

Creativity and Its' Relationships with 21st Century Skills in Job Performance

Jeremy Lamri

JobTeaser, France

Todd Lubart

Université de Paris and Univ Gustave Eiffel, LaPEA, France

Abstract

This conceptual article addresses the question of the role creativity plays in job performance, on a stand-alone basis, as well as on a joint basis when coupled with other 21st century skills. Based on a literature review, we define creativity in the context of job performance, and explore how this skill is related to job performance. We show also in this article which soft skills seem to best combine with creativity for success, using the increasingly popular 21st century skills framework, and more precisely the 4Cs, for Creativity, Critical Thinking, Communication, and Collaboration. In addition to academic research, for practitioners this article provides insights for a better understanding of creativity as a core skill for job performance, to be used to enhance upskilling goals or recruitment processes.

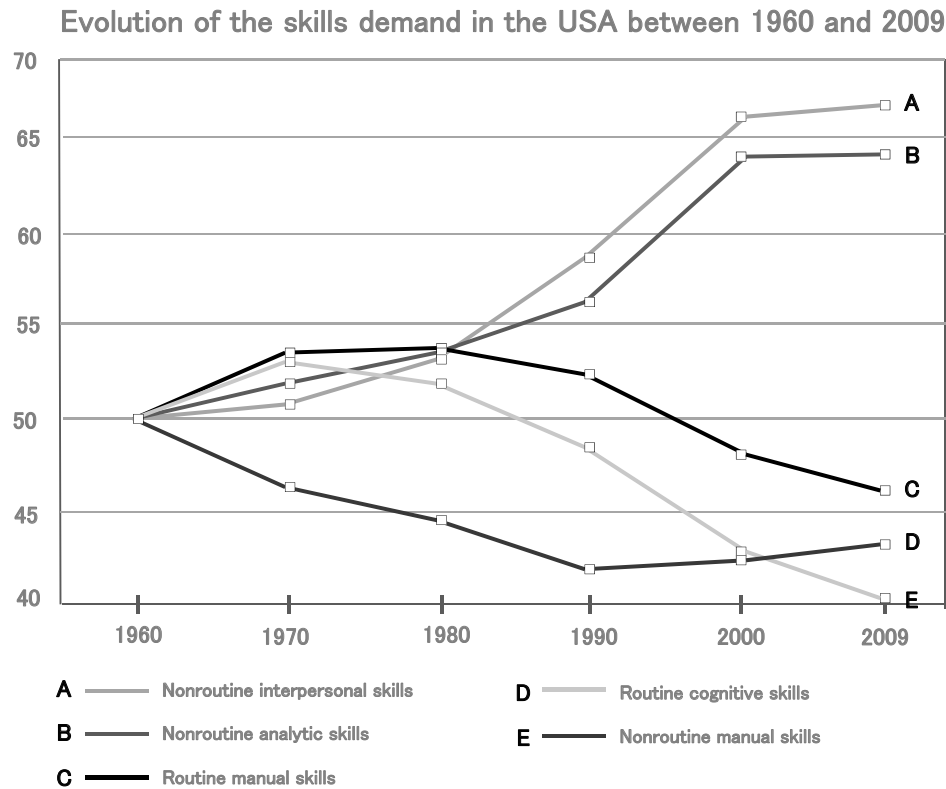
Keywords: *creativity, job performance, critical thinking, communication, collaboration, 21st century skills, 4Cs*

INTRODUCTION

Creativity is considered an essential skill to acquire in the twenty-first century, as endorsed by most teachers, executives and even international organizations (Archibugi & Lundvall, 2002; Partnership for 21st century skills, 2008). The main reason for this growing consensus seems to be related to an accelerating trend during the past fifty years, with a shift in the very nature of skills required to perform tasks on an economy-wide scale (Levy & Murnane, 2004, 2013). Until the 1980's, the work environment was focused mainly on routine tasks, which can be defined as repetitive manual or intellectual tasks in which success can be predicted with limited input (Fox, 2016). The rise of information technologies since then, such as personal computers and the

Internet, modified deeply the nature of tasks to be performed, as did the constant increase in information itself (McCain & Jukes, 2001).

The accelerating digital transformation of the workplace in recent years has led to recent studies on the link between skills and performance. Indeed, as the digital transformation seems to lead to human capital depreciation and massive growth in unemployment, it is useful to recall the literature concerning the 1970's. In that period of disruptive innovations, technological progress created strong economic turbulence, which questioned the appropriate skills for performance (Ljungvist & Sargent, 1998). The US Army War College qualified in 1991 this new world using the acronym VUCA, for volatile, uncertain, complex and ambiguous. In this VUCA world, more complex problems arise, more



From Levy, F., & Murnane, R. J. (2013). *Dancing with Robots: Human skills for Computerized Work, Third Way*.

Figure 1: Economy-wide measures of routine and non-routine task input in the USA between 1960 and 2009

Source: Levy & Murnane, 2013

often, requiring advanced problem-solving skills. Also, the exchange of information has become a key driver for value creation, and therefore interaction skills facilitating those exchanges with other people have become highly valued. Such context-dependent skills are called non-routine skills, and they are required for collaborative invention and problem solving (Antonczyk & Fitzenberger, 2009). Creativity fits clearly into this non-routine-skills category, together with critical thinking, collaboration and communication, called the 21st century skills.

UNDERSTANDING THE 21ST CENTURY SKILLS FRAMEWORK AND THE 4CS

The notion of 21st century skills implies that some skills have relatively more importance in the 21st century compared to previous centuries. With the

evolution in the demand of skills since the 1970's more non-routine skills have gained attention. However, what is the definition of a skill? In the 1980's, a skill was defined as "a fixed set of knowledge and know-how (...) of standard procedures, of types of reasoning that can be applied without new learning" (De Montmolin, 1984). A few years later, the notion of problem solving emerged when defining a skill; Michel and Ledru (1991) presented a skill as the capacity to solve a problem in a given context. Since then, both definitions proved too general to differentiate routine skills and non-routine skills, according to Levy and Murnane (2004). Beyond the notion of action, skills refer to the ability to think and interact. The level of complexity of thinking and interacting might be a relevant indicator to differentiate routine and non-routine skills.

In a work context, a skill can be seen as an individual capacity to perform one or several tasks

using the appropriate resources (Le Boterf, 2008). Those resources require three conditions for success: the desire to go from inaction to action, the knowledge of how to use and combine the right resources to reach an expected result, and the availability of all external resources required to perform the action and succeed. Another definition of the concept of skill describes the necessary combination of knowledge, know-how, and knowing-how-to-be (Parlier, 1994). Although there is still no complete consensus on what a skill really is, it is clear that it is related to expected and predictable outcomes from action, and has a multidimensional nature (Zarifian, 2009). This conception of a skill introduces the idea that a person can possess a skill without necessarily being competent (Geay, 1998). Having a skill and using it seem to be two different concepts, as proposed numerous times in the literature (Stroobants, 1993; Rope & Tanguy, 1994; Schwartz, 1997).

For many years, skills were seen as something to be acquired and executed, in a repeatable way. Those are the routine skills, as defined earlier. They can also be called hard skills. Focusing on routine skills seemed then to lead to satisfactory economic performance at the time. For many years, governments and organizations focused on routine skills, neglecting the development of context-related skills, requiring specific thinking and interactions based each time on unique sets of parameters. Technological evolutions created a rapidly changing environment, forcing organizations and workers to adapt, rendering a large part of existing knowledge and skills useless. This phenomenon was called skill obsolescence (Kaufman, 1974), and describes the moment when the knowledge and know-how possessed by a worker no longer enable him/her to perform well in his/her field.

Technology allowed many tasks to be automated decreasing drastically the need for dedicated workers (Frey & Osborne, 2013). On the other hand, non-routine tasks seem much harder and more expensive to automate. The more routine tasks are automated and the more complex the world becomes, the more non-routine tasks need to be addressed in the work environment. As opposed to hard skills, non-routine cognitive and interaction

skills are generally called soft skills. However, the concept of soft skill remains very vague, and does not define a precise set of skills or competencies. “21st century skills” refer to a recently proposed concept that has seen growing interest since the past twenty years. It is now widely used by international organizations, such as the Organization for Economic Cooperation and Development (OECD) and the World Economic Forum, to identify the critical skills required for individual performance in today’s world (OECD, 2017; WEF, 2016).

Several 21st-century-skill frameworks have been proposed and all share the same purpose: to identify a common set of vital skills for creating value and achieving self-fulfillment in a strongly digitalised economy. One of the first initiatives using the term “21st Century Skills,” was established in 2002 by Ken Kay and Diny Golder-Dardy, under the Partnership for 21st Century Skills. This project, better known today as P21, launched a model which has since become the reference point on this topic at the international level (Partnership for 21st century skills, 2008). This initiative was supported by tech giants (AOL, Cisco, Microsoft, Apple, Dell) and the US Department of Education. Having observed the impact of their own technology on society, culture and the workplace, these organisations became specially interested in the kind of skills, competencies and qualities humans may need in order to find a new role creating value alongside machines.

One of the other main initiatives, founded in 2008, is the Assessment and Teaching for the 21st Century Skills (ATC21S) project. Microsoft and Cisco financed this new initiative as well, joined by Intel, to explore different approaches to teaching and evaluating key competencies. OECD joined to prepare future evolutions of the worldwide Programme for International Student Assessment (PISA), used to assess educational attainment administered in OECD member and non-member countries. Often based on these two leading initiatives, some organizations and administrations proposed their own frameworks, such as the enGauge model (NCREL, 2003), the Seven Survival Skills, the Iowa Essential Concepts and Skills (Iowa Core, 2012) or the Connecticut Department of Education’s model. Table 1 shows the skills considered for

Table 1: Crosswalk of 21st Century Skills

| Ranking | Skill | Partnership for 21st Century Skills | Seven Survival Skills | engage | Iowa Essential Concepts and Skills | Connecticut Dept. of Ed | ATC21S |
|---------|---------------------------------------|---|--------------------------|--------|--|----------------------------|--------|
| 1st | Collaboration and teamwork | x | x | x | x | x | x |
| | Creativity, imagination | x | x | x | x | x | x |
| | Critical thinking | x | x | x | x | x | x |
| | Problem solving | x | x | x | x | x | x |
| 2nd | Flexibility and adaptability | x | x | x | x | x | |
| | Global and cultural awareness | x | | x | x | x | x |
| | Information literacy | x | | x | x | x | x |
| | Leadership | x | x | x | x | x | |
| 3rd | Civic literacy and citizenship | x | | | x | x | x |
| | Oral and written communication skills | | x | | x | x | x |
| | Social responsibility and ethics | | | x | x | x | x |
| | Technology literacy | x | | x | x | | x |
| | Initiative | x | x | x | x | | |
| 4th | Curiosity and inquisitiveness | | x | x | x | | |
| | Financial literacy | x | | | x | x | |
| | Health and wellness | x | | | x | x | |
| | Media literacy | x | | | | x | x |
| | Productivity | x | | | x | x | |
| 5th | Accountability | | | | x | x | |
| | Entrepreneurialism | x | x | | | | |
| | Information analysis | | x | | x | | |
| 6th | Basic literacy | | | x | | | |
| | Contextual learning | | | | | x | |
| | Environmental literacy | x | | | | | |
| | Interpersonal skills | | | | | x | |
| | Metacognition | | | | | | x |
| | Visualization skills | | | x | | | |

Note: Skills are ranked based on the frequency that they are found on the six skills lists examined in this report.

Source: Hanover Research, 2012

each of these 21st-century-skills framework.

Following their own path, Van Laar and other researchers (Van Laar, Van Deursen, Van Dijk & DeHaan, 2017) identified seven core skills and five contextual skills for success in the 21st century. The core skills are creativity, critical thinking, collaboration, communication, problem solving, technical and information management. The five contextual skills are flexibility, cultural awareness, ethical awareness, lifelong learning, and self-direction. However, the P21 framework has become the most

commonly used and accepted framework of 21st century skills, probably because of its widespread diffusion by OECD and the World Economic Forum.

The P21 framework of 21st century skills identifies twelve skills, divided into three categories. Four skills are identified as central in the framework: creativity, critical thinking, communication and collaboration, called the 4Cs, alongside three other literacy-focused skills: information literacy, information and communication technology literacy

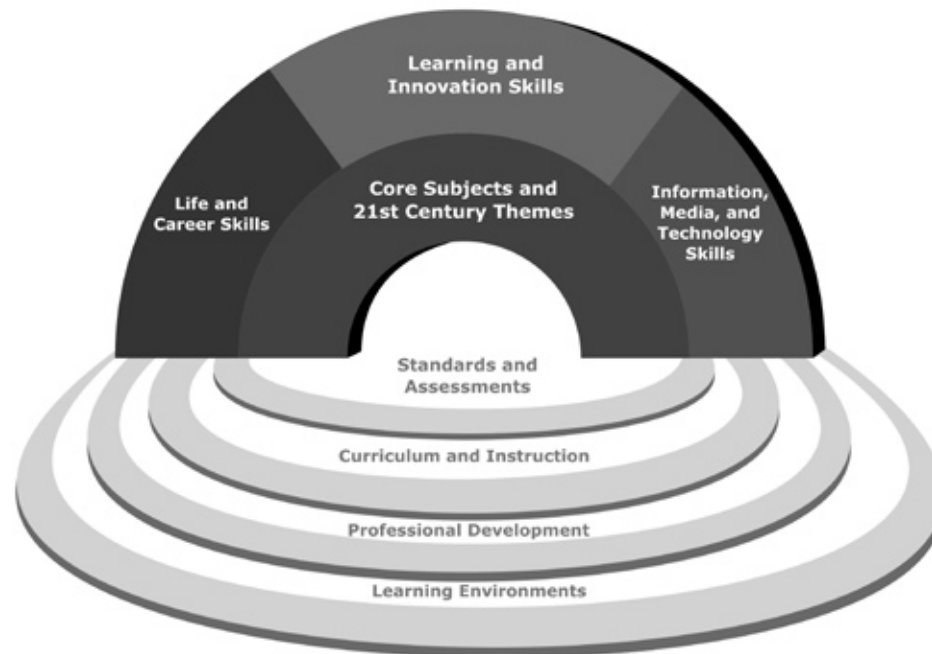


Figure 2: P21 Framework for 21st Century Learning

Source: Charles Fadel and Krishna Chaitanya Velaga, licence CC BY-SA 4.0

and media literacy. Interestingly, being creative, thinking in a critical manner, communicating and collaborating also seem to be those skills least susceptible to being computerised, at least in the short- or medium- term. These are followed by five life-skills linked to the day-to-day experiences of 21st century citizens: flexibility, initiative, social skills, productivity and leadership. As mentioned earlier, five complementary skills are sometimes associated with these via a fourth category aiming to regroup elements linked specifically to the core themes of our day and age: environmental literacy, global awareness, financial literacy, health literacy and civic literacy. The areas represented in the figure represent knowledge, expertise and skills people should master to succeed in life and work in the 21st century. The Learning & Innovation Skills (4Cs) are central and constitute the core of the framework. These skills enable the development of Life & Career Skills, as well as Information, Media & Technology Skills. The 21st Century themes provide relevant context to develop the 3 cited categories.

As we are focusing on the role of creativity in job performance, it is worth noting that there is a

consensus on the necessity to develop creativity to perform in the 21st century. However, before drawing conclusions regarding the role of creativity for job performance, it is worth exploring what creativity actually means, as it may help better understand in which aspects creativity is a key factor for success.

DEFINITION OF CREATIVITY

First, it is important to note that there is no full consensus on the definition of creativity. (see Parkhurst, 1999; Ferrari, Cachia & Punie, 2009). Looking at the main known origins, the noun creativity derives from the Latin *creatus*, which is related to production and growth. Creativity as a concept is mainly defined by the unusual, meaningful and transformative aspect of actions carried out to reach a result (Jackson & Messick, 1965; Runco & Jaeger, 2012). Runco & Jaeger (2012) propose a standard definition that creativity requires both originality and effectiveness, based on definitions from both recent and classic literature from the nineteenth and twentieth centuries. This consideration does not connote positively or negatively

the impact of creativity. Indeed, whereas creativity research is generally associated with the concept of individual or organisational performance, it can be noted that creativity may also present some negative impacts on performance, that are often missing or marginalized in studies about creativity (Kampylis, Panagiotis & Valtanen, 2010). Beyond the usual arguable drawbacks associated with individual creativity, such as lack of structure or focus, some studies pointed out the potential use of creativity for destructive, unethical or illegal purposes, also seen as the dark side of creativity (Clark & James, 1999; Cropley, Cropley, Kaufman & Runco, 2010; Kampylis, 2010; Runco, 2007; McLaren, 1999; Sternberg, 2010).

Although some cultural differences seem to exist (Trompenaars & Hampden-Turner, 1998; Starko, 2005; Craft, 2005), creativity is a process in which a transformation or a new production takes place (Amabile, 1988; Lubart & Thornhill-Miller, 2019; Stein, 1974; Sternberg & Lubart, 1995). Organisational culture and national culture are even described as the two main cultural aspects having an impact on creativity and innovation (Tian, Deng, Zhang & Samlador, 2018). Dimensions underlying creativity generally include originality and inventiveness, which can be summarized by a tendency to search for new solutions to problems. Divergent-exploratory thinking, which can be defined as the ability to think outside the box, with multiple rare and unusual concepts and convergent-integrative ability to establish uncommon links between concepts, far from social codes and norms, are both important in the creative process. Ultimately, creative people tend to have a growth mindset, using failure as a way of learning. Creative performance is evidenced through its achievements, such as products, ideas, or procedures that are novel, and potentially relevant or useful for the organisation. Novel means here unusual, unique, original, and contributing something new relative to existing ideas (Amabile, 1997; Csikszentmihalyi, 1996; Oldham & Cummings, 1996).

Creativity and innovation are even considered to be the foundation of organisations' competitive advantages, considering that creativity research focuses more on the generation of ideas, and innovation research on their concrete applications

(Acar, Tarakci & Knippenberg, 2019; Amabile, 1996; Amabile & Pratt, 2016; Anderson, Potočník, Bledow, Hülshager & Rosing, 2017; Damanpour, 1991). It seems then clear that creative performance embeds the effective translation of ideas into actions and results. Zhou and Hoever (2014) qualify creativity in the workplace as the result of a complex set of actor-context interactions. These interactions seem to be varied, such as synergistic interactions or antagonistic ones.

Creative ability depends on a variety of attributes, & requires a sophisticated multivariate approach to allow a better understanding (Mumford and Gustafson, 1988). For a more detailed approach of the main components of individual creativity, Sternberg and Lubart (1995) proposed such a multivariate model, with four main factors:

- A cognitive factor, referring to the ability to think and process information, either in a convergent or divergent way, to combine pre-existing concepts and solve problems in an original and efficient way.
- A conative factor, including personality traits, as some behaviors tend to facilitate and reinforce the creative process, such as tolerance for ambiguity or openness to experience and learning.
- An affective factor, specifying emotions, which may inhibit or exhibit our ideation process.
- An environmental factor, concerning people and objects we interact with, and which can stimulate our ability to associate or discover new concepts.

Creative performance in organisations however seems to depend on how well creativity and innovation are assessed and adopted (Zhou, Wang, Bavator, Tasselli & Wu, 2019). Zhou et al. identify an underlying pattern of four groups of factors: characteristics of target, creator, perceiver, and context. This echoes the multivariate aspect of creative performance in an organizational context, beyond the aspects of individual creativity. For an individual, creativity works generally well to solve problems that directly affect daily life. When creativity must be used to solve a problem outside this

perimeter, it requires empathy, and an ability to embrace the context without actually experiencing it. When used at a larger scale, creativity contributes to economic growth, as it is the case for intellectual property in organizations.

Creativity opens also the way for continuous improvement, to find more productive and efficient ways to use available resources. Thus, it seems quite obvious that creativity plays a crucial role for global economic performance in the long run (Artige & Lubart, 2016).

Using the critical incidents method (Flanagan, 1954; Bachet, Larcebeau, Ledoux, Léon, Leplat, Reuchlin & Valin, 1995), we identified the items that define behaviours associated with the 4Cs in a context of high workplace performance, as well as those in a context of low performance. Lamri (2019) examined the qualitative descriptors provided through the critical incidents' method, in a sample of managers, using a multidimensional scaling (MDS) approach. Four dimensions for creativity were identified in terms of workplace performance, with the following items:

- Dimension 1—Change orientation
 - Be sensitive to changes
 - Be open to changes
 - Be motivated to innovate
- Dimension 2—New idea generation
 - Have new ideas
 - Break away from conventions
 - Be original and still relevant
 - Have constructive ideas
 - Explore new leads
 - Do not give up easily
- Dimension 3—Action orientation
 - Be interested in results
 - Take initiatives
- Dimension 4—Solution orientation
 - Propose solutions
 - Solve problems
 - Have relevant ideas

CREATIVITY AND JOB PERFORMANCE

In the context of value creation in the workplace, performance relates to the ability to manage successfully operations and processes to obtain the

expected result. Performance implies then an action and its successful result for value creation. In contrast, the failure to get results, leading to absence or insufficiency of value creation could define non-performance (Malleret, 1994; Bourguignon, 1997). Job performance relates generally to skill levels or productivity (Benson, Finegold & Mohrman, 2004). Creative performance in such a context would refer to the use of a creative process to reach results. In modern organizations, it seems that job performance requires more and more flexibility (Bennett & Lemoine, 2014). It is interesting to underline the contrast in the time frames for creativity assessment at the individual or team level versus the organizational level (West & Richter, 2008). Indeed, the assessment of creativity outcomes in teams of novelty and utility for success focus generally on short time frames when examining the individual level. However, at the organizational level, creativity rather refers to innovation and large-scale implementation of creative ideas, which is assessed over the long-term. Whereas at the individual level, creativity has been considered as an indicator of job performance for a long time (Welbourne, Johnson & Erez, 1998), the ability to use creativity to innovate has become increasingly critical for organisations to survive and thrive in a fast-changing economy.

As problems become more complex, it is critical to develop the skills that allow innovation both individually and collectively, to maintain competitiveness (Fukugawa, 2006). Engagement in the creative process correlates with job performance in complex jobs, but also with professional experience (Zhang & Bartol, 2010). Creativity as presented in P21's Framework for 21st Century Learning is actually a core component of students' academic and career success (Amabile, 1988; Craft, 2005; Torrance, 1972). In addition to personal ability and motivation, professional environments and contextual factors seem to have a significant influence on the level of creative performance (Agars, Kaufman, Deane & Smith, 2012). They may impact the general organization of work, optimizing people's schedule with the possibility to allocate significant time for reflection and project engagement, where creative ideas may actually be implemented, and lead to actual performance. It is important to note

that employees have the potential to work creatively at all hierarchical levels of an organization, and in different areas of activity (Oldham & Cummings, 1996; Zhou & Shalley, 2003). Day-to-day activity in complex jobs may, however, create an overwhelming environment, with a great number of interactions and problems to solve. This may make it harder to both find the clarity of mind to engage in a creative process, and also the time to implement the ideas.

Engaging in a creative process at work can be seen as a way to challenge the status quo, to introduce changes in routines and known processes (Yoon, Sung & Choi, 2015). In this context, the organizational structure may be a significant environmental factor impacting creative performance in the workplace. However, in their literature review, Yoon, Sung and Choi showed that potential extrinsic rewards for creative performance only have an impact when workers actually show intrinsic motivation and commitment to engage in a creative process. Promoting social interactions and collaboration in objectives and processes may be a way to enable creative performance for success (Wisman, 2000). Notably, in order to benefit the organization, collaborative creative performance needs to focus on collaborative excellence (Shalley, Litchfield & Gilson, 2018). This requires an adaptation of the work environment, such as privileging collaboration over competition. It seems that the relationship between the work environment and creative performance is not simple, and may depend on more intrinsic aspects of workers to play a role, which requires further investigation (Hunter, Bedell & Mumford, 2007; Madjar, Greenberg & Chen, 2011).

Beyond these aspects, the notion of control seems to be the primary factor identified as an inhibitor for creativity (Oldham & Cummings, 1996; Amabile, 1998), although few empirical studies about the link between creativity and control were actually conducted (Oldham & Cummings, 1996; McLean, 2005; Sundgren, Dimenas, Gustafsson & Selart, 2005). Existing research seems to conclude that the more control there is, the less freedom is possible for creativity in task execution. Freedom can be simplified here as the possibility to decide what to do or how to do it (Amabile, 1997; Zhou, 1998; Isaksen & Ekvall, 2010). Research

shows that creativity emerges more easily when people have this type of freedom, as they are able to organize their actions according to their own goals and interests (Zhou, 1998; Oldham & Cummings, 1996). The development of ideas can be impeded if requirements and processes are too rigid, and creative ideas may emerge from the flexible use of resources, as this stimulates experimentation and variation (Carmeli & Schaubroeck, 2007; Agars et al., 2012).

Depending on the specificity of the environment, and the profile of individuals, different types of creativity may be privileged. In their study, Madiar et al. (2011) tried to identify the relevant parameters in the workplace, and in workers' behaviors, that would encourage workers to engage in a creative process. Two forms of creative activity were identified: incremental and radical creativity. Incremental creativity represents a way to adapt the processes through minor changes, whereas radical creativity allows more significant changes and impact. However, both types are linked, because repeated incremental changes may lead to radical ones.

To encourage one or the other of these types of creativity, the authors identified the main drivers such as career commitment, the impact of sense-making, the presence of creative co-workers, willingness to take risks, and the actual values promoted by the company. If the presence of creative co-workers seems to promote incremental creativity, the willingness to take risks and the values of the company seem to benefit radical creative performance. On the contrary, conformity to processes and culture would seem to discourage workers from engaging in creative performance, especially radical creative performance. Along with the willingness to take risks, openness to experience is a core component of creative minds, with a direct impact on individuals' intrinsic motivation to learn new things (Minbashian, Earl & Bright, 2012). The more open people are, the more willing they tend to be to learn and acquire new skills. They tend also to search actively for new things in their environment, and seem to be more engaged in their work, making more effort to tackle issues. In particular, openness to experience, may foster performance maintained over time.

West and Richter (2008) suggest that different types of creativity may be useful depending on the organizational objectives, and that one or the other may be privileged by the type of creative leadership. As an example, they explain that directive creative leadership may be better suited for large scale and long-term innovations, whereas facilitative creative leadership may be more adapted to situations where short-term creative solutions at smaller magnitudes may be required.

LINKS BETWEEN CREATIVITY AND THE OTHER 4CS FOR JOB PERFORMANCE

The 21st Century Skills 4Cs seem to be increasingly used and cited in the literature, and each of these 4Cs has been the subject of extensive studies and interest. However, interrelationships between the 4Cs are poorly described in the literature, as is their joint role in job performance (Lamri, Ahmadi, Besançon, Stankov, Lee & Lubart, 2020). Also, although a certain mastery of creativity appears to be a necessary condition for outstanding job performance, it also appears not to be a sufficient condition, showing that other skills need to be associated for effective performance (Lamri & Lubart, 2019). We conducted a study using the Necessary Condition Analysis approach, to understand the interrelationships between all 4Cs in job performance for executives and managers in France. NCA is an approach that is useful to determine the necessary but not sufficient conditions for a phenomenon (Dul, 2016). 94 people were assessed by former work colleagues or managers regarding their professional performance: 49 of them were considered as high achievers, the 45 others were considered as low achievers. For each of them, the assessors had to rank their mastery score for each of the 4Cs on a 7-point scale from 1 (low) to 7 (high) mastery. The assessors were chosen from diverse professional backgrounds in terms of job categories and industry sectors.

Concerning creativity, a first finding of the study was to show the difference in the average score of mastery between the low performing group ($M = 1.98$; $SD = 1.34$), and the high performing group ($M = 5.57$, $SD = 1.15$). The mean creativity score in the high performing group is almost three times

higher compared to the mean in the low performing group. This difference is statistically significant, $t(94) = 13.94$, $p < .0001$. However, creativity alone could not explain high performance. A main finding was that a mastery score of at least 3 out of 7 on creativity is a necessary but not sufficient condition for job performance. This means that high performance cannot be achieved whenever the creativity score is lower than 3 out of 7, and it also means that other factors necessarily are involved to make performance possible.

Also, it is interesting to note that low performance could be explained with one factor, whereas high performance needed at least two factors to be explained. Another conclusion of the study was to show that a sum of at least 13 in the mastery scores of 4Cs is necessary but not sufficient to explain high performance. This means that a high mastery score in creativity but not in any other 4Cs could not alone lead to high performance. This result points to the joint relationships of the 4Cs for job performance. However, to understand better the links to performance between creativity and the other 4Cs, it is useful to explore further their definition and composition.

The literature considers critical thinking as the ability to mobilize a specific set of mental processes, in order to make decisions, learn new things, and solve problems (Halpern, 2003). More precisely, critical thinking implies inductive reasoning as well as deductive reasoning, both from available knowledge, facts and data. Analysis, inference and judicious assessment complete the set of these mental processes (Abrami, Bernard, Borokhovsky, Waddington, Wade & Persson, 2015). Critical thinking is generally associated with personality traits such as openness to experience, flexibility and curiosity in giving value to alternative opinions (Abrami, Bernard, Borokhovski, Waddington & Persson, 2015; Facione, 1990). From all the 21st century skills frameworks shown in the literature, critical thinking is the only one which is systematically included in the essential set of skills, and its' impact on performance is widely proven (Greiff & Killonen, 2016; Kuncel, Rose, Ejiogu & Yang, 2014).

Creativity is the second most present skill in 21st century skills frameworks. Both of them are

considered to be key skills for the future, as they both play a major role in complex problem solving (Wechsler et al., 2018; Trilling & Fadel, 2009; Lau, 2011). Both critical thinking and creativity are associated with the concept of intelligence (Corazza & Lubart, 2021; Sternberg, 1986; O'Hare, 2012), and particularly with rational intelligence when dealing with the creation of mental models in systems thinking, and with the creation of unforeseen connections between concepts and ideas (Senge, 1999). Critical thinking and creativity have been associated several times in the literature, mainly because they involve related complex cognitive abilities (Glassner & Schwarz, 2007; Hayes, 1989). Both skills seem quite interdependent for effective problem solving (Halpern, 2003; Wechsler et al., 2018; Kivunja, 2015).

Communication, a third "C," is important for the smooth transmission of information, which naturally contributes to productivity and commitment in the workplace (Meyer & Herscovitch, 2001). Actually, communication in the workplace has been considered a key individual skill for more than fifty years (Crockett, 1965; Beatty & Paine, 1984). With non-routine tasks gaining more and more importance, so do interactions. Also, with people interacting increasingly through digital tools, communication skills have become critical to facilitate collective achievements in organisations. In this context, communication can be seen as a complex socio-cognitive skill which allows the exchange of information with other people. In other words, it is the ability of a transmitter to adapt to a given context and faithfully deliver a message to a receiver (Barrett, 2006). Decker (1989) characterizes the communication process in terms of four main stages: transmission of the message, reception of the message, understanding the message, and feedback formulation. There are several ways to exchange information. Beyond the typical verbal and written communication modes, para-verbal, nonverbal and mediated communication can be cited as other ways to exchange information between two individuals (Adler, Rosenfeld & Proctor., 2010). It seems that quality communication requires shared information, clarity, and also balance in the dialogue between participants (Mohr, Fisher & Nevin 1996). Also, the quality of speaking

and active listening seem to be essential prerequisites for performance and success (Morreale, Osborn & Pearson, 2000).

The link between creativity and communication in effective performance is not strongly made in the literature. However, when communication is seen as a way to educate, create and negotiate with others, as well as an enabler for leadership and career success (Michelman, 2009), it seems clear that communication can sometimes involve a creative process to generate new ideas, and find new ways to make people understand a message. Effective communication may be used for individual purposes as well as collective purposes. Even if creativity and communication may appear to be linked conceptually, they require further study to specify their joint relationship in job performance.

Beyond communication stands collaboration. When people communicate, they do not necessarily collaborate. However, it is hard to think of a collaboration process with no communication whatsoever. Indeed, collaboration relies on communication skills, and can be defined as its combination with negotiation, decision making, problem solving and conflict resolution (Lai, 2011). Collaboration in the workplace appears to be one of the most critical challenges for organisations. Indeed, with the increasing complexity of problems, solutions become harder to generate for single, isolated individuals (Vygotsky, 1978). The socio-constructivist vision developed by Vygotsky seems more and more accurate in the 21st century. Effective collaboration results from a voluntary action based on a need or a desire to collaborate, and therefore requires specific values and attitudes (Rojas-Drummonda & Mercer, 2003). Successful collaboration involves the awareness by participants of common objectives, and the engagement in unbiased discussions about the goal to be reached. It requires also intrinsic motivation from participants to reach the common objectives, as well as self-awareness, awareness of others and awareness of the context. It is important to underline that collaboration is not the opposite of individualism or competition, as all three may coexist in a group.

Collaboration and creativity are not often studied together in the literature, as interdependent skills (however, see Sawyer, 2017). A key topic for

research concerning collaboration has often been the quality of interactions between team members. However, even if collaboration and creativity are quite different skills, collaboration has the potential to foster creativity, when breaking the status quo to reach a common goal. In this context, it may allow organizations to innovate and become more efficient and productive (Fukugawa, 2006). Collaborative creativity, which has been a study topic for decades, is generally supported by formal techniques such as brainstorming or design thinking (Wylant, 2008). Such techniques may be adapted for physical and online use, having both different advantages and inconveniences (Hilliges, Terrenghi, Boring, Kim, Richter & Butz, 2007). However, techniques alone do not allow creative performance within a group, as this seems to require a specific mindset for participants, with a supporting motivational context, and effective cognitive and social processes. Indeed, team members need to coordinate efficiently and effectively, and must share and select their respective knowledge and ideas. It appears that it may take significant training and experience for successful creative collaboration to happen (Paulus, Dzindolet & Kohn, 2012), which is why groups using collaborative creativity may underperform.

Creativity and critical thinking are often associated in the literature, as are communication and collaboration. At a surface level, this seems logical as creativity and critical thinking refer to thinking abilities, whereas communication and collaboration relate more to social, personality and emotional abilities. Of course, each of 4Cs is not unidimensional, and therefore all of them share several common elements, to a specific extent for each pair. And even if there seems to be a split between creativity and critical thinking versus communication and collaboration, recent literature shows that performance can be predicted using self-beliefs, which suggests an underestimated link between cognitive attributes and personality attributes (Lee & Stankov, 2018). The existing literature indicates that creativity can be linked to each of the other 4Cs, directly or indirectly, to facilitate performance. Within the 4Cs, studies show as well that other pairs of Cs may be linked to performance, such as communication and critical thinking (Metallinos, 1992; Allen,

Berkowitz, Hunt & Loudon, 1999), or communication and collaboration (Price, 1991; Grace, 1996).

DISCREPANCIES IN STUDIES LINKING CREATIVITY TO PERFORMANCE

The literature indicates generally a positive relationship between creativity and performance, but there is no definitive consensus. Indeed, significant variability may be observed from one study to another. The multidimensional structure of creativity makes it a complex construct to study, as its expression may differ based on several criteria such as expertise, age, nationality (Sternberg & Lubart, 1995).

Furthermore, creativity may be a somewhat different concept depending on the context, and still called creativity. As an example, Kaufman and Beghetto (2009) distinguish in their model at least four concepts of creativity: creativity used in the learning process, called mini-c; creativity used for everyday life situations, called little-c; creativity related to professional activities, called pro-c; and eminent creativity, called Big-C. The expression of creativity may also differ for a given person, depending on the activity. For example, some people may show radical creativity in their personal lives, whereas they will only display incremental creativity in their day-to-day job.

Finally, the way creativity is assessed may have a strong impact on the observed link with performance. Both creativity and performance are generally assessed on a declarative basis, either from individuals themselves, or from the declarations of their managers or peers. There is a well-known limit in the objectivity of self-report assessment techniques. In general it is difficult to isolate the specific contribution of creativity to performance, but also it is difficult to compare studies using different types of assessments, as creativity is not perceived the same way depending on the nature of the assessment tools used.

In general, many criteria may be used as performance measures which challenge as well the identification of creativity-related effects to determine the isolated role of creativity (Greiff & Kyllonen, 2016).

CONCLUSIONS

Research indicates that creativity and job performance correlate positively. However, there is no definitive conclusion at this stage. The complexity of assessing both creativity and performance in an objective way seems to be a hurdle for both researchers and human-resource professionals. Based on the current literature, it is clear, however, that even if creativity may be a necessary condition for high performance, it is not a sufficient one, as one or several of the other 4Cs must be present.

This article shows from the literature that the link between creativity and job performance is more complex than it seems at first. Indeed, creative performance seems to depend on both intrinsic and extrinsic parameters, with extrinsic parameters having a differential impact across individuals. People perceive creativity in a variety of ways, and also perceive performance in various ways. They perceive it in different ways based on the values and culture promoted by the organization where they work. However, it is useful to note that even if several conditions are required for creative performance, people will most likely not engage in a creative process if the environment does not encourage it. In this way, promoting creativity at work may be seen as a key enabler that is an obvious starting point for any human resource management policy to favor creativity.

This statement may also stand for the promotion of the other 4Cs. A work environment that would promote creativity, critical thinking, communication and collaboration would not only enable the expression of each of these 4Cs, but it may also enable an increase in performance caused by the synergies between all 4Cs. The literature seems to validate the interdependence of two or more of 4Cs for effective performance, which opens up an interesting debate about the possibility to develop fully and use one of the 4Cs without considering any of the other 4Cs. Although the complex interactions between the 4Cs for effective performance need to be studied in more detail, they may prove to be much more interdependent than expected when examining their individual contribution to performance, which leads to taking these four skills together to develop them in the 21st

century. Indeed, further studies of interactions between the 4Cs may help to understand better the circumstances under which creativity is most supportive of workplace performance.

BIBLIOGRAPHY

- Abrami, P. C., Bernard, R. M., Borokhovsky, E., Waddington, D. I., Wade, C. A. & Persson, T. (2015). Strategies for teaching students to think critically. *Review of Educational Research*, 85, 171-204.
- Acar, O. A., Tarakci, M. & Knippenberg, D. (2019). Creativity and Innovation Under Constraints: A Cross-Disciplinary Integrative Review. *Journal of Management*, 45, 96-121. 10.1177/0149206318805832.
- Adler, R. B. Rosenfeld, L. B. & Proctor, R. F. (2010) *Interplay. the process of interpersonal communication*. New York, Oxford University Press.
- Agars, M. D., Kaufman, J. C., Deane, A. & Smith, B. (2012). Fostering individual creativity through organizational context: A review of recent research and recommendations for organizational leaders. In M. C. Mumford (Ed.), *Handbook of organizational creativity*, 271-291. San Diego, CA: Academic Press.
- Allen, M. & Berkowitz, S., Hunt, S. & Loudon, A. (1999). A meta-analysis of the impact of forensics and communication education on critical thinking. *Communication Education*, 18-30.
- Amabile, T. M. (1988). A model of creativity and innovation in organizations. *Research in Organizational Behavior*, 10, 123-167.
- Amabile, T. M. (1996). *Creativity in context*. Boulder, CO: Westview Press.
- Amabile, T. M. (1997). Motivating Creativity in Organizations: On Doing What You Love and Loving What You Do. *California Management Review*, 40(1), 39-59.
- Amabile, T. M. & Pratt, M. G. (2016). The dynamic componential model of creativity and innovation in organizations: Making progress, making meaning. *Research in Organizational Behavior*, 36, 157-183.
- Anderson, N., Potočník, K., Bledow, R., Hülsheger & U., Rosing, K. (2017). *Innovation and Creativ-*

- ity in Organizations.
- Antonczyk, D. & Fitzenberger, B. (2009). Can a Task-Based Approach Explain the Recent Changes in the German Wage Structure? *Journal of Economics and Statistics*, 229(2-3), 214-238.
- Archibugi, D. & Lundvall, B. (2002). *The Globalizing Learning Economy*. Oxford University Press. Retrieved from <http://econpapers.repec.org/bookchap/oxpobooks/9780199258178.htm>
- Artige, L. & Lubart, T. (2016). Economic perspectives on creativity. In M. A. Runco & S. Pritzner (Eds), *Encyclopedia of creativity*. New York: Academic Press.
- Bachet, F., Larcebeau, S., Ledoux, V., Léon, A., Leplat J., Reuchlin M. & Valin E. V. (1995). Psychologie appliquée. *L'année psychologique*, 55(1), 486-487.
- Barrett, D. J. (2006). Strong Communication Skills a must for today's leaders. *Handbook of Business Strategy*, 385-390. Emerald.
- Beatty, M. J. & Payne, S. K. (1984). Listening comprehension as a function of cognitive complexity: A research note. *Communication Monographs*, 51, 85-89.
- Bennet, N. & Lemoine, J. (2014). What VUCA really means for you. *Harvard Business Review*, 92, No. 1/2.
- Benson, G. S., Finegold, D. & Mohrman, S. A. (2004). You Paid for the Skills, Now Keep Them: Tuition Reimbursement and Voluntary Turnover. *Academy of Management Journal*, 47(3), 315-331.
- Bourguignon, A. (1997). Sous les pavés la plage...ou Les multiples fonctions du vocabulaire comptable: l'exemple de la performance. *Compabilité-Contrôle-Audit*, tome 3, 1, 89-101.
- Carmeli, A. & Schaubroeck, J. (2007). The Influence of Leaders' and Other Referents' Normative Expectations on Individual Involvement in Creative Work. *Leadership Quarterly*, 18, 35-48.
- Clark, K. & James, K. (1999). Justice and positive and negative creativity. *Creativity Research Journal*, 12(4), 311-320.
- Corazza, G. & Lubart, T. (2021). Intelligence and creativity: Mapping the Space-Time continuum. *Journal of Intelligence*, 9(1), 1-27.
- Craft, A. (2005). *Creativity in schools: tensions and dilemmas*. London; New York: Routledge.
- Crockett, W. H. (1965). Cognitive complexity and impression formation. In B. A. Maher (Ed.), *Progress in experimental and social psychology*, Vol. 2. New York: Academic Press.
- Cropley, D. H., Cropley, A. J., Kaufman, J. C. & Runco, M. A. (Eds). (2010). *The Dark side of creativity*. New York: Cambridge University Press.
- Csikszentmihalyi, M. (1996). *Creativity*. New York: HarperCollins.
- Damanpour, F. (1991). Organizational innovation: A meta-analysis of effects of determinants and moderators. *Academy of Management Journal*, 34, 555-590.
- De Montmollin, M. (1984). *L'intelligence de la tâche, éléments d'ergonomie cognitive*. Berne, Peter Lang.
- Decker, B. (1989). *How to communicate effectively*. London: Kogan Page.
- Dul, J. (2016). Necessary Condition Analysis (NCA): Logic and Methodology of "Necessary but Not Sufficient" Causality. *Organizational Research Methods*, 19(1), 10-52.
- Facione, P. A. (1990). *Critical thinking: A statement of expert consensus for purposes of educational assessment and instruction-The Delphi report*. Millbrae, CA: California Academic Press.
- Ferrari, A., Cachia, R. & Punie, Y. (2009). Innovation and Creativity in Education and Training in the EU Member States: Fostering Creative Learning and Supporting Innovative Teaching—*Literature review on Innovation and Creativity in E&T in the EU Member States (ICEAC)*. Luxembourg: Office for Official Publications of the European Communities.
- Flanagan, J. C. (1954). The critical incident technique. *Psychological Bulletin*, 51, 327-358.
- Fox, S. (2016). Leapfrog skills: Combining vertical and horizontal multi-skills to overcome skill trade-offs that limit prosperity growth. *Technology in Society*, 47, 129-139.
- Frey, C. B. & Osborne, M. (2013). The Future of Employment: How susceptible are jobs to computerization?, University of Oxford working paper, Oxford Martin Programme on Technology and Employment.
- Fukugawa, N. (2006). Determining factors in

- innovation of small firm networks: a case of cross industry groups in Japan. *Small Business Economics*, 27, 181-193.
- Geay, A. (1998). *L'école de l'alternance*. Paris, Editions L'Harmattan, 194.
- Glassner, A. & Scwharz, B. B. (2007). What stands and develops between creative and critical thinking? Argumentation? *Thinking Skills and Creativity*, 2-1, 10-18.
- Grace, W. (1996). Values, vision, voice, virtue: The 4 'V' model for ethical leadership development. Paper presented at the Annual International Conference of the National Community College Chair Academy, Phoenix, AZ.
- Greiff, S. & Kyllonen, P. (2016). Contemporary Assessment Challenges: The Measurement of 21st Century Skills. *Applied Measurement in Education*, 29(4), 243-244, DOI: 10.1080/08957347.2016.1209209.
- Halpern, D. F. (2003). Thinking critically about creative thinking. In M. A. Runco (Ed.), *Perspectives on creativity research. Critical creative processes*, 189-207. Cresskill, NJ, US: Hampton Press.
- Hanover Research (2012). A Crosswalk of 21st Century Skills. Accessed May, 22nd 2018: <http://www.hanoverresearch.com/wp-content/uploads/2011/12/A-Crosswalk-of-21st-Century-Skills-Membership.pdf>.
- Hayes J. R. (1989). Cognitive Processes in Creativity. In Glover J. A., Ronning R. R. & Reynolds C. R. (Eds.), *Handbook of Creativity. Perspectives on Individual Differences*. Springer, Boston, MA.
- Hilliges, O., Terrenghi, L., Boring, S., Kim, D., Richter, H. & Butz, A. (2007). Designing for collaborative creative problem solving. *C&C '07: Proceedings of the 6th ACM SIGCHI conference on Creativity & cognition*, 137-146.
- Hunter, S. T., Bedell, K. E. & Mumford, M. D. (2007). Climate for creativity: A quantitative review. *Creativity Research Journal*, 19, 69-90.
- Iowa Core (2012). K-12 21st Century Skills, Essential Concepts and Skills with Details and Examples. Accessed online on March 29th 2019: https://iowacore.gov/sites/default/files/k-12_21stcenturyskills.pdf.
- Isaksen, S. G. & Ekvall, G. (2010). Managing for Innovation: The Two Faces of Tension in Creative Climates. *Creativity and Innovation Management*, 19(2), 73-88.
- Jackson, P. W. & Messick, S. (1965). The Person, the Product, and the Response: Conceptual Problems in the Assessment of Creativity. *Journal of Personality*, 33(3), 309-29.
- Kampylis, P. (2010). Fostering creative thinking—The role of primary teachers. *Jyväskylä Studies in Computing*, 115. Jyväskylä, Finland: University of Jyväskylä.
- Kampylis, Panagiotis & Valtanen, Juri. (2010). Redefining Creativity—Analyzing Definitions, Collocations, and Consequences. *Journal of Creative Behavior*, 44, 191-214. 10.1002/j.2162-6057.2010.tb01333.x.
- Kaufman, H. G. (1974). *Obsolescence & Professional Career Development*. Amacom.
- Kaufman, J. C. & Begheto, R. A. (2009). Beyond Big and Little: The Four C Model of Creativity. *Review of General Psychology*, 13(1), 1-12.
- Kivunja, C. (2015). *Teaching, Learning and Assessment: Steps towards Creative Practice*. Melbourne: Oxford University Press.
- Kuncel, N. R., Rose, M., Ejiogu, K. & Yang, Z. (2014). Cognitive ability and socio-economic status relations with job performance. *Intelligence*, 46, 203-208.
- Lai, E. R. (2011). Collaboration: A Literature Review, Pearson. Retrieved from <http://ed.pearsonassessments.com/hai/images/tmrs/Collaboration-Review.pdf>.
- Lamri, J. (2017). *Relationship between 21st Century Skills and Executives and Managers Professional Performance*. Paris, University of Paris Dissertation.
- Lamri, J. & Lubart, T. (2019). Professional performance based on 21st Century Skills: Necessary Conditions Analysis (NCA). *International Journal of Creativity & Problem Solving*, 29(1), 5-16
- Lamri, J., Ahmadi, N., Besançon, M., Stankov, L., Lee, J. & Lubart, T. (2020). 21st Century Skills: How performance is linked to creativity, critical thinking, communication and cooperation. Pre-print article.
- Lau, J. Y. (2011). *An Introduction to Critical Thinking and Creativity*. New York, John Wiley & Sons.

- Le Boterf, G. (2008). *Repenser la compétence*, Eyrolles, Éditions d'Organisation, Paris.
- Lee, J. & Stankov, L. (2018). Non-cognitive predictors of academic achievement: Evidence from TIMSS and PISA. *Learning and Individual Differences*, 65, 50-64.
- Levy, F. & Murnane, R. J. (2004). *The new division of labor: how computers are creating the next job market*. Princeton University Press.
- Levy, F. & R. Murnane. (2013). Dancing with robots: Human skills for computerized work. Report. Retrieved from: <http://content.thirdway.org/publications/714/Dancing-With-Robots.pdf>.
- Ljungvist, L. & Sargent, T. J. (1998). The European Unemployment Dilemma. *Journal of Political Economy*, 106, 514-550.
- Lubart, T. & Thornhill-Miller, B. (2019). Creativity: An overview of the 7 C's of creative thought. In R. J. Sternberg & J. Funke (Eds.), *The psychology of human thought: An introduction*. Heidelberg: Heidelberg University Press.
- Madjar, N., Greenberg, E. & Chen, Z. (2011). Factors for Radical Creativity, Incremental Creativity, and Routine, Noncreative Performance. *Journal of Applied Psychology*, 96, 730-743.
- Malleret, V. (1994). Du contrôle de gestion au management de la performance. In *Les Professeurs du Groupe HEC, L'École des rnanagers de demain*, Économica, avec le concours de la Fondation HEC, collection Gestion, 121-143.
- McCain, T. & Jukes, I. (2001). *Windows in the future: education in the age of technology*. Corwin Press.
- McLaren, R. B. (1999). The dark side of creativity. In M. A. Runco & S. R. Pritzker (Eds.), *Encyclopedia of Creativity*, 483-491. San Diego, CA: Academic Press.
- McLean, L. D. (2005). Organizational Culture's Influence on Creativity and Innovation: A Review of the Literature and Implications for Human Resource Development. *Advances in Developing Human Resources*, 7(2), 226-246.
- Metallinos, N. (1992). Cognitive factors in the study of visual image recognition standards, Paper presented to the Annual Conference of the International Visual Literacy Association, Pittsburgh, PA.
- Meyer, J. & Herscovitch, L. (2001). Commitment in the Workplace: Toward a General Model. *Human Resource Management Review*, 11, 10.10 16/S1053-4822(00)00053-X.
- Michel, S. & Ledru, M. (1991). *Capital compétence dans l'entreprise*. éditions ESF.
- Michelman, B. (2009). Effective communication: the key to career success and great leadership. *Journal of Healthcare Protection Management: publication of the International Association for Hospital Security*, 25(1), 9-13.
- Minbashian, A., Earl, J. & Bright, J. E. H. (2012). Openness to experience as a predictor of job performance trajectories. *Journal of Applied Psychology*, 62(1), 112.
- Mohr J. J. , Fisher R. S. & Nevin J. R. (1996) Collaborative Communication in Interfirm Relationships. *Journal of Marketing*, 60(3), 103-115.
- Morreale, S. P., Osborn M. M. & Pearson J. C. (2000). Why Communication is Important: A Rationale for the Centrality of the Study of Communication. *Journal of the Association for Communication Administration*, 29, 1-25
- Mumford, M. D. & Gustafson, S. B. (1988). Creativity syndrome: Integration, application, and innovation. *Psychological Bulletin*, 103, 27-43.
- North Central Regional Educational Laboratory (2003). EnGauge 21st Century Skills: literacy in the digital age. Accessed online on March 29th 2019: https://www.researchgate.net/publication/234731444_enGauge_21st_Century_Skills_Digital_Literacies_for_a_Digital_Age.
- O'Hare, L. (2012). Measuring Critical Thinking, Intelligence, and Academic Performance in Psychology Undergraduates. *The Irish Journal of Psychology*, 30(3-4), 123-131.
- OECD (2017). *PISA 2015 Results (Volume V): Collaborative Problem Solving*. PISA, OECD Publishing, Paris. <http://dx.doi.org/10.1787/9789264285521-en>.
- Oldham, G. R. & Cummings, A. (1996). Employee Creativity: Personal and Contextual Factors at Work. *Academy of Management Journal*, 39(3), 607-634.
- Parkhurst, H. B. (1999). Confusion, lack consensus, and the definition of creativity as a construct. *Journal of Creative Behavior*, 33, 1-21.
- Parlier, M. (1994). La compétence au service d'objectifs de gestion, dans Minet, F., Parlier M., et

- De Witte, S. (Eds.), *La compétence. Mythe, construction ou réalité ?*, 91-108. Paris, L'Harmattan.
- Partnership for 21st century skills (2008). *21st century skills education & competitiveness: A resource and policy guide*. Tuscon, AZ: Partnership for 21st Century Skills.
- Paulus, P. B., Dzindolet, M. & Kohn, N. W. (2012). Collaborative Creativity-Group Creativity and Team Innovation. *Handbook of Organizational Creativity*, Academic Press, 327-357.
- Price, J. P. (1991). Effective communication: A key to successful collaboration. *Preventing School Failure*, 35, 25-28.
- Rojas-Drummonda, S. & Mercer, N. (2003). Scaffolding the development of effective collaboration and learning. *International Journal of Educational Research*, 39(1-2), 99-111.
- Rope F. & Tanguy, L. (1994). *Savoirs et compétences. De l'usage de ces notions dans l'école et dans l'entreprise*. Paris: L'Harmattan.
- Runco, M. A. (2007). *Creativity-Theories and themes: research, development, and practice*. Amsterdam; Boston: Elsevier Academic Press.
- Runco, M. A. & Jaeger, G. J. (2012). The standard definition of creativity. *Creativity Research Journal*, 24(1), 92-96
- Sawyer, K. (2017). *Group creativity: The creative power of collaboration* (2nd Ed.). New York: Basic books.
- Schwartz, Y. (1997). Les ingrédients de la compétence: un exercice nécessaire pour une question insoluble. *Éducation Permanente*, 133.
- Senge, P. (1999). *The Fifth Disciple: The Art and Practice of the Learning Organization*. Adelaide: Griffin Press.
- Shalley, C. E., Litchfield, R. C. & Gilson, L. L. (2018). 20 years later: Organizational context for team creativity. In R. Reiter-Palmon (Ed.), *Team creativity and innovation*, 167-194. Oxford: Oxford University Press.
- Starko, A. J. (2005). *Creativity in the classroom: schools of curious delight* (3rd ed.). Mahwah, NJ: L. Erlbaum Associates.
- Stein, M. I. (1974). *Stimulating creativity: individual procedures*. New York: Academic Press.
- Sternberg, R. J. (1986). *Critical thinking: Its nature, measurement, and improvement*. Washington, DC: National Institute of Education. Retrieved from <http://eric.ed.gov/PDFS/ED272882.pdf>.
- Sternberg, R. J. (2010). The dark side of creativity and how to combat it. In D. H. Cropley, J. C. Kaufman, A. R. Cropley & M. A. Runco (Eds.), *The dark side of creativity*. New York: Cambridge University Press.
- Sternberg, R. J. & Lubart, T. I. (1995). *Defying the crowd: Cultivating creativity in a culture of conformity*. New York Free Press.
- Stroobants, M. (1993). *Savoir-faire et compétences au travail. Une sociologie de la fabrication des aptitudes*. Bruxelles, Éditions de l'Université.
- Sundgren, M., Dimenäs, E., Gustafsson, J. E. & Selart, M. (2005). Drivers of Organizational Creativity: A Path Model of Creative Climate in Pharmaceutical R&D. *R&D Management*, 35(4), 359-374.
- Tian, M., Deng, P., Zhang, Y. & Salmador, M. P. (2018). How does culture influence innovation: A systematic literature review. *Management Decision*, 56, 1088-1107. DOI 10.1108/MD-05-2017-0462.
- Torrance, E. P. (1972). Un résumé historique du développement des tests de pensée créative de Torrance. *Revue de Psychologie Appliquée*, 22(4), 203-218.
- Trilling, B. & Fadel, C. (2009). *21st Century Skills: Learning for Life in Our Times*. San Francisco, CA: Jossey-Bass.
- Trompenaars, F. & Hampden-Turner, C. (1998). *Riding the Waves of Culture*. New York: McGrawHill.
- Van Laar, E., Van Deursen, A., Van Dijk J. & De Haan, J. (2017). The relation between 21st-century skills and digital skills: A systematic literature review. *Computers in Human Behaviour*, 72, 577-588.
- Vygotsky, L. (1978). Interaction Between Learning & Development. In Gauvain & Cole (Eds.), *Readings on the Development of Children*, New York: Scientific American Book, 34-40.
- Wechsler, S., Saiz, C., Rivas, S., Vendramini, C., Almeida, L., Mundim, M. & Franco, A. (2018). Creative and critical thinking: Independent or overlapping components? *Thinking Skills and Creativity*, 27. 10.1016/j.tsc.2017.12.003.
- Welbourne M., Johnson D. & Erez A. (1998). The

- Role-Based Performance Scale: Validity Analysis of a Theory-Based Measure. *Academy of Management Journal*, 41, 540-555.
- West, M. A. & Richter, A. W. (2008). Climate and cultures for innovation and creativity at work. In: J. Zhou & C. E. Shalley (Eds.), *Handbook of Organizational Creativity*, 211-236. New York: Lawrence Erlbaum.
- Wisman, J. D. (2000). Competition, Cooperation, and the Future of Work. *Peace Review, A Journal of Social Justice*, 12(2), 197-203.
- World Economic Forum (2016). The Future of Jobs, 2016. Retrieved from http://www3.weforum.org/docs/WEF_Future_of_Jobs.pdf.
- Wylant, B. (2008). Design thinking and the experience of innovation. *Design Issues*, 24(2), 3-14.
- Yoon, H., Sung, S. & Choi, J. (2015). Mechanisms underlying creative performance: Employee perceptions of intrinsic and extrinsic rewards for creativity. *Social Behavior and Personality: An international journal*, 43, 1161-1180.
- Zarifian, P. (2009). *Le travail et la compétence: entre puissance et contrôle*. Éditions PUF.
- Zhang, X. & Bartol, K. M. (2010). The influence of creative process engagement on employee creative performance and overall job performance: a curvilinear assessment. *Journal of Applied Psychology*, 95(5), 862-873.
- Zhou, J. (1998). Feedback Valence, Feedback Style, Task Autonomy, and Achievement Orientation: Interactive Effects on Creative Performance. *Journal of Applied Psychology*, 83(2), 261-276.
- Zhou, J. & George, J. M. (2003). Awakening Employee Creativity: The Role of Leader Emotional Intelligence. *Leadership Quarterly*, 14(4-5), 545-568.
- Zhou, J. & Hoever, I. J. (2014). Research on workplace creativity: A review and redirection. *Annual Review of Organizational Psychology and Organizational Behavior*, 1, 333-359.
- Zhou, J. & Shalley, C. E. (2003). Research of Employee Creativity: A Critical Review and Direction for Future Research. *Research in Personnel and Human Resources Management*, 22, 165-217.
- Zhou, J., Wang, X. M., Bavator, D., Tasselli, S. & Wu, J. (2019). Understanding the receiving side of creativity: A multidisciplinary review and implications for management research. *Journal of Management*, 45, 2570-2595. DOI: 10.1177/0149206319827088.

Dr. Jeremy Lamri is Head of Research and Innovation at JobTeaser, France. Email: jeremylamri@gmail.com
 Dr. Todd Lubart is professor of Psychology at University of Paris, France. Email: todd.lubart@u-paris.fr