

Creativity in education: an overview of the implications of creativity in curricula

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Abstract:

Creativity is often overlooked as a part of the school curriculum, especially when high-stakes testing and abundant content in national curricula dominate education. This chapter examines several aspects of the research on creativity before focusing on the implications of creativity in the curriculum for learners and teachers, and to a degree society at large. Our argument for the place of creativity in the curriculum includes an in-depth analysis of enabling factors and barriers to creativity revealed through theory, research, policy, and classroom practice. We conclude with reflections on how creativity might be envisaged and institutionalized in curricula, and propose more systematic inclusion of creativity in national curriculum objectives.

Keywords: Creativity, creative learning, curriculum, formal education

Creativity can be viewed as an essential characteristic of human thinking, related to the freedom of the human spirit. More instrumentally, creativity can be valued in relation to its economic impact. Governments around the world have turned their attention to how children and young people might acquire the necessary attributes of creativity as part of their education. This has often been a result of politicians' views that creativity is a driver of economic prosperity. The analysis of survey data and input-output models data from Arts Council and Office for National Statistics in the UK (Centre for Economics and Business Research Ltd, 2013) offered a powerful case for the economic benefits of arts and culture, as exemplified in the following points:

- “Businesses in the UK arts and culture industry generated turnover of £12.4 billion in 2011 ...” (approx. 0.4 to 1.0% GDP)
- “The arts and culture industry employed, on average, about 0.45 per cent of total employment in the UK and 0.48 per cent of all employment in England.”
- The greatest contributor to the overall funding of the industry ... has been and still is earned income. ... Arts and culture is experiencing a pincer movement effect, reduced consumer expenditure due to squeezed incomes and reduced public funding.
- Commercial creative industries (as recently defined by Nesta) are estimated to provide nearly five per cent of UK employment, 10 per cent of UK GDP and 11 per cent of the UK's service exports. Arts and culture plays a significant role in supporting these industries (p. 2).

Political emphasis has revealed the view by policy makers that creativity is deemed essential for collective and individual well-being (Robinson, 2006; Blamires & Petterson, 2014) and a student asset for the 21st century (Barroso, 2009; Katz-Buonincontro, 2012). As a result of these emphases governments have responded with actions. The Australian government's Melbourne Declaration on Educational Goals for Young Australians (which sets educational priorities for 10 years) committed the nation to developing ‘confident and

creative individuals' (Ministerial Council on Education Employment Training and Young Affairs, 2008). In China, from 2006, creativity in the early years became an educational priority (Vong, 2008). In the special administrative region of Hong Kong creativity has become the theme of educational reform to prepare for the challenges of a twenty-first century society (Leong, 2010). In Greece, the Cross-thematic Curriculum Framework introduced in primary education in 2003 focused on creative abilities and imagination through exploration and discovery (Kampylis, 2010). In the twenty-first century skills movement, which has global reach but started in the USA, creativity is perceived as a core skill to redefine the goals of education in the new millennium (Binkley et al., 2012).

Political actions to fashion school curricula reveal specific educational priorities including priorities for the kind of knowledge to be taught. A curriculum is the way in which domains of knowledge are made available to students (Craft, 2005); curriculum development is a political act, one which establishes a vision of the kind of society policy-makers envisage for the future (Williamson & Payton, 2009). Indeed the creation of a curriculum depends upon a politics of adjustment and negotiation between prospective competence needs, disciplinary domains, and educational traditions. National Curricula are built, explicitly and/or implicitly, on societal aims for education, conceptions of knowledge, and political control (Wyse, Hayward, Higgins & Livingston, 2014).

In this chapter we discuss how different perceptions of creativity influence its place in the curriculum, and some of the consequences that this has for the education of children and young people. Our framing for the chapter is based on the idea that conceptualisations of creativity are reflected in curriculum development and curriculum policy. We argue for the necessity of a clear and consensual agenda for creativity in education. The first section of the chapter outlines how plural conceptions of creativity have been established through research. Three conceptions in particular are then related to a discussion of personality traits of creative people, and the ways that these traits are perceived by teachers. The second section of the chapter considers the implications of fostering a creative culture in schools, and analyses barriers and enablers, in particular considering how curricula and assessment play a part in fostering or hindering creativity.

Conceptions of creativity

An emerging consensus for the definition of creativity stands on three pillars: *originality*, *value*, and *acceptance* (Wyse and Ferrari, 2014). A process, or product, or output is considered creative when it is original and valuable at the same time (thus contributing to a specific area or domain; Beghetto, 2005). Across diverse fields and disciplines, originality (or novelty) and value (or appropriateness) emerge repeatedly as the hallmarks of creative endeavour (Barron, 1955; Mednick, 1962; Mumford & Simonton, 1997; Stein, 1974; Sternberg & Lubart, 1999, Vernon, 1989). The third pillar of the definition – acceptance – involves the judgment of 'experts' in recognising the originality and value of the output or process, thus generating, as we shall point out, one of the unresolved dilemmas about creativity in the designation of such experts.

Authors have diverged in their precise definitions beyond these three pillars. Meusburger (2009) argues that over a hundred different analyses can be found in the literature. Different research perspectives isolate a specific aspect of creativity, often neglecting to relate the single aspect to the whole (Sternberg & Lubart, 1999).

Despite Laske's (1993) opinion that creativity is impossible to define or explain (and should rather be exemplified), a number of scholars have proposed definitions of creativity, each bringing a different voice and perspective to the debate. At one end of a continuum of levels of creativity, Gardner (1993) suggests that creative works cause a 'refashioning' of the domain they contribute to. At the other end of the continuum, Craft (2005) identifies creativity as the ability to see possibilities that others have not noticed: possibility thinking (Burnard et al, 2006), the 'what if' and 'as if' driven by questioning and imagination. Among scholars underlining the 'thinking' side of creativity we include Amabile (1990) for whom a creative response to a task is heuristic rather than algorithmic: a discovery rather than a procedural process; thus being substantively different to reproduction (Taylor, 1988).

An important dimension of the debate has been the consideration of creativity as the preserve of eminent people versus the kind of creativity that occurs in everyday life. According to Kaufman and Beghetto (2009) most research on creativity takes one of two directions: while some scholars focus on major creative breakthroughs (e.g. Gardner, 1993; Gruber 1974; Simonton, 1999), other will look at new and valuable contributions from ordinary people (e.g. Wiley, 1998; Ward, Patterson, Sifonis, 2004). The distinction between the two strands has been referred to as Big C and little c creativity, a distinction being reported in many studies, albeit sometimes with different wordings (Amabile, 2013; Craft, Jeffrey, & Leibling, 2001; Kaufman & Beghetto, 2009; Kozbelt et al., 2010; Shneiderman, 2000).

Big C creativity refers to the creative accomplishments of geniuses, seen in people such as Curie, Confucius, Dickinson, Mozart, Nureyev, or Senghor. Their creative achievements are exemplary and comprise ground-breaking novelty and excellence in their domain, as well as societal recognition and valuation. Little c creativity, on the other hand, can be seen as the ability and attitude that leads to new and effective solutions to everyday 'problems'. 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 unforeseen diagnoses.

The theoretical distinction between the different levels of creativity raises a substantial problem, one we briefly mentioned at the beginning of the chapter: namely the role and designation of 'experts'. In order to judge whether something is original there needs to be a domain of reference: the idea or product has to be seen in a context from which it differs and in which it is judged to be of value. This requires a field of experts who accept the idea or product as new and valuable (Csikszentmihalyi, 1999). However Amabile (2013) cautions that while experts will easily recognise the originality of a contribution they will

not necessarily endorse its value, which in some cases requires the test of time to be perceived as authoritative or revolutionary. Hence there is a paradox: creativity contributes to the advancement of society through the work of eminent people, however pioneering contributions might not be perceived as valuable by contemporaries (Van Gogh comes to mind, dying in poverty and disgrace). Yet it is contemporary experts who act as gate-keepers of a domain and who are asked to judge the novelty and relevance of contributions.

In relation to little c creativity the three pillars of our definition can be further contextualised (Jones and Wyse, 2013). Originality is taken to mean original for the individual, the context, or the situation, but not necessarily in comparison with larger norms (Runco, 2003). Value is assessed in the context and field in which the person is acting. Acceptance, we have just seen, may come from educators and/or pupils who are not necessarily eminent experts. Yet, while little c creativity might not involve a refashioning of a domain or field, it can contribute to the improvement of processes, products, actions, ideas, and practices.

Traits of creative people

A strand of studies on creativity considers the personal traits and characteristics of creative individuals. Significant work has been done in seeking to understand eminent intellectuals and creators, but also research has been carried out on ordinary people, with the identification of several intellectual and personality traits that have been recognised as attributes of creativity. We consider that this strand of research is relevant for a discussion of creativity in education as it sheds some light on specific aspects of creativity, and on traits and attitudes that we believe could be fostered in the classroom in the interest of enhancing creativity. Intelligence and motivation are two central aspects of this line of research, as they are central in education; we thus primarily focus on those two features.

For decades intelligence was misleadingly understood as the central individual characteristic of creative people (Albert & Runco, 1999). We can still hear the echo of this idea in the number of studies that associate creativity with genius or giftedness (Albert & Runco, 1990). However, the relationship between creativity and intelligence is not linear. The *threshold theory* suggests that there is a minimum level of intelligence (measured in terms of IQ) required to be creative, but above a certain level, intelligence does not influence creativity (Runco, 2007). Other studies conclude that intelligence is a “necessary but not sufficient component of creativity” (Heilman et al., 2003: 370). For Getzel and Jackson (1962), intelligence plays a smaller role than personality in determining creativity.

Sharp (2004) distinguished creativity from talent, arguing that talent refers to the possession of aptitude and skills in a given area, without necessarily implying originality or creative ability. A comparison with the musical domain will exemplify the complexity of this claim. Talented performing musicians might be judged to be less creative than musical composers. However, we believe it would be more useful to talk of ‘gradients’ of creativity. It is undoubtedly clear

that performers such as pianist Glenn Gould or violinist Jascha Heifetz brought original and valuable aspects to performance, thus their performances might be judged as creative (Wyse, 2014). According to Gardner (1993), although a performance often requires reproduction of musical notation, opportunities for innovation, improvisation, and interpretation are also present. This reminds us of Amabile's (1990) point that heuristic rather than algorithmic processes are discriminant of creative acts: a performance is creative when it involves discovery, when the process moves away from more basic procedural reproduction.

Motivation is one of the main factors conducive to creative output. On the basis of her research, Amabile (1998) argued that intrinsic motivation is more important than extrinsic when determining impact on creativity. Intrinsic motivation is about passion and interest, an internal desire to be engaged in a specific activity. This internal push is the stronger driver of creative production: people will be creative when they are driven by their interest, passion, and not by external pressure (extrinsic motivation, which can take the form of a cash incentive or in education a good grade from the teacher). Creative people are those who are engaged in a task because they derive pleasure from the task itself. This pleasure was described by Csikszentmihalyi (1996) as a mental state of *flow*: being fully immersed in an activity, experiencing an automatic, effortless yet focused state. Csikszentmihalyi (1990) coined the term *flow* to describe these pleasurable feelings of complete absorption reported by creative people engaged in their selected activity, during which creation seems to flow naturally, and concentration makes them lose perception of time. Csikszentmihalyi holds that this state is the fuel of creativity. Sustained creativity needs sustained and undivided attention to the task at hand (Bohm, 1998).

The undivided dedication derived from intrinsic motivation could relate to another two common characteristics of creative people: work ethic and perseverance (Runco, 2007; Csikszentmihalyi, 1988). Csikszentmihalyi (1996) interviewed creative people from different fields (a sculptor, a physicist, a social scientist, a physician, a painter, an inventor). When talking about their work, they all referred to long periods of hard work and to the fact that their curiosity pushed them to dedicate long hours to the tasks they were involved in. Csikszentmihalyi said that without perseverance novel ideas would not come to completion. For Gardner (1993), the 'Exemplary Creator' 'works nearly all the time' (p. 362) and is obsessed with their work. Their perseverance does not stop at motivation and engagement. Creative people tend to persevere in having their ideas accepted: they are persuasive (Simonton, 1990). They analyse which ideas are worth pursuing and will persuade others that their ideas are of value (Sternberg and Lubart, 1999). Their persuasiveness, however, can also create social friction, according to Ng and Smith (2004). While many people tend to agree with group norms, creative persons are often dogmatic and will stand up for their ideas against everything and everyone: for example the case of Galileo Galilei and his conflicts with the Catholic Church. Feist (1998) lists a series of arguably less attractive characteristics of creative people: less conventional, dominant, hostile, and impulsive. They are norm-doubting, non-conformist, independent. And, while being independent, they can also show a certain immaturity (Gardner, 1993; Csikszentmihalyi, 1996).

Despite undesirable characteristics recognised in a variety of studies, the so-called 'dark side' of creativity is often based on misconceptions. The Romantic period is still casting a shade on the artist and creative person as mad and savage (Csikszentmihalyi, 1996); and on the creative process as a mysterious and mystical creation (Rodari, 1973). Csikszentmihalyi (1996) argued that every period puts a 'transient mask' on creative people (p. 56). In ancient times, he asserts, creativity was associated with mystical beliefs (Sternberg & Lubart, 1999) or inspired by the Muses ('Sing, goddess', so Homer opened the *Iliad*). More recently, creativity was believed to be induced by drugs (Plucker & Dana, 1999) and has been linked to mental breakdowns and illness (Beghetto, 2005). However, most robust overviews of creativity research reject the link between mental illness and creativity, and between drug use and creativity (Sawyer, 2012). However, there is a commonly held belief that creative people are tortured souls who need their creative acts as a sort of healing process (Sawyer, 2012).

Teachers, creativity and learning

Creativity is a fundamental part of human information processing (Dietrich, 2004), and central to the construction of personal meaning (Runco, 2003), thus aligned with learning. It has long been recognised that appropriate knowledge and expertise in a field is an essential aspect of creativity (Guilford, 1950; Weisberg, 1999; Boden, 2001). Learning in a creative way is 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) claimed, 'to understand is to invent'. Without invention, learning mainly involves memorisation, and teaching as a consequence can be viewed as nothing more than transmission.

Teaching practices can sometimes privilege knowledge reproduction of factual information over knowledge creation, thus reducing creative endeavours. In an article on future middle and secondary teachers' preferences for students' responses, Beghetto (2007b) showed, there is a tendency among teachers to prefer standard answers to unique ones, and to dismiss creative answers. Sometimes dismissal of ideas can be a teacher's response to what are seen as pupils' attempts to distract attention from the tasks planned for the lesson. As Kennedy (2005) reports, while not being a punishment, dismissal conveys to students the message that some ideas will not be discussed, hence discouraging students from investing intellectual energy in the pursuit of their new idea. In her study on school reform, Kennedy observed that unexpected ideas from students were often dismissed by teachers because they felt the need to maintain the lesson's momentum. Kennedy refers to this process as a 'tension' to be resolved routinely by teachers in engaging with students, a tension created between the objectives of the lesson and the unexpected reflections and outbursts of students, as if students' active participation in their lessons was a 'misplaced' act. Although Kennedy does not refer explicitly to creativity, her description of classroom interactions can be seen as a possible ground for creative engagement. Banaji, Cranmer, & Perrotta (2013) talk about a dualist framework in schools, one which sees some knowledge as good and

some knowledge as bad. Runco (2004b) and Beghetto (2007a) also agree on the detrimental effects on students' creativity of the dismissal of their ideas. One of the personality traits of creative people is their capacity to take risks (Davies, 1999), a quality often hindered in a school environment, where the correct, standardised answer is the desired response. Some forms of teaching, often regarded as 'traditional teaching', can deter students' individual autonomy (Ng, 2002) which affects their creative performance.

Cropley (2014) found that research in many countries and over many years portrays a majority of teachers who 'disapprove of or even dislike' creative children. Despite this, Feldhusen and Treffinger (1975) showed that 96% of the teachers they surveyed agreed that creativity is a good thing. Runco, Johnson and Bear (1993) reported teachers' favourable attitudes to creativity. The paradox of desirability (i.e. creativity being explicitly seen as desirable but in practice avoided) is reflected in teachers' views of the ideal student. Teachers seem to prefer learners who have characteristics such as 'conforming' and 'considerate', that are in sharp contrast with creative personality traits (Runco, 1999). Ng and Smith (2004) and Westby and Dawson (1995) came to the same conclusion: teachers dislike personality traits associated with creativity. Creative behaviour in students is often perceived by teachers with scepticism and viewed as students behaving egotistically.

Teachers are pivotal in students' creative performance because they can build a climate conducive to creative learning (Esquivel, 1995). They provide the balance between structure and freedom of expression (Beghetto, 2005). 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. However, it is the *acceptance* of the original and valuable thinking, process or output that is often not supported by teachers.

Creativity and the curriculum

There have been a number of moves in policy to promote creativity in school curricula, albeit with contradictory actions from governments. There is an international tendency to tighten government control of curriculum and assessment (Wyse, Hayward, Higgins & Livingston, 2014). At the same time teachers are asked to be creative and innovative, but often feel the pressure to achieve standards (for instance in literacy and numeracy). Tasks, duties and demands accumulate, as new requirements do not substitute others but are added to workload (Christensen, Johnson and Horn, 2008). In a comparative study involving teachers from England, France, and Denmark, Osborne and McNess (2002) found that teachers from England reported that highly prescribed curriculum and high stakes testing left them little possibility for creativity. The knowledge-burden that teachers are often required to impart has a negative impact on the time that can be allocated to exploring topics in a creative and innovative way (Craft, 2005).

A creative environment, where children and young people feel safe and accepted, can be an aim of education. Openness towards different people (tolerance) is one of the principles of creative environments according to Florida

(2002) who studies creative cities but whose analyses can also be applied to school environments. The notion of acceptance of creativity goes hand in hand with an understanding of what creativity is. This understanding implies tackling some 'implicit theories' (Runco, 1999), ideas that teachers might have about creativity, which might differ from scholarship on the subject. For instance, while we have wide scholar support for originality and value as key factors of creativity (within a context of consensual judgement), teachers seem to perceive creativity mainly as an original output (Beghetto 2007a).

As one major geographical area of the world, the nation states of the European Union represent important sites for consideration of creativity in the school curriculum. Creativity is present and mentioned in school curricula. In a previous publication (Wyse & Ferrari, 2014), we reported findings on an analysis of national curriculum texts for primary and secondary schools from the 27 countries that were at the time forming the European Union.¹ The focus of the analysis was the frequency of use of the word 'creativity' which was searched through its stem *creativ** and calculated per thousand words. The analysis highlighted that creativity was mentioned in national curriculum texts of all European countries albeit with notable frequency differences. Occurrences of creativity ranged from 0.04 per thousand words in the Netherlands and Poland to 1.78 in Northern Ireland. The countries where creativity ranked higher in terms of relative occurrences were: UK - Northern Ireland, 1.78 occurrences per thousand words; Estonia, 1.65; UK - Scotland, 1.25. The long-lasting tradition of creativity in the UK was evident in the rate of occurrences at or above the mean of the EU 27, and in two of the four UK countries significantly above the mean (Wyse and Ferrari, 2014).

The case of Estonia is interesting. In unpublished interviews with three educational experts from Estonia (collected during the ICEAC study, see Cachia et al. 2010, and Banaji, Cranmer, & Perrotta, 2013), interviewees reported that education in Estonia was very traditional. However, since 2002 there had been reforms in both teacher training and curriculum, in order to modernise the education in the Soviet era aftermath (see Moree, 2013 for a fascinating account by teachers of similar curriculum development in Czechoslovakia). In the new curriculum, creativity was seen as one of the seven general competences, and a section of the curriculum on cross-curricular themes supported its conceptualisation. The most common collocates (i.e. words that appear more frequently together with the searched term) of creativity in the Estonian curriculum were 'students' and 'development'. However, the three experts who were interviewed recognised that practices were likely to differ across schools and classrooms. They argued that although there was evidence of transition from didactic to active teaching methods, it was predicted that it would be neither easy nor immediate to change teachers' beliefs, especially in this case of radical change.

¹ At the time of the study, Croatia was not yet part of the European Union. Curricula document could not be retrieved from Cyprus. For Belgium, the curricula of all communities were acquired. In countries such as Spain and Germany, where the national ministries provide general guidelines and the autonomous communities and Landern provide the regional curriculum, three regions per country were chosen. For the UK, the curricula of the four countries were acquired.

In terms of relative occurrences, the places where creativity was less frequently mentioned per thousand words in the national curriculum texts of the EU were France, 0.09; Belgium—Wallonia, 0.07; The Netherlands, 0.04; and Poland, 0.04 (Wyse and Ferrari, 2014). The case of the Netherlands stands out for both low absolute and relative occurrences (creativity is mentioned 17 times in curricula for all subjects and all levels of compulsory school). However, consultation with experts, and data from the ICEAC survey, showed that creativity is highly valued in schools in the Netherlands (Cachia et al, 2010). The discrepancy in the data between occurrences of the terms in national curriculum texts and the views of experts could be a result of the independence that schools in the Netherlands have in their interpretation and implementation of the curriculum. To a certain extent a similar discrepancy can be seen in the relatively high levels of curriculum prescription in England against continuing determination by some settings, schools and teachers to implement creative approaches (Wyse, Hayward, Higgins & Livingston, 2014).

Even if sufficient attention is paid to creativity in national curricula, and if teachers and schools have sufficient freedom, it does not follow that students will foster their creativity. A key factor is the beliefs about creativity and education that teachers hold. A long-lasting debate considers the domain of creativity: while creativity is commonly perceived as inherently connected to the arts (Sawyer, 2012), some scholarship has argued that creativity is a feature of any domain or area of knowledge (Runco, 1999; Sharp, 2004; Beghetto, 2007). The analysis of curricula of the EU showed that creativity occurred almost twice as much in the curricula for arts-related subjects than in other subjects (Wyse & Ferrari, 2014). Banaji, Cranmer, & Perrotta (2013), who interviewed 80 educational experts and stakeholders from Europe, reported that a third of interviewees perceived that limiting creativity to the Arts was a problem for its development in education. An interviewee from France stated: “Basically in France creativity is only associated with the arts and maybe advertising. But a scientist would not consider himself creative” (Banaji, Cranmer, & Perrotta, 2013, p. 455). But Cachia and Ferrari (2010) found that teachers from Europe held an encompassing view of creativity. Almost all teachers who took part in the survey (98%) believed that creativity can be applied to every domain of knowledge. When asked if they agreed that creativity is only relevant to visual arts, music, drama and artistic performance, 86% disagreed, with 31% strongly disagreeing and 56% disagreeing. This finding was quite a surprise in the context of general agreement and evidence that teachers tend to hold contradictory conceptions of creativity (Kampylis, et al., 2009; Runco, 2003; Westby & Dawson, 1995). The issue of the location of creativity in relation to disciplines and/or subjects is a very important one to tackle, as understanding creativity as relevant for the arts only allows for teachers' withdrawal from an engagement in developing students' creative potential across the curriculum (Kampylis, et al., 2009).

One of the explanatory factors in relation to aligning some subjects more than others with creativity was revealed in the two main ways in which creativity was described in the analysed curriculum texts: as an artistic output or as a thinking skill. The cases of national curricula from Ireland and Lithuania provide typical examples of this distinction (Heilmann & Korte, 2010). In art-related subjects of

those curricula (Visual arts, Music, Drama), creativity was mainly formulated in terms of self-expression, spontaneity, and enjoyment; while in other subjects the prevalent focus was on thinking skills and problem solving. The distinction is unhelpful because self-expression can be present in scientific subjects, for example the act of persuading others that one's ideas are of value; while creative problem solving is often a feature of artistic creativity, for example deciding how a character might behave in a novel.

The relevance of creativity for all school subjects is evident in the number of publications, mainly books, dedicated to the topic, where typically there would be a general introduction on creativity, its meaning and implication for education, and different contributions differentiated on how creativity is relevant for each school subject. This is the structure of 'Unlocking Creativity: teaching across the curriculum' (Fisher & Williams, 2004); of 'Creativity for a New Curriculum: 5-11' (Newton, 2012); and of 'Creativity in the Primary Curriculum' (Jones & Wyse, 2013). In these books, suggestions are given on how to foster creativity across the curriculum and in all school subjects. There are however different conceptualisations of creativity that emerge in these books and their chapters, ranging from an emphasis on imagination in literacy and writing, to the focus on problem solving in science and mathematics. Given that we perceive creativity as being relevant for every school subject, does being creative in Biology mean something different to being creative in Music? Is the type of creativity fostered through a specific subject transposable to another subject, or field, or domain? Research is polarised on this matter: some studies have promoted a vision of creativity as transferable across domains (Woods and Jeffrey, 1996; Mardell et al, 2008); others argue that creativity occurs in a specific disciplinary area (Amabile, 1990; Chappell, 2006; Csizsentmihalyi, 1999; Gardner, 1993; Miell and Littleton, 2008). We are left with the impression that disciplinary areas or subjects are perceived each in their own uniqueness and each with their own interpretation of creativity, thus contributing to a kaleidoscopic vision of creativity and failing to provide a definition of and approach to creativity across the curriculum as a transversal competence.

The field of mathematics is a thought-provoking case. Mathematics is a discipline where creative thinking and creative problem solving is often claimed to be prominent. However, in their review of the literature, Leikin & Pitta-Pantazi (2013) found that creativity is neglected in mathematics education research. They notice a double lack of interest: mathematics research devotes little space to creativity, and research on creativity devotes little space to mathematics. In the mathematics field, research on creativity is recent, mainly having been carried out in the last few years, and it still remains a niche area in studies on mathematics. The article is the introductory discussion of a special issue on the role of creativity in mathematics of the ZDM journal, which already in 1997 dedicated another special issue on creativity and mathematics (Volume 29, number 3). Kohler (1997) suggests that teachers of mathematics should act like artists and welcome creative solutions and self-expression, 'For creativity must first be *permitted*' (p. 88, emphasis in the original). Mann (2006), in his inspiring article on creativity as the essence of mathematics, simply points to problems with the standard pedagogy of mathematics which sees 'learning from the master' as the main educational method: teachers demonstrate and

students repeat and practice, which he clearly sees as a hindrance to developing creativity. He claims that, even at the level of research on mathematics, there is a lack of a satisfactory and accepted definition of mathematical creativity. We see the problem of definition again coming back as a cause that influences practices and adoptions. Mann argues that the essence of mathematics is thinking creatively, not providing the right answer. Conversely, Beghetto (2007b) reported that prospective teachers of Mathematics at secondary school level prioritised relevance of responses above uniqueness of responses much more than prospective teachers from other subjects, thus dismissing novel ideas.

Assessing creativity

When claiming that creativity should form a strong, coherent, constituent part of the curriculum, we acknowledge that policy texts as curricula are indicative of practice, rather than definitive, in part because policies are mediated by schools and teachers and other actors in education systems (Ball, 1997). This is part of the reason why we consider it relevant to discuss the role of assessment in relation to creativity in curricula in this chapter. Assessment is an essential component of learning and teaching, as it allows the quality of both teaching and learning to be judged and improved. Assessment often determines the priorities of education; it has 'back-wash' effects on teaching and learning. As a result, the promotion of creativity at the curriculum level will not be fruitful if assessment is based on the avoidance or dismissal of creativity. The literature recognises a barrier for creative learning in the way in which formal, national assessment, especially in the form of tests, is conducted. Wyse and Jones (2003) maintained that testing had narrowed school provision at the expense of creativity. Notwithstanding the amount of time required to prepare students for examinations, there was little evidence that testing helps to raise standards. On the contrary, the high stakes statutory assessment system has been seen to introduce some undesirable effects (Wyse & Torrance, 2009).

High-stake tests are not the only form of assessment that influence school provision. Classroom interaction is often perceived by teacher and students as a form of informal assessment and direct feedback, and as we mentioned above classroom conversations could benefit from the recognition of learners' unique ideas. Simplicio (2000) and Beghetto (2005) agree on the importance of goal-setting: what has to be learned and how should be clear for both learners and teachers. Despite the statutory summative role of assessment in many countries, the other two functions of assessment should not be forgotten as they offer wide opportunities for the recognition of creativity. These are: 1. the diagnostic, which aims to analyse pupils' capabilities and aptitudes as a basis for planning; and, 2. the formative, which gathers evidence about pupils' progress to influence teaching methods and priorities (Harlen & James, 1997; Black & William, 2003). As rote-learning cannot be recognised as creative learning, so summative assessment of mainly factual knowledge provides little space for recognition of creativity.

Assessing creativity has long been a challenging area despite pioneering work carried out by Torrance (1988) who tested several components of divergent

thinking. Ellis and Barrs (2008) recognised the compounded difficulties of assessing creativity. They offered a framework and a creative learning scale, the latter divided into five levels or attainment targets, accounting for both creative products and processes. Ellis and Barr propose an assessment that aims to detect creativity. Their framework of Creative Learning Assessment (CLA) encompasses diagnostic, formative and summative assessment, allowing teachers to make informal judgements and also to evaluate children's creative work in several ways, including collecting pupils' work in portfolios and e-portfolios. Blamires & Petterson (2014) present and discuss seven frameworks that are currently in use to assess creativity in school. In their review, they notice two main limits of those frameworks: first, frameworks are decontextualized from the subjects or disciplines; second, some of the frameworks lack some degree of construct validity. They propose the use of assessment *for* learning instead of assessment *of* learning to be applied to the domain of creativity. 'Assessment for Learning' (AfL, elaborated by the Assessment Reform Group, 2002), though it does not consider creativity, provides scope and space for recognition of creative endeavours. It recognises the priority of promoting students' learning and understanding, and highlights the impact of self-assessment and peer assessment in raising children's achievement (Black, Harrison, Lee, Marshall, & Wiliam, 2004).

The field of assessment of creativity in education does not appear to have provided a satisfying solution or approach. As Munro (2010) points out, discussing assessment of creativity raises a number of questions, for instance on what to assess: the creative person? The creative output? The conditions surrounding the act of creation? Collard and Looney (2014) remind us that assessment is a central aspect of creativity, as creative processes or products are described as valuable and original, therefore are assessed against two sets of standards. They recognise however that little attention has been given to assessing learners' creative processes or products and they ascribe this lack of attention to be 'in part due to the lack of a clear definition of creativity' (p. 356).

Conclusions: curricula for creative education

The idea of a school culture based on acceptance, the possibility of long periods of time to be dedicated to creative engagement, the clarification on what creativity actually means and how it can be fostered could all be transmitted through appropriate, new, well-drafted educational curricula. Curriculum developers should therefore foster the acceptance of creativity for learning throughout the curriculum and in every subject, and should do so with a promotion of a clear, consistent, and evident definition of creativity to be enacted through a balanced curriculum with space for experimentation, creation, and digression. This vision is however far from where we stand.

There is agreement in the literature that a prescriptive curriculum hinders creativity and affects the teaching formats. Curricula are often knowledge-driven and often allow little time for exploration. Another pitfall of prescriptiveness resides in the distance of the curriculum takes from learners' needs, experiences and motivations. Intrinsic motivation, we have seen, is one of the main triggers of creativity and of engagement. Therefore, a curriculum that

facilitates creativity is one that triggers the intrinsic interests of learners, while at the same time being appropriate to their cognitive current level of functioning. The ideal curriculum is tailored to the interests and stage of development of a specific and real class, rather than based on a cohort of anonymous learners.

The literature highlights another aspect of the curriculum that hinders some creative engagement: namely, the distinction between core and foundation subjects. Even if not all countries have such a clear-cut distinction, there is still a hierarchy of areas of knowledge which is exemplified in the different school subjects. School subjects are not only perceived to have different weight in the schooling of children and young people, but moreover their actualisation in terms of learning outcomes seems to be built on different parameters. We reported how creativity, which is rhetorically endorsed as a cross-curricular competence, is conceptualised differently across the curriculum and described in quite different terms from one subject to another.

The long-standing debate in the field about how creativity should most appropriately be defined continues. We found evidence of the following: some broad consensus in relation to originality and value in the context of disciplinary differences; implicit theories of teachers insufficiently informed by research; stereotypical traits inappropriately associated with creative people; weak specification of creativity in school curricula; and a lack of systematic assessment of creativity. To foster creativity there is need for a precise definition of creativity that is subscribed to by educational stakeholders (policy-makers, researchers, curricula developers, teachers, ministries of education, pupils, parents). Such a definition should be widely applicable to disciplinary domains and therefore school subjects. The definition should allow for a conceptualisation of creativity as an entity which is strongly recognisable independently from the domain of application, far from the current situation where creativity implies fairly different processes in different contexts. While recognising that there are degrees of creativity, and that different disciplines reveal different applications of the concept, a precise definition of creativity would help understanding the underlying process of the creative endeavour in terms that, although difficult to measure, would be clearly identifiable. We conclude that, despite the richness of research on creativity and the relevance of academic work on creativity in education, in order to effectively promote creativity in education, and to do so with serious intentions of its development, creativity has to be more consistently part of the educational objectives of national curricula.

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