng & Smith, 2004). Teachers should allow the co-construction of knowledge (Craft, 2005), being 'reflective practitioners' (Esquivel, 1995), supporters and facilitators (Sharp, 2004) and not bureaucrats (Ng & Smith, 2004), nor technicians applying governmental policies without questioning them (Craft, 2005) or inhibitors by being overly didactic or prescriptive (Sharp, 2004).

Research indicates that traditional teachers, formats and institutions tend to deter students' individual autonomy (Ng, 2002) which affects their creative performance. Creative performance is more likely to happen alongside an empowerment of students (Craft, 2005). Amabile (1989) stresses the importance of a nurturing environment to kindle the creative spark, an environment where students feels rewarded, are active learners, have a sense of ownership, and can freely discuss their problems; where teachers are coaches and promote cooperative learning methods, thus making learning relevant to life experiences.

Teaching for creativity implies allowing pupils to take responsibility for their own learning. Pupils ought not to be considered as merely receivers of information: on the contrary, it is important that they assume the role of discovery, but support and guidance are needed in order for them to succeed. For this, teachers need to be prepared both on the pedagogical side, being aware of the ways and means to foster autonomy and student-centeredness (Simplicio, 2000), and on the subject-knowledge side. Lack of preparation will prevent teachers from being willing and ready to provide a learning format which allows students to discover and explore (Craft, 2005).

Craft (2005) recognises that there have been several moves to promote creativity in schools in England. Notwithstanding the political effort, messages from the government are conflicting. There is, Craft argues, a tendency to tighten the control of governmental bodies over learning content, assessment, attainment targets, and other educational issues. Teachers are asked to be creative and innovative and, at the same time, they feel the pressure to achieve standards (for instance with the National Literacy strategy and National Numeracy strategy). The same discourse is repeated by Christensen, Johnson and Horn (2008): policymakers are constantly requesting teachers and institutions to complete some particular task, while never forgetting what was institutionalised beforehand. Tasks, duties and demands accumulate, as new requirements do not shade or substitute the others but are added to the workload. Im-

plementing creativity in education is particularly challenging, Craft (2005) continues, because the control over teachers' pedagogies and learners' performances is higher than a creative environment could withstand. Creativity needs time, flow, interaction, suspension of judgement, and risk-taking, all these being attitudes that go against traditional school institutional principles. Schools mandate standardisation (Christensen et al., 2008), creativity requires uniqueness.

The literature recommends taking off some of the pressure, first by giving clear and not conflicting priorities. Moreover, policies should offer a balance between freedom and control, and, most importantly, should provide enough time to teachers and students, away from propositional knowledge, to internalise and experiment (Craft, 2005). It is also important to train teachers and to implement continual professional development, as the needs of learners change at a fast pace (Simplicio, 2000).

## **A new pedagogy for creativity**

A major enabler for fostering creative learning and innovative teaching is certainly the teaching and learning format. If technologies, for instance, are adopted on a large scale, but their usage is a plain reproduction of old, traditional teaching formats, their impact on creativity will be minimal. As it has already been argued, current and forthcoming cohorts of students are already at home, and at a very young age, exploring new technologies and changing their ways of retrieving and accessing information, of appropriating technologies, of understanding and exploring. These changes have an impact on their cognitive skills and on their meaning-making (Pedró, 2006). Therefore, current educational systems need to adopt new methods and formats that are suitable for present and future learners, that grasp and expand students' low concentrations spans, that provide them with interesting, up-to-date and engaging materials. In line with this, fostering creativity also requires an active mode of learning, and consequently a new teaching format, where the teacher is a coach and supporter and learners are empowered to take ownership of their own learning processes. Creativity is stimulated by the co-production of knowledge, where learners have an active role in the exploration and negotiation of meaning (Craft, 2005; Jeffrey, 2005; Runco, 2003). These aspects point towards a learner-centred pedagogy, where personalisation and individualisation of learning have a growing role, and where pupils have a say in the fashioning of tasks (Craft, 2005; Williamson, 2009). The above mentioned aspects are all in line with emerging institutional and educational trends (Punie & Almutka, 2007), which are advocating for a democratic, personalised and collaborative approach to learning, regardless of the support they give to creativity. Punie and Almutka (2007), in an article about future learning spaces, pointed out the necessity to

move from a content-based education to one promoting skills and competences, especially transversal competences such as *learning to learn* skills. This kind of education, which they see as the more foreseeable and desirable for the future knowledge-based society, will require, as they argue, an ever-increasing digital competence, but also, we add, a combination of new skills, among which creativity is a key factor. Future learning spaces require creative learning, as they 'emphasise personalisation, creativity and innovation in learning, as opposed to focusing on reproducing knowledge' (p. 214). These future learning spaces are ICT-enabled, as technologies increase personalisation of learning paths and flexibility.

A change in the teaching and learning format will have to endorse creativity as a common practice. This entails a specific and explicit focus on teaching for creativity and learning in a creative way by, for instance, stimulating students' thinking skills, by appreciating students' unique responses, by valuing creative outputs, processes, performances and products. In this creative format, learners are treated as thinkers and provocative methods are used to stimulate responses and interests (Taylor 1988). Intrinsic motivation is thus fuelled and learners are willing to work and learn because they derive pleasure for being involved in a given task (Amabile, 1989; Runco, 2007). Their involvement is also positive on an emotional level, as both teachers and learners have worked on the affective components of learning, such as tolerance of anxiety and affective fantasy in play (Russ, 1996). Teachers have high expectations of learners' creative potential, hence triggering their self-esteem and motivation (Craft, 2005; Robinson, 2001; Wyse & Jones, 2003). They are also able to understand, frame and adapt creativity to age groups, recognising that being creative means different things at different stages/ages of development. They therefore tailor content and method to students' interests, to their current level of functioning and to current or proximal abilities (Runco, 2003; Russ, 2003).

## Conclusions

This paper argues for the necessity of creativity and innovation in educational sets. Creative learning is defined as any learning privileging understanding over memorisation; creativity is thus a transversal skill facilitating a specific form of learning, requiring understanding, meaning-making and active participation. Creative learning is therefore increasingly relevant for the needs of the 21st century knowledge-based society.

A shift in learning asks for a change in teaching practices and methods, this is why this paper also addressed innovative teaching, which is understood as the implementation of new teaching methods, formats and practices aimed at fostering teachers and students creativity. Educational stakeholders, in order to implement and

foster innovative teaching and creative learning, will have to understand what creativity for education is and what it entails, tackling thus myths or implicit theories about creativity. It is also necessary to sustain creative learning and innovative teaching with a series of support mechanisms which have been addressed here as 'enablers'.

This paper focused on three interrelated enablers for change: technologies, culture and pedagogy. Technologies are already accepted by the young generation, who are appropriating ICT-tools and in particular web 2.0 applications in new creative ways. New pedagogies have to take into account what it means to be educated in our times, as the overwhelming presence of technologies in our lives brings about a change in the way young people and children learn and understand.

A cultural shift is also required in order to promote values that are not always recognised in a school environment, such as risk-taking, uniqueness and originality. Teachers are key figures in implementing change, but they need support to understand and accept creativity in their practices. They can empower students to become more responsible for their own learning. This will require a shift of pedagogy, moving towards pupils' and students' centeredness and the idea of cooperative learning as a means to foster not only creativity but also other transversal skills, such as learning to learn skills and entrepreneurship.

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