SKILLS FOR LIFE

Fostering Creativity

IDB Inter-American Development Bank

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The policy brief draws on the work from a CERI project on Fostering and Assessing Creativity and Critical Thinking in Education (Vincent-Lancrin et al., 2019).

Abstract

In an age of innovation and digitalization, creativity has become one of the most valued skills in the labor market. This brief shows how policymakers and teachers can empower students to innovate and improve their education by developing students' creativity. After defining creativity, the paper shows how the concept can be translated into teacher-friendly rubrics to support them to design or redesign better lessons but also to assess their students. Lastly, the brief highlights 10 concrete steps for policymakers, school principals, and teachers to better prepare students for the future and improve the quality of their education. While applied to the fostering and assessing of students' creativity, those 10 steps can be generalized to the implementation of other forms of educational innovation, notably to implement competency-based curricula.

1. Why creativity matters

Creativity has become a key component of the skill set that people should develop to have better prospects in the labor market as well as a better personal and civic life. This mainly relates to the increasing importance of and reliance on innovation in most economies, but also relates to job prospects and the complexity of social problems in our digital age.

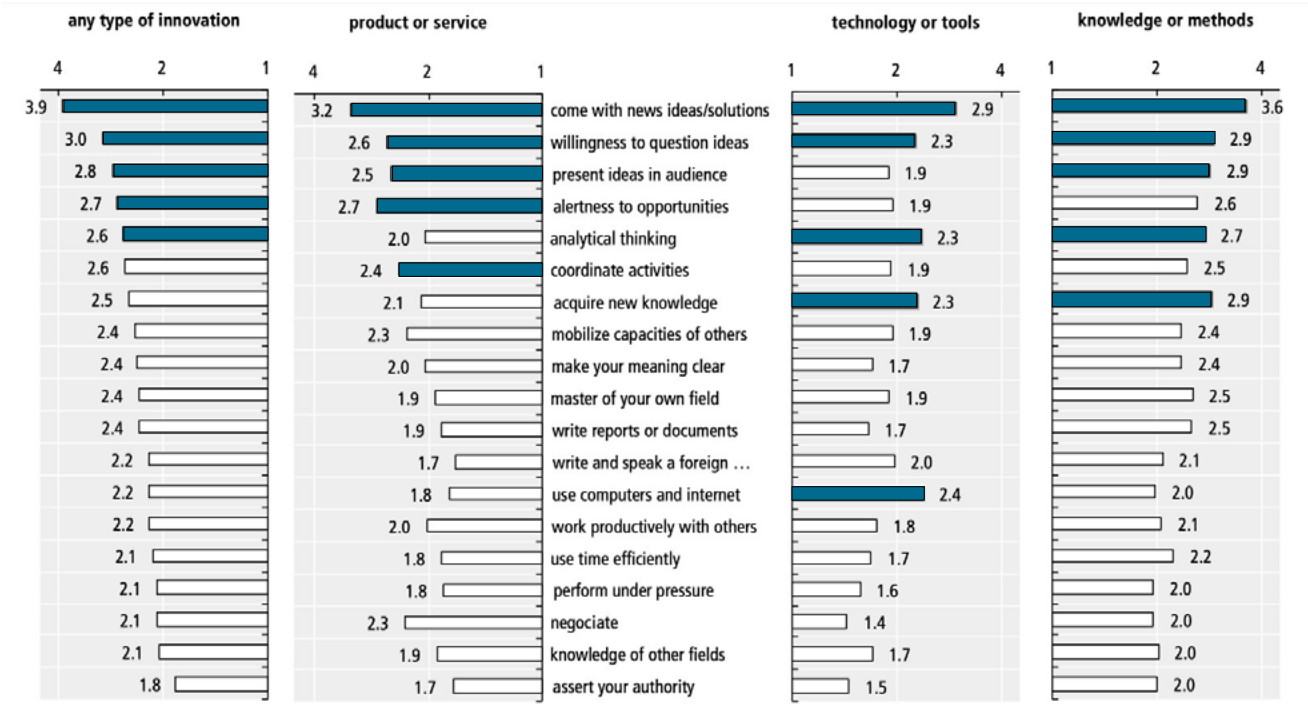
Skills for innovation

Creativity is a necessary skill for innovation. Innovation policy typically emphasizes the role of science, technology, engineering, and mathematics (STEM) in innovation, the role of entrepreneurship, and the role of advanced higher education degrees, such as doctorates. For example, Avvisati et al. (2013) showed that tertiary education graduates from all fields of study do contribute to innovation in the labor market. They analyzed two international surveys of tertiary education graduates (Research into Employment and professional Flexibility [Reflex] and Higher Education as a Generator of Strategic Competences [Hegesco]) covering 19 European countries and Japan, and defined a highly innovative job as a job contributing to the innovation process in an organization that is at the forefront of absorbing innovation. It is only regarding innovative products or technologies that engineers, scientists, and mathematicians tend to be more likely to contribute to the innovation process compared to their peers in other domains. In knowledge and process innovation, all graduates contribute almost equally to innovation.

Avvisati et al. (2013) demonstrated that creativity represents a crucial ingredient of innovation (alongside other skills, such as critical thinking). Avvisati et al. (2013) identified some specific skills that matter for innovation at the individual level across fields of study. Specifically, they identified the most critical skills for innovation that distinguish 'innovators' from 'non-innovators' by comparing the (self-reported) job requirements of highly innovative and non-innovative jobs. The critical skills that distinguish innovators from non-innovators the most are creativity ('come up with new ideas and solutions') and critical thinking (the 'willingness to question ideas'), followed by communication ('present ideas to the audience'), entrepreneurship ('alertness to opportunities'), 'analytical thinking,' 'ability to coordinate activities,' and the 'ability to acquire new knowledge' (see Figure 1). On average, with all types of innovation combined, innovators are about four (3.9) times as likely as non-innovators to say that creativity is a very important skill to perform their job. These innovation skills matched widely-held assumptions about individual skills for innovation, and they are triangulated in an analytical way to overcome social desirability bias.

Figure 1. Critical skills for the most innovative jobs, by type of innovation

Tertiary-educated workers who contribute to their organization's innovation activities face higher skill requirements than non-innovative graduates

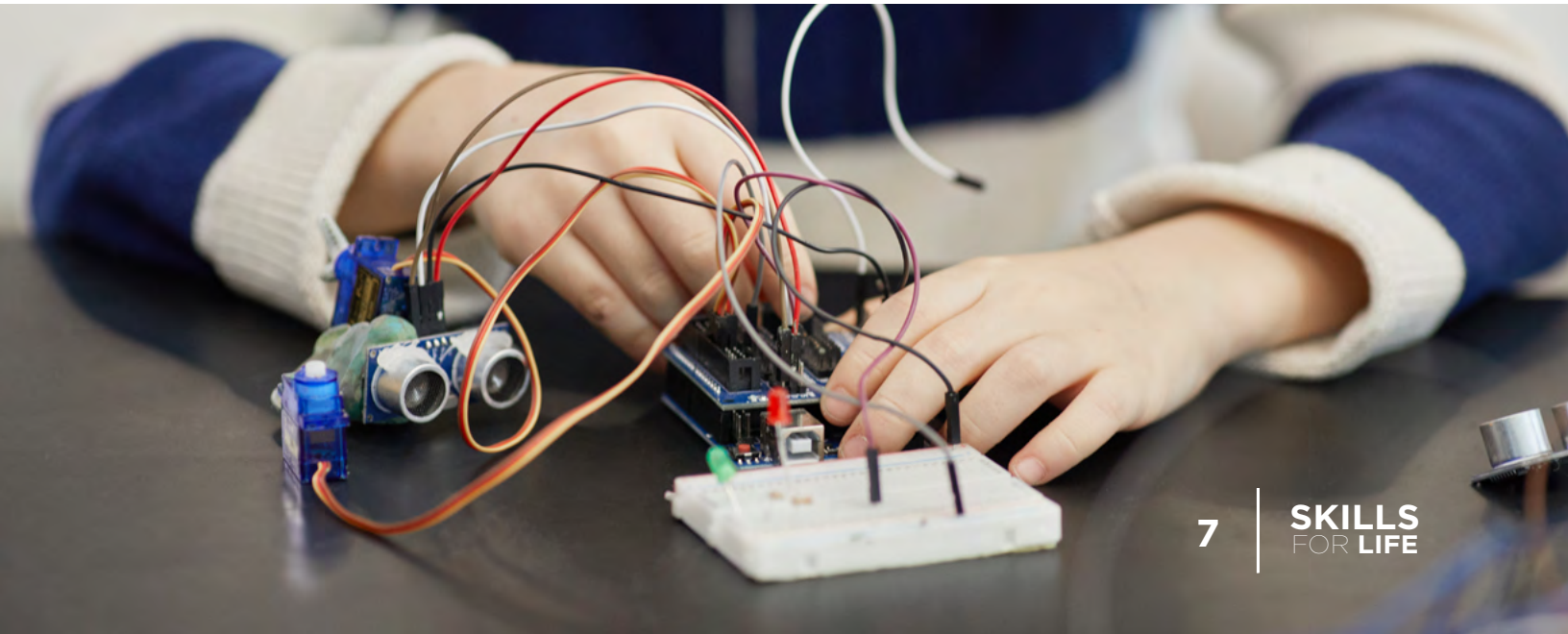


Source: Avvisati et al. (2013). Authors' calculation. Based on Reflex and Hegesco. Odds ratios correspond to the likelihood of mentioning the skill as required for workers in innovative jobs, compared to workers in non-innovative jobs. Generalized odds ratios are computed from logistic regressions controlling for country and sector of activity. The five most critical skills are highlighted in blue for each type of innovation.

Skills for innovation

Creativity is one of the most in-demand skills in the labor market, in response to digitalization and automation. The development of artificial intelligence, robotics, and the globalization of OECD societies have led many observers and media to speculate on the future of jobs (Baldwin, 2019; OECD, 2019a, 2019b). Will some jobs disappear from OECD economies and be outsourced to countries where workers receive comparatively lower compensation? More fundamentally, will a large share of the jobs performed by human beings be automated and performed by different types of computers (notably robots and AI-supported agents)? According to recent OECD estimates, 14% of jobs in the OECD area are at risk of being completely automated, while another 32% is likely to change significantly (OECD, 2019c). While this is unlikely to lead to fewer jobs for humans, there will be a significant cost to adjust to these changes. Chief Executive Officers and Chief Human Resource Officers of multinational and large domestic companies that answered the Future of Job survey of the World Economic Forum (WEF) identified creativity among the top 10 most important skills in the labor market in 2018, ranking it as the 10th most demanded skill ("analytical thinking and innovation" and "complex problem solving" being first and second, and critical thinking, third). They forecast creativity to become the 3rd most demanded skill in 2022 (WEF, 2018).

Other reports using different methodologies also point in the same direction (Accenture, 2018; Bughin et al., 2018; Petrone, 2019a, 2019b). All in all, there seems to be a consensus that creativity will become more important in professional life, and in much higher demand in the labor market in the decades to come, inter alia as a result of the ongoing automation of many roles in a more digital economy.



Creativity for personal and social wellbeing

Creativity can contribute to individuals' wellbeing and democratic societies. At the social level, many domestic and international issues require creativity in order to be solved in an agreeable way. These include finding solutions to global challenges, such as climate change or pandemics.

At the individual level, creativity is at the top of Bloom's taxonomy for its level of complexity and demand in teaching and learning (under the term "create"). Creativity can create the feeling of focus and well-being, according to positive psychologists. Csikszentmihalyi (1990; 1996) famously described the state of flow that often comes with creativity, and, generally challenging tasks. Flow refers to a state, in which people are so involved in an activity that nothing else seems to matter; the experience is so enjoyable that people will continue to do it even at great cost, for the sheer sake of doing it (Csikszentmihalyi, 1990).

Csikszentmihalyi and Schneider (2000) showed that these optimal moments can be experienced by adolescents in school when they perform certain learning tasks.

Additionally, Schneider et al. (2020) showed that this experience can support learning, as good curricular materials can induce optimal learning moments. One particularity of the flow analysis is that it represents well-being in the moment, rather than as an enduring state of happiness. Research on creativity has also focused on other types of association between creativity and well-being, usually understood as positive emotional states. Research showed that positive affects enhance creativity, but that everyday creativity also creates positive effects that are likely to be sustained in the days following its occurrence. Thus, psychologists increasingly argue that creative moments in one's everyday life contribute to people's and society's well being (Conner et al., 2017; Kaufman, 2018; Perach & Wisman, 2019; Richards, 2010).

2. Defining creativity

In the economic and labor market contexts presented above, creativity generally refers to 'coming up with new ideas and solutions.' Creativity is about producing new business solutions, companies, and technical solutions. It is also about producing great new songs, books, scientific theories, TV series, food, and others. Creativity can manifest itself in all domains, and all societies have emblematic and recognized creative entrepreneurs, scientists, artists, architects, chefs, and others.

Origin and definitions

There is a long-standing interest in creativity in the western world. While it was initially related to religion and the creation of the world, since the Romantic era the emphasis has shifted to individual creativity (e.g., Nietzsche). However, individual creativity has not always been socially valued. The mastery of technical skills was seen more as an imitative model than as creativity. Still, the narrative threads of the novel My Name is Red (Pamuk, 2001) highlights that excellence in imitative mastery can only be recognized if there is some level of creativity in the imitation, one that only the other masters or experts will notice.

Creativity has been studied from different perspectives (Steiner, 2001), yet most of the current creativity research arguably comes from the field of psychology. Accordingly, many definitions of creativity exist. Treffinger et al. (2002) analyzed 120 definitions and noted that they agree on the main features of creativity. Studies on creativity focus on the person, product, and process (Runco, 2004; Glaveanu, 2011); come from a variety of theoretical lenses (Sternberg and Lubart, 1999; Runco, 2007); and include more or less emphasis on the social environment or context in which creativity happens (Csikszentmihalyi, 1996; Amabile, 1996]; Florida, 2002/2012).

Sternberg and Lubart (1999) proposed a simple definition of creativity: "Creativity is the ability to produce work that is both novel (i.e., original, unexpected) and appropriate (i.e., useful, adaptive concerning tasks constraints" (p. 3). Appropriateness recalls that creativity happens within a system or context with its standards and constraints; it is not just about doing something new. As Dennett (2013) put it:
Being creative is not just a matter of casting about for something novel – anybody can do that, since novelty can be found in any random juxtaposition of stuff – but of making the novelty jump out of some system, a system that has become established, for good reason (p. 45).

People sometimes refer to creativity as thinking out of the box, acknowledging that creative ideas or actions are assessed against a box, and may indeed stretch or violate the system in an appropriate way – either changing the borders of the box or creating a new one.

A popular variant is to define creativity as the production of something novel and valuable. We prefer the neutrality of the word appropriate (or effective, as per Runco and Jaeger [2012]) to valuable, because it better differentiates innovation and creativity — two concepts that are closely related, and sometimes used interchangeably. In economics, innovation refers to the introduction of a creative product or process that has a market value contributing to a firm or country's economic performance (Yusuf, 2009). While creativity requires social confirmation, with external authorities or experts agreeing on whether the creative product or process can be deemed original and appropriate (Amabile, 1996; Csikszentmihalyi, 1996), it does not require market viability. One can easily agree that inventors are creative, even though their inventions may fail to become commercially viable. Creative people may fail to get their creations widely adopted, even though their peers acknowledge their creativity. By definition, innovators are supposed to push their innovations to the market and have a certain level of social success.

This distinction between creativity and innovation matters in an educational context, where creativity should not be measured against commercial or social value. In this case, teachers (and possibly the learners' peers) are the experts, who recognize the novelty and appropriateness of the solution. The degrees of creativity can also vary. Some productions can be considered as novel to the world, to a given society, or to a given people. In education, one would generally expect that creativity is not about being new to the world, but just new to the student or going beyond what could be expected of them. Anyone can be creative at a certain level.

Everyone can become more creative (to some degree)

Sternberg and Lubart (1995) debunked the myth that only gifted or exceptional people can be creative. Most writers on creativity have claimed the same, and Csikszentmihalyi has introduced the idea of a little-c (ordinary) and big-C (exceptional) creativity to emphasize the idea that anyone can be creative in everyday life. Any skill can be performed at differing levels of virtuosity, and while the greatest creators show what outstanding creativity looks like, people can produce things at different levels of creativity (Csikszentmihalyi, 1996; Craft, 2001). As (at least most) other skills, creativity is not binary, but a continuum that can be experienced at different levels of proficiency.

Several authors of books on creativity base their theories on the biographies or interviews of successful creative people, who have created something novel that has become part of the world culture (i.e., scientific, artistic, technological, etc.) (e.g., Csikszentmihalyi [1996]; Gardner [1993]), such as Einstein, Feynman, Turing, Skłodowska-Curie, Beckett, Borges, Proust, Monk, Billie Holiday, Charlie Parker, Louise Bourgeois, Hepworth or Chanel. This may give the impression that only extraordinary people can be creative. However, it should be noted that most of these people spent years of practice in their field to gain expertise and master it. Furthermore, perhaps coincidentally, many psychologists who have worked on creativity have also worked with gifted or precocious students, adding to the tendency to associate creativity with giftedness. In fact, rather than limiting giftedness to a high intelligence quotient, the idea should be broadened to include creativity in various areas.

Clarifying that creativity can be expressed by anyone at different levels of proficiency matters for teachers, students, and parents. In educational contexts, limiting creativity to the great creators admired by humankind is limiting, and nurtures a set rather than a growth mindset (Dweck, 2006). Children and adolescents are unlikely to equal exceptional creators. Instead, they can gradually develop their creativity, as is the case for all other skills they acquire as they grow up. Some of them will eventually be added to the list of admired creators.

Creativity as a cognitive process

Emphasizing both process and output, Lubart (2000) defined creativity as "a sequence of thoughts and actions that leads to novel, adaptive production." What is this sequence? Creativity research has explored the cognitive processes involved in creativity. Guilford (1950) emphasized two processes leading to creativity: divergent thinking (generating many ideas) and convergent thinking (choosing and developing a good one). Torrance (1970), distinguished four aspects of the creativity process: fluency (having many relevant ideas), flexibility (having different types of relevant ideas), originality (having statistically novel ideas), and elaboration (being able to elaborate one's ideas). Most standardized tests of creativity or creative potential (e.g., tests by Torrance, Wallach-Kogan, Guilford, Getzel Jackson, Mednick or Runco) decompose the creative process along similar focuses on some of its aspects. The test of creative potential used within the OECD project assessed the divergent-exploratory and convergent-integrative skills of students (see Lubart et al., 2011).

Beyond these aspects usually assessed by tests of creative potential, scientific research on creativity has decomposed the creative process into a series of human skills. Building on some of the categorization proposed by Lucas, Claxton, and Spencer (2013), Vincent-Lancrin et al. (2019) summarized the macro-processes they involve under the following headings: inquiring, imagining, doing, and reflecting.

Inquiring. One of the dimensions of the creative cognitive process is close to scientific inquiry. Torrance (1966) highlights the importance of identifying problems, gaps in knowledge, missing knowledge, and elements in the creative process. Creativity cannot happen without knowledge about the field or problem investigated; thus, looking for information, finding the problem, and understanding its different possible dimensions constitute one of the important aspects of the creative process. This can take different forms depending on the problem — from feeling and empathizing with people (possibly customers) to a more objective approach of observing, describing, and analyzing from different possible perspectives what the issues and problems at stake are. Curiosity and unconventional connections between different knowledge and problems matter in the creative inquiry process.

Imagining. Imagination refers to the ability to see and play with ideas and things in one's mind. This exercise allows people to break away from conventional reality and pursue novel ideas and invent new stories, anticipate the future, pursue different scenarios, envision counterfactuals, simulate consequences of different ideas and solutions, etc. In the context of creativity, imagination is about a free and playful generation of ideas, theories, and assumptions, with a certain level of intentionality. This can take the form of an independent generation of multiple ideas or the association of ideas, either by seeing actual or sometimes metaphorical connections (Mednick, 1962; Runco, 2009). Being able to push ideas to their limits, or to explore unconventional ideas or even seemingly absurd ideas without much actual risk, constitute one of the cognitive processes that creativity may involve.

Doing. Creativity implies the creation of something novel and appropriate, based on one's inquiry and imagination. This is typically the convergent or integrative part of the creative process. This output production can take different forms based on the domain: it can be a product, a performance, an idea, a physical or mental model, etc. It implies the selection of some of the ideas that have been imagined and inquired, and thus some level of reflection and audacious decision making to meet the two main aspects of creativity. While products can be associated with the final stage of the creative process, the creative process can also include a tinkering process of trial and error, or the development of prototypes and models at different stages of the process.

Reflecting. Finally, intentionality and reflection are key aspects of creativity. Intentionality distinguishes creativity from random novelty, and sometimes from small children's spontaneity. The level of intentionality and reflection can vary with age, but also with one's level of creative proficiency. As noted above, reflection also occurs at different stages of the creative process as one decides which ideas to select and how to move forward.

While these different aspects of creativity do not necessarily come in a definite order, or are solicited at different points in the creative process, they can easily be related to the Design Thinking method. The Design Thinking method codifies the innovation or creativity process and aims to turn it into art (Kelley, 2001). For educational purposes, the d.school at Stanford University summarized the innovation process in five steps that can be looped: empathize, define, ideate, prototype, and test.

Creativity as a disposition

Finally, some researchers looked at creativity as specific personal attitudes or dispositions. Therefore, creativity is sometimes associated with a social and emotional (or behavioral) skill. Psychologists have studied attitudes that are associated with being more creative. Csikszentmihalyi (1996) attributes ten personality traits to outstandingly creative people, portrayed as: 1) physically energetic, with a taste for rest and quietness; 2) smart and naïve; 3) playful and responsible; 4) full of imagination and fantasy but rooted in reality; 5) both introvert and extravert; 6) humble and proud; 7) more sensitive and less gender-stereotyped; 8) both traditional and conservative and rebellious and iconoclast; 9) both passionate and objective about their work; 10) both suffering and enjoying more than others. According to him, creative people are characterized by contrasting personality traits, rather than a clear set of traits. Recent research on personality traits (usually measured by the Big Five model) and creativity theoretically and empirically associated the trait of openness to experience as a disposition for creativity (McCrae, 1987).

Summary

In sum, creativity is a sequence of thoughts and actions that produces something that knowledgeable people in a domain recognize as original and appropriate in a certain context. In a few instances, social confirmation can come late, as the peers or knowledgeable people could not or did not want to accept the truth or beauty of what was created; it was recognized well after the death of the creator. But those are relatively rare cases that can arguably be ignored when the focus is education.

Creativity can be relative, and in an educational context, teachers may be those knowledgeable people seeing that some product is original and appropriate (for a student of a certain age and knowledge). Examples of creative actions include producing or proposing something significantly different from existing solutions, producing or proposing something significantly different from what one has done before, and finding an unusual way to solve a given problem. Conversely, while they are valuable in many other ways, the following actions are not creative: reproducing something someone or oneself has done (although this may require being very skilled, and is a strong way of learning and acquiring mastery), finding the solution to a complex problem in a usual way, producing something novel but inappropriate, or producing something that one finds novel but nobody else does.

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Figure 2. Creativity

3. Teaching creativity

Using conceptual rubrics to be intentional in developing creativity

Overall, researchers share a common understanding on the key dimensions of creativity presented in the previous section, such as novelty and appropriateness, fluency and convergence-integration. However, transferring the concept to a consistent educational application requires further translation. This is where rubrics intervene.

Rubrics are a way to simplify, translate, and construct a social representation of what creativity looks like in the teaching and learning process. They aim to create a shared understanding of what creativity means in the classroom, and shared expectations among teachers, and among teachers and students. The function of rubrics is to simplify big concepts to make them relevant to teachers and learners in their actual educational activities. Rubrics are a metacognitive tool that helps make learning visible and tangible, and teaching intentional. Different types of rubrics serve different purposes. Conceptual rubrics are those that merely clarify what counts or what teachers and students should particularly keep in mind.

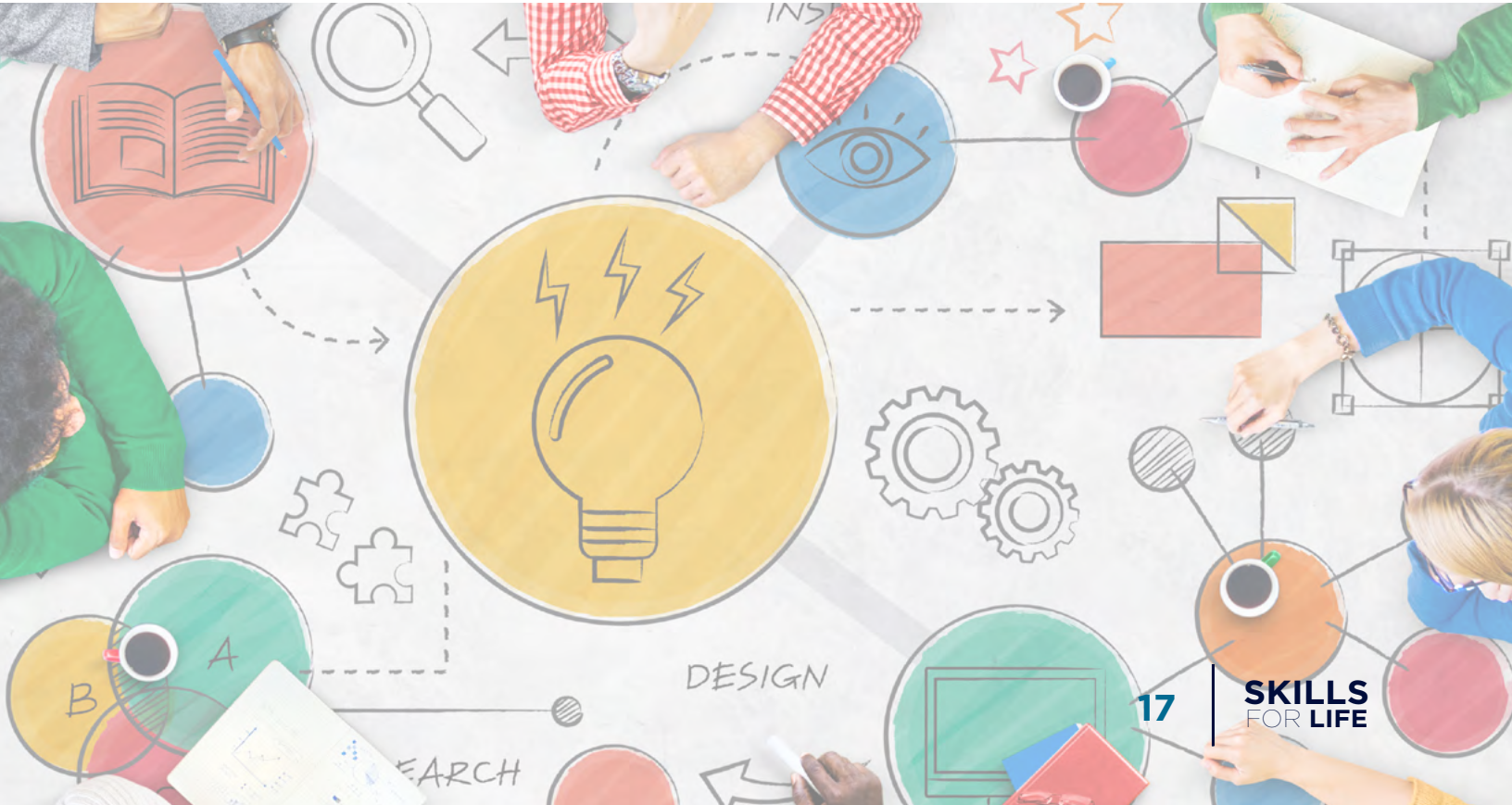


Table 1. OECD rubrics on creativity (domain-general, comprehensive, and class-friendly)

	COMPREHENSIVE (Coming up with new ideas and solutions)	CLASS-FRIENDLY (Coming up with new ideas and solutions)
INQUIRING	• Feel, empathize, observe, describe relevant experience, knowledge, and information • Make connections to other concepts and ideas, integrate other disciplinary perspectives	• Make connections to other concepts and knowledge from the same or other disciplines
IMAGINING	• Explore, seek and generate ideas • Stretch and play with unusual, risky, or radical ideas	• Generate and play with unusual and radical ideas
DOING	• Produce, perform, envision, prototype a product, a solution, or a performance in a personally novel way	• Produce, perform or envision a meaningful output that is personally novel
REFLECTING	• Reflect and assess the novelty of the chosen solution and its possible consequences • Reflect and assess the relevance of the chosen solution and its possible consequences	• Reflect on the novelty of the solution and of its possible consequences

Note: This rubric is meant for teachers/faculty use to identify the student skills related to creativity that they have to foster in their teaching and learning, not for assessment. Each column is usually presented alongside the "critical thinking" rubric in the same "comprehensive" or "class-friendly" format.

As part of its project on "Fostering creativity and critical thinking in education", the OECD worked with teachers and school networks in 11 countries to develop rubrics and other supporting materials through a quick prototyping process (Vincent-Lancrin et al., 2019). Two domain-general conceptual rubrics were developed: a comprehensive rubric and a class-friendly rubric. Domain-specific adaptations of those rubrics were also developed. Table 1 shows the comprehensive domain-general rubric (first column), and class-friendly domain-general rubric (second column) for creativity. A portfolio of domain-specific rubrics (for science, math, language art, music, and visual arts) was also developed.

Depending on the subject and the other learning outcomes that teachers want to achieve, using a conceptual rubric while designing a lesson helps teachers to build in it some assignments or tasks that help students to develop at least some of the sub-skills of creativity (or critical thinking). Some lessons may just develop a few sub-skills, while others could cover the full range. Existing lessons could be modified according to the same process — just adding one opportunity to develop a sub-skill here and there, thanks to small changes or pedagogical delivery. For example, teachers may include a brainstorming session about the topic of the lesson before they start getting into it (imagining). They can include something practical that will allow students to try out something original for them (e.g., a presentation, an object, a text), and ensure students have a chance to be creative and do not only focus on an assessment of their content knowledge (doing).

The conceptual rubrics also represent a key element of a quality assurance method. After decomposing their lessons or entire course or project into steps, teachers can identify when students were given the possibility or were asked to practice some of the skills identified in the rubric. Examples of lesson plans developed during the project include a mapping of the different steps of the lesson against the sub-skills of the conceptual rubrics. This is a way to quality assure the components of the lesson against the learning goals of the rubric and a reflective process: for example, one may ask oneself when do I give students the space to make connections with other ideas or things they know? (inquiring).

The OECD rubrics were meant to be used by teachers working in real-life settings in various ways: 1) designing and revising lesson plans to allow students to develop their creativity (and critical thinking); 2) assessing student work and progression in the acquisition of these skills; and 3) generating newly aligned rubrics adapted to their local context or self-assessment tools.

The fieldwork showed that seven in ten teachers participating in the international network did use the OECD rubrics for those purposes. The rubrics proved useful and adoptable in most of the countries in which the project was implemented, despite most teachers having no prior practical knowledge of rubrics.

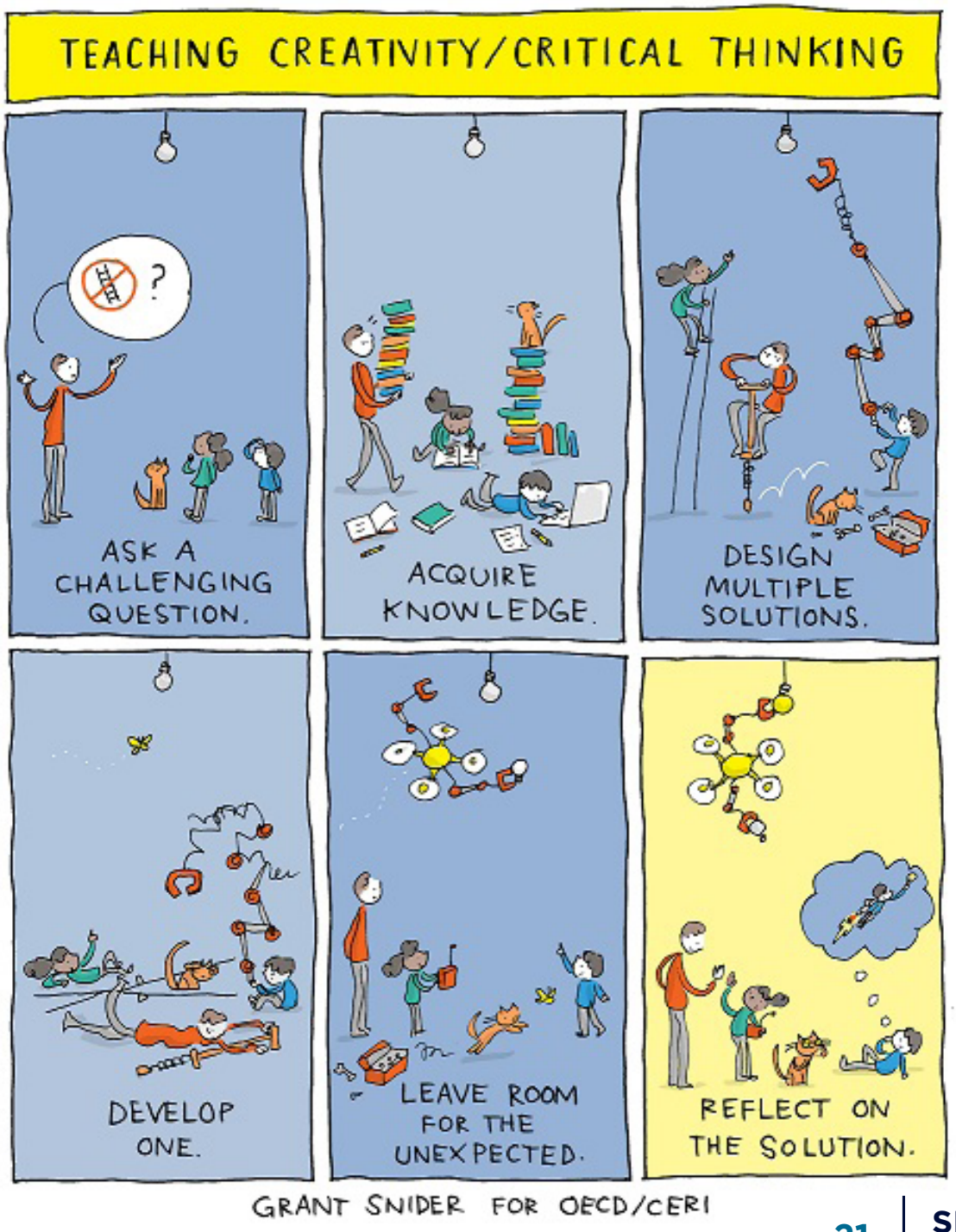
Designing lesson plans to include creativity as a learning objective

The conceptual rubrics presented above can help teachers review their curriculum units and plan lessons that give students opportunities to develop the sub-skills identified by the rubrics. However, they do not guide all key dimensions of the pedagogy. While creativity can be nurtured in any domain, it requires giving students certain types of tasks and problems.

Thus, a set of design criteria was developed to support teachers further. The criteria are based on learning science principles, including motivation, cognitive activation, self-regulation, and opportunities for formative assessment (see Table 2 and Figure 3 for a free adaptation). These design criteria for good lesson plans represent another set of quality checks and a new perspective on how to approach pedagogical redesign to foster students' creativity. Their development stems from fieldwork and the analysis of teachers' lessons by peer teachers, pedagogues, and experts. They are based on the best examples of lesson plans, so they provide an additional checklist to the rubrics (Vincent-Lancrin et al., 2019).

The design criteria highlight that tasks to develop and then demonstrate creativity in education share some general features. Specifically, these tasks seek to engage students, and may have a deliberate open nature. Also, these tasks encourage students to explore multiple solutions to problems within parameters and constraints that clarify goals, yet remain relatively flexible to allow students to address them with a certain level of agency. This creates some challenges for teachers, who have to thoroughly prepare their lessons yet be ready to let students go in unexpected directions. This may also imply that their mastery of the subject may be challenged, as students explore areas or topics that may fall out of their domain of expertise.

Figure 3. Teaching creativity (and critical thinking)



Successful creativity teaching also hinges critically on teachers' attitude and their ability to create learning environments in which students feel safe to take risks in their thinking and expressions. This in turn presupposes a positive attitude towards mistakes and learner empowerment. A positive attitude among teachers towards student mistakes or failure can take the form of using these to trigger reflection about learning opportunities, thus helping students to see misunderstandings and other matters — too often labeled 'failures' — as a chance for improvement. Choosing questions and tasks that teachers themselves cannot resolve can make it clear to students that the thinking process behind a problem can be as important as its answer. This is typically the role of the Driving Question Board in project-based learning (Schneider et al., 2020), which requires a positive teacher attitude towards students' questions and explanations.

Table 2. Design criteria for activities that foster creativity or critical thinking skills

A pedagogical activity aligned with the OECD rubric on creativity and critical thinking should:	Competences
1. Create students' need/interest to learn	• Usually implies starting with a big question or an unusual activity. • May imply coming back to these questions several times during the activity.
2. Be challenging	• Often, the lack of student engagement comes from learning goals or activities that lack challenge. The tasks should be challenging enough, though not too difficult given the students' level.
3. Develop clear technical knowledge in one domain or more	• The activity should include the acquisition and practice of both content and procedural knowledge (technical knowledge).
4. Include the development of a product	• A product (a paper, a presentation, a performance, a model, etc.) makes the learning visible and tangible. • Teachers and students should also be attentive to and possibly document the learning process.
5. Have students co-design part of the product/solution or problem	• Products should thus in principle not all look alike.
6. Deal with problems that can be looked at from different perspectives	• Problems should have several possible solutions. • Several techniques may be used to solve them.
7. Leave room for the unexpected	• Teachers and students do not have to know all the answers. • The most commonly adopted techniques/solutions may have to be taught and learned, but there should be room for exploring or discussing unexpected answers.
8. Include space and time for students to reflect and give/receive feedback	

Source: Vincent-Lancrin et al. (2019)

4. Assessing creativity

What is important to teach must also be assessed, both by teachers and by education systems. Creativity emphasis is still rather uncommon in most educational settings, although creativity may implicitly be considered by teachers when they assess essays, projects, or exams. However, creativity assessment has been increasingly developed for educational settings.

Formative assessment of creativity

Beyond a better understanding of the skills that one should develop, rubrics can also be used to assess student work. In countries where rubrics are popular, teachers mainly use them for formative assessment. They usually have descriptors of different levels of proficiency for each of their dimensions, either attached to a specific assignment or generic for any task.

Table 3 presents the OECD assessment rubric on creativity. Teachers can use this rubric for the formative assessment of their students (it can also be used for summative assessments, by giving points according to the levels and score students' assignments). Specifically, the assessment rubrics has four proficiency levels. The two lower levels were intentionally defined so that they would not correlate with the "technical skills" in the subject of the assignment. The initial level of progression ("dormant") suggests that the student work demonstrates a good level of mastery of the technical learning outcome in the subject, but not in creativity. The lower level describes a lack of effort to demonstrate those skills in the assignment. The second level ("emergent") describes a relatively low level in these skills, but an attempt to demonstrate them. They are deliberately combined with a possibly lower level of mastery in the technical skills in the subject (that is, the other learning goals of the assignment). The top two levels of progression more classically point to a certain achievement in both technical skills and creativity, and just vary in degree. Level 3 ("flourishing") shows a certain level of imagination, appropriateness, and originality, given what one would expect the student to do or know. Level 4 goes one step further, with more imaginative and personal features touched upon by the work and even greater appropriateness of the solution to the task.

Table 3. OECD assessment rubric: Creativity

	Level 4 **Outstanding**	Level 3 **Flourishing**	Level 2 **Emergent**	Level 1 **Dormant**
Product	**The student work:** • is highly imaginative, showing many instances of personal features and risk-taking (formulation, technique, composition, or content) • fully meets the requirements of the task • goes beyond the knowledge and rules expected to be mastered by the student in more than one aspect.	**The student work:** • is imaginative, showing some examples of personal features (formulation, technique, composition, or content) • meets the requirements of the task • goes beyond the knowledge and rules expected to be mastered by the student in one aspect.	**The student work:** • is personal in some of its features (formulation, technique, composition, or content) • meets some but possibly not all the requirements of the task • is in line with the knowledge and rules expected to be mastered by the student.	**The student work:** • meets the requirement of the task but reproduces existing examples, with a little personal perspective on formulation, content, technique, or composition.
Process	**The work process:** • shows a willingness to examine carefully a variety of ideas as well the ability to make meaningful connections with other ideas or domains. • generated several unusual or radical ideas and pushed some to their limits before making the final choices. • shows a clear awareness of the areas of personal novelty and risk that were pursued, and of why the final choices were made.	**The work process:** • shows a willingness to brainstorm ideas and examines carefully the chosen idea. • generated one unusual or radical idea and pushed it to its limit before making the final choices. • shows a clear awareness of the areas of personal novelty or risk that were pursued.	**The work process:** • shows a willingness to think or act beyond one's first idea, but connections made between ideas or domains lack consistency or remain superficial. • fails to explore selected ideas with depth. • shows little awareness of the areas of personal novelty or risk that were pursued.	**The work process:** • is limited to the exploration of imitative patterns or to the examples presented by the teacher or expected to be familiar.

Notes: The class-friendly assessment rubric for creativity is supposed to assess a task targeting the acquisition of some learning outcome in a discipline or more. It is not meant to assess a "creativity" exercise, but any exercise in which students have space to develop their creative thinking skills. "Product" refers to a visible final student work (for example, the response to a problem, an essay, an artifact of a performance). The criteria are meant to assess the student's work even if the learning process is not observable by the rater or was not fully documented. "Process" refers to the learning and production process observed by the teachers or documented by the students: the process may not be entirely visible in the final product as some interim ideas or aspects of the process may not be reflected in the final student work. Typically, the process could show a greater level of acquisition of the skills than the product. Levels 1 to 4 correspond to a continuum. Level 1 corresponds to little effort to exercise one's creativity, whether the technical requirements of the task are met or not. Level 2 corresponds to some effort, even if the technical requirements of the task are met or not. Level 3 corresponds to both an output that shows some level of creativity and some technical mastery. Level 4 combines both a high level of creativity and technical mastery.

Promoting creativity requires tolerance of experimentation and failure. Just celebrating success in the final output may overlook the actual creative skills acquired through the process. While final products say something about students' learning and skill acquisition, they do not tell the whole story about the learning process. It could be that the final product does not fully reflect the learning, and that teachers' assessments would differ if they had documentation about the whole process rather than just the final output. The two product and process approaches correspond to two different assessment situations, depending on what the assessor can see and assess (or wants to). Assessing the learning process implies that the assessor(s) could see it (or documentation about it, for example through a portfolio).

There is nonetheless a similar logic between the product and process dimensions of the assessment rubric. Level 1, the lowest level of proficiency ("dormant"), refers to a production process during which students did not try to go beyond what was familiar to them, either due to their teachers or their community. Level 2 ("emergent") shows some effort to search and go beyond one's first idea, but not appropriate connections between ideas, selection of ideas, depth in the research, or risk-taking. Level 3 ("flourishing") shows actual brainstorming, careful examination of the ideas, and playing with at least one radical or unusual idea, with a good understanding of what personal novelty means to them. Finally, Level 4 ("outstanding") refers to the careful examination of multiple ideas, meaningful connections across ideas, the generation and serious exploration of several unusual or radical ideas, and strong intentionality and awareness about the process and its novelty or risk-taking for the students.

Let us use an example. In a situation where teachers only see the final output produced by a student (for example, an essay) when given an assignment (that requires a student to demonstrate some level of creativity), they can use the product line of the rubric to give their students individual feedback. When someone submits an essay that properly answers the assignment with good knowledge, but that clearly shows no effort to demonstrate any form of originality, teachers should say that they essay (not the students) exhibited the dormant level of creativity and it would be good to provide a new version that would take it to at least levels 2 or 3. If teachers see how students deal with an assignment, for example in a painting class, they can give feedback on the full process as they see how students' paintings evolve.

Exams and standardized assessments of creativity

Creativity should also be one dimension assessed in national exams –in particular, in exams at the transition of different levels of education (for example, university entrance exams in the countries where they exist). It can also be part of (low-stake for students) national evaluations, to inform the system. Several countries have started to develop these.

Many standardized creativity tests also exist, albeit they tend not to be related to 'educational' issues. This is the case for the tests mentioned in the "Defining creativity" section above. Those tests are typically developed by creativity psychologists to assess people's creativity potential. For example, the test of creative potential used within the OECD project (EpoC) assessed the divergent (generating many ideas) – exploratory, and convergent (choosing and developing a good one)-integrative skills of students (see Lubart et al., 2011), with the particularity of being domain-specific. It is thus applied to specific domains (science, social science, music, drawing, math, etc.). One limitation of some of these tests in the educational context is that they are usually not related to what students and teachers do in school – and may thus look somewhat disconnected. New education-specific tests are emerging, assessing creativity in environments that are more school-related in terms of subjects or knowledge. For example, the OECD Program for the International Student Assessment (PISA) will assess students' creative thinking in 2022, focusing on four domains: visual expression, written expression, social problem-solving, and scientific problem solving (OECD, 2019).

The departments of education in France and Australia (Victoria) have developed or are in the process of piloting standardized tests of creativity (or critical and creative thinking, in the case of Victoria) to support their (low-stake) national evaluations of students' learning.

These tests are very important to show that creativity is valued (and thus assessed) alongside the other skills that educators want students to develop. As with any test, it is crucial to be sure that the measured construct of creativity matches the definition of creativity adopted by the education system or the institution, and that those tests give stakeholders a good idea of what implemented creativity looks like. Ideally, this should be tested at the same time as other skills. It should also be aligned with the formative (and summative) instruments provided by teachers in school, so that this becomes a school practice and not just a remote assessment.

5. 10 steps for policymakers and practitioners to drive the change

This final section summarizes the ways that could drive actual change towards competency-based creativity curricula on the ground. Some of the steps are at the system level, whereas others are more for teachers and school principals at the implementation level.

Step 1. Be explicit about why creativity matters in your education policy

The reasons why creativity and other skills have become essential in education should be clearly articulated in the country's (or institution's) policy or strategy. This can be for economic (e.g., jobs or innovation), political, or personal (e.g., well-being) reasons.

Step 2. Define what you mean by creativity

In many cases, the lack of implementation is not due to a resistance to change, but more to the lack of clear understanding of what the objectives mean. For example, teachers tend to understand what creativity means much more vaguely than critical thinking. Thus, it often remains unclear what it means for their teaching or how they can observe whether learners are making progress. It is important to have both definitions and conceptual rubrics that are anchored in the research literature, but make the concept more tangible and applicable in an educational setting.

Step 3. Integrate creativity in the subject knowledge in the curriculum

Many curriculum documents include a competency list in addition to the knowledge, values, and attitudes that education aims to develop. It is noteworthy that subject knowledge and creativity skills are not separate. Adding competencies to subject knowledge is just a way to make that traditional aspect of education more salient. The importance of creativity as a learning outcome is often mentioned in the preambles of curriculum documents, while the knowledge part focuses on content and procedural knowledge of the subject. This disconnect does not help, as curricula should also exemplify how creativity could be embedded in the teaching of the knowledge part of any subject. Another approach to teaching creativity separately (usually through design thinking or a similar method) is also valuable, but less likely to reach sustainable outcomes as an integrative approach.

Step 4. Make creativity part of exams and evaluations

What is assessed is eventually what matters to students and teachers. Thus, it is essential to assess creativity formally, either as part of national evaluations or exams. This has to be done in the context of the assessment of a subject, rather than as a generic exercise. This will show students, parents, and teachers (and employers) that the skill is taken seriously and becomes an integral part of what students are supposed to learn in a country or an institution. The signal that PISA will assess creative thinking shows its international importance.

Step 5. Create alignment and incentives at all levels of education

Teaching and learning critical thinking skills can start in primary education and continue until higher education. For this to happen, there should be some alignment and continuity from one level to another. The OECD project on Fostering Creativity and Critical Thinking in Education showed that the same conceptual rubrics and methods could be used at all levels of education, with appropriate adaptations. Higher education institutions also have to value creativity (and include some creativity dimension in their university entrance exams, if those exist) in order for the secondary education level to take it seriously. This creates the right incentives and alignment of all actors in the system. This should also apply to the initial teacher education. Teacher students must be exposed to those teaching practices so they can not only emulate them but also have the creativity to redesign and adapt lesson plans (e.g., textbooks, their peers, or their past lesson plans).

While these first 5 steps are about the system design, driving change at the practice level also draws on conditions that were experienced during the OECD project regarding creativity and critical thinking (Vincent-Lancrin et al., 2019). One important condition is time, as driving change is challenging and takes time. Countries could develop and implement practice-engaged programs, such as the one that OECD developed and implemented. The project was based on four elements: collaborative work with practitioners to understand how their teaching can give more space to creativity and develop teacher-friendly resources; providing teachers with learning opportunities; work with teachers on the establishment of rubrics, examples of lesson plans and assessments; and, evaluation of progress to identify practices that work best but also to adjust the project if necessary. Those are reflected in the 5 next steps.

Step 6. Make sure school principals support work towards fostering creativity

Similar to the system level, it is important for the institution's leadership to publicly support and embrace developing creativity skills as a part of its institutional education strategy. Improving one's practice is difficult and time-consuming, and some teachers may feel that the efforts are not worthwhile if not recognized in some way; others will not even feel authorized.

Step 7. Provide teachers with continuous professional learning opportunities

Participating in action research projects (i.e., practice-engaged research where projects, scaffolding tools and evaluation instruments are co-designed on the ground through an iterative process of trial and improvement) or any transformative program is, in itself, a professional learning opportunity. However, when some practices are innovative, they have to be accompanied by possibly diverse forms of professional learning — from workshops to peer learning through exchanges and diverse platforms. These professional learning opportunities can take different forms depending on the context, but they have to be more than a one-off workshop. They must be sustained over time.

Step 8. Provide teachers with learning tools and exemplars

While face-to-face delivery is ideal, teachers should also be empowered to develop their students' creativity skills through other remote, independent forms of learning. As part of its project, the OECD developed a bank of resources for teachers, comprised of conceptual rubrics (including those presented above), assessment rubrics, examples of lesson plans, assessment tasks, design criteria for good lessons involving creativity or critical thinking, and a method to use them as a complementary set of resources. Video examples showing how those lessons could be implemented in the spirit of the OECD Global Teaching Insights platform, or classroom observation tools, could also be provided. The objective is really to trigger teachers' self-reflection and to get them inspired by peer educators' work so they can design or adapt their lesson plans.

Step 9. Create and support international and domestic communities of practice

A strong way for professionals to learn includes professional learning communities (or communities of practice) that bring together professionals interested in similar topics or trying to achieve similar goals. One way to learn with peers is through face-to-face and virtual learning communities. This can certainly be created around specific programs or projects, whether national or international. Additionally, this can be done on digital platforms where peers exchange ideas and comment on each other's lessons.

Step 10. Monitor and evaluate the effects and impacts

Finally, it is essential to invest in some form of monitoring, and ideally a proper evaluation of teachers' practices. Do they improve their teaching skills when participating in those programs? Do their learners become stronger at critical thinking while continuing to learn the subject knowledge they are supposed to learn? Do their social and emotional skills improve as well as their engagement in learning? Does education become more enjoyable and meaningful? Teachers can use the evaluation protocol and instruments that the OECD developed for countries or districts interested in evaluating their progress with a robust quasi-experimental design. Depending on the context, other forms of evaluation (e.g., peer feedback and randomized control trials) could also be considered.

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