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From the Perspective of Interdisciplinary Research and Practice

Edited by Fangqi Xu

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Japan Creativity Society

The Institute for Creative Management and Innovation, Kindai University

Preface

Every year, I go overseas to attend conferences on creativity and innovation. I often receive the same question from my foreign colleagues and friends. “Why don’t you hold an international conference in Japan?” Then, I answer, “Yes, we’ll do.” In fact, we have been thinking about this conference for many years. But we understood that we lacked resources, not only fund but also human resources and support infrastructure. Fortunately, our board of directors of the Japan Creativity Society agreed with my suggestion and started financial preparations five years ago. And from an other hand, we received financial support from Kindai University, my employer. It was the second problem of human resources and support infrastructure that when we were planning to hold the conference proved to be a more crucial concern. Timing was also critical since the Japan Creativity Society was born in 1979. We decided to hold our conference in this memorable year, as we welcome our 40th anniversary.

Therefore, it was not enough that we only did financial preparations. We needed academic support from professional organizations. So, we contacted the associations on creativity around the world and asked them to support us. Fortunately, ACA (American Creativity Association), EACI (European Association for Creativity and Innovation), GAC (German Association for Creativity), Crea-france (Association France for Development of Creativity), Portuguese Association for Creativity and Innovation, Creativity Foundation of South Africa, International Center for Studies in Creativity at Buffalo State, Creative Education Foundation (CEF), International Entrepreneurship Forum, and Essex Business School (UK) agreed with our suggestion and became the official partners for this conference. On this occasion, as the representative of Japan Creativity Society and the Institute for Creative Management and Innovation, I am grateful to all our partners and sponsors for their valuable assistance and cooperation.

Today’s world is becoming the era of IoT and AI. These changes are going beyond our imagination at an accelerating pace. Creativity and innovation are required more than ever in such times. So, we hope and expect that ICCI 2018 will be a watershed conference in the history of research on creativity and innovation in the world.

Osaka is a beautiful city. We hope you enjoy not only the conference, but also Japanese culture while you are staying in Osaka. We will do our best to make this conference not only meaningful but also enjoyable. We are looking forward to meeting you at ICCI 2018.



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Creativity and Digital Literacy: Skills for the Future

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Abstract

Educators prepare students for the future, however, due to the exponential and constant rate of change, it is difficult to predict which jobs will still be around for them or whether the profession of their choice will remain a valid option. As Talwar et al. state, 'for those aged under eleven, the bulk of the jobs they'll do probably don't exist yet' (2016, ¶18). Students today spend hours daily on their devices and the question which arises is: How can educators capitalise on the manner in which students are motivated by their digital devices in order to enhance their creative thinking skills?

This paper argues for the view that creativity is a skill and that everyone has the possibility to improve their creative thinking skills. It links creativity to digital literacy, which involves elements of embodiment, and this enables the transfer of skills learnt to real life situations. Today's students are digital natives, born into the internet age with easy access to PCs, mobile phones and tablets on which they can access multiplayer online games and virtual worlds. They are raised in an environment where they encounter motivating and exciting online challenges on a daily basis through online digital technology. Students acquire skills and maintain their motivation while playing games online. Their motivation and imagination are often aroused as they strive to move on to higher levels of the game which require improved skills and increased collaboration.

Some forms of online learning include strategies for the transfer of skills from the online environment into real life. One example is war game simulation where participants experiment with strategies and where the consequences of online training provide learning experiences for those involved.

The paper introduces the CREMO 'Academy for Creativity' e-platform (<https://academyforcreativity.com/>) which is the result of work by academics from five countries over three years. The platform incorporates games which enable students to acquire transferable skills, including creativity and digital literacy. Although creativity and digital literacy have been studied extensively as key skills for young people, there is limited literature on how they are related, and on how digital technology can be used to enhance creativity among young people. This paper contributes to the literature on creativity and creative education by linking creativity to digital literacy, and by introducing the 'Academy for Creativity' e-platform which incorporates both creativity and digital literacy as skills for the future.

The skills required today are no longer those that most people were taught at school or university. Education should be geared to provide students with creative thinking skills, digital literacy and an entrepreneurial mindset where opportunities are recognised and individuals are prepared to take risks.

Keywords: Creativity, digital literacy, skill transfer, serious games, future

1. Introduction: An Uncertain Future

Most of us would agree that a key role of educators is to prepare students for the future. Teachers strive to develop their students' full potential, and to enable them to become responsible citizens who can sustain themselves in the world of work and life in general. Traditionally, education has been geared at teaching students specific subjects to prepare them for particular careers or professions. The message conveyed to students has generally been to study hard, obtain qualifications, and seek employment, with the aim of attaining job security and stability (Baldacchino & Pulis Xerxen, 2013).

However, due to the exponential rate of change which we constantly experience, it is difficult to predict which professions or jobs will still be around in the future, whether the profession of one's choice will remain a valid option and, if so, for how long. As Talwar et al. (2016) state, "for those aged under eleven, the bulk of the jobs they'll do probably don't exist yet" (¶8). Quite a few jobs and professions have indeed become obsolete over the years. One of the authors of this paper was, for example, trained to become a Telex operator, while her parents were a telegraphist and a switchboard operator. None of these jobs exist today as there have been huge changes, particularly related to information and communications technology (ICT). Various industries have experienced an economic slump due to these changes – one only needs to think of the reduction in the number of print copy newspapers sold daily, the use of fixed telephone land lines or the amount of snail mail sent through the post. Retail outlets, banks, supermarkets, travel agents and other customer oriented industries have reduced their staff as they encourage customers to use online portals, electronic check-out machines or internet banking.

Furthermore, job stability has decreased drastically over the years and the notion of a career as it was traditionally perceived is fast becoming redundant, as was hypothesised by Flores and Gray (2000). For the older generations, a career spanned most of a person's working life, but today there is a trend towards increased job mobility, internships, freelancing, and fixed-term contracts in the so-called 'gig economy' (Kuhn, 2016). While the above-mentioned telegraphist and switchboard operator were employed in those roles, with the same organisations, for most of their adult lives until they retired, today's young people will most likely change their jobs several times throughout their working life (Flores & Gray, 2000). This may be due to pull factors such as young people's desire to diversify their work experience and an availability of a wider range of opportunities, or to push factors such as organisational downsizing and redundancy. Whatever the reason, job mobility has become the norm, and it is becoming increasingly evident that traditional methods of teaching and learning are becoming outdated and need to be reconsidered.

The above begs the question: What should educators be teaching their students so that they are well equipped to survive and prosper in a dynamic and uncertain future? There have, of course, been various initiatives to address this question, and new pedagogies and policies have been implemented. In this conceptual paper, we focus on creativity and digital literacy as key skills for the future. We define creativity as the ability to generate ideas that are novel and useful (Amabile, Conti, Coon, Lazenby & Herron, 1996) and digital literacy as the skilful use of digital technology to process information and the ability to engage with digital environments (Walton, 2016) – or, in other words, being "technology fluent" (Meyers,

Erickson & Small, 2013, p. 356). We argue for the view that, like digital literacy, creativity is a skill that everyone has the possibility to acquire and improve.

Moreover, we acknowledge that most young people today are digital natives (Tkalac Verčič & Verčič, 2013) who spend hours daily on their digital devices – smartphones, tablets, laptops, and PCs. Another question thus arises: How can educators capitalise on the manner in which students are engaged with their digital devices, to enable them to acquire and enhance their creativity skills? In this paper we link creativity to digital literacy, and argue that the versatility of digital devices, and the platforms and applications set up on them, allow for creativity skills to be developed and improved with practice over time in an interdisciplinary manner. The main claims made in this paper incorporate the way in which young people are motivated by their digital devices. We maintain that, when used in an appropriate manner, these devices can foster creativity skills which are transferable to other domains and real life situations.

Although creativity and digital literacy have been studied extensively as key skills for young people, there is limited literature on how they are related, and how digital technology can be used to enhance creativity among young people. In this paper we maintain that digital literacy in general – and appropriately designed digital games in particular – can be used to enhance creative thinking skills. We introduce an innovative e-platform for creativity training which incorporates both creativity and digital literacy as skills for the future. In so doing we make a contribution to knowledge on creativity and creative education.

This paper proceeds as follows: The next section reviews a selection of reports and frameworks on the skills that are expected to be required in the future, highlighting the importance of creativity and digital literacy. This is followed by a brief discussion on the acquisition of skills in general, and creativity in particular. The link between digital technology, games and online learning is outlined next, followed by an overview of the above-mentioned e-platform for creativity training. A brief conclusion draws the paper to a close.

2. Skills for the Future

As outlined above, the skills required today are no longer those that most people were taught at school or university, and a new approach to teaching and learning is required. Senge et al. (2000) had drawn attention to the fact that bells ringing to signal a break or the end of the school day and children sitting down for hours on end may have been suitable to prepare students for work in the manufacturing industry, but the employment context – including in manufacturing – has since evolved considerably. Education today consists of a lifelong undertaking, and should be geared to provide students with skills (both hard and soft skills) for the future. What are the skill sets that we need to instil in young people for the future?

Various reports and frameworks on future skills have been published over the past few years, including those by the Institute for the Future (IFTF, 2011), the World Economic Forum (WEF, 2015), Bakhshi et al. (2017), and the Partnership for 21st Century Learning (P21, 2015). The report published by IFTF (2011) specifically states that predictions of future jobs reported by various studies have consistently proven to be difficult and that “many of the past predictions have been proven wrong” (p. 1). Their report therefore focuses on future work skills (as opposed to future jobs), and proposes ten skill sets which will be of crucial importance in 2020, as listed in Table 1 below. Of most relevance to this paper is that “novel and adaptive

thinking”, which is defined as a “proficiency at thinking and coming up with solutions and responses beyond that which is rote or rule based” (p. 9) – and is therefore analogous to creative thinking – is ranked third. Also of relevance to this paper is “new-media literacy”, which refers to the “ability to critically assess and develop content that uses new media forms, and to leverage these media for persuasive communication” (p. 10), and “virtual collaboration”, which includes the “ability to work as a member of a virtual team” (p. 12) – which are both related to digital literacy – were ranked sixth and tenth respectively.

The study by the WEF (2016) gathered the views of human resources managers and strategy officers from leading global organisations on what were the most important skills that employees possessed at the time of the survey (in 2015), and what skills would be most important five years later (in 2020). The top 10 current and prospective skills that were identified in this study are also presented in Table 1. It is interesting to note that creativity was ranked tenth in 2015, but it was expected to rise to third place by 2020. Furthermore, complex problem solving, which may be argued to require creative thinking skills, was ranked first both currently and prospectively.

Table 1: Top 10 Skills identified by the WEF (2016), IFTF (2011), and Bakhski et al. (2017)

Rank	Top 10 Skills in 2015 (WEF, 2016)	Top 10 Skills in 2020 (WEF, 2016)	Top 10 Skills in 2020 (IFTF, 2011)	Top 10 Skills in 2030 (US) (Bakhski et al., 2017)	Top 10 Skills in 2030 (UK) (Bakhski et al., 2017)
1	Complex problem solving	Complex problem solving	Sense Making	Learning Strategies	Judgment & Decision-Making
2	Coordinating with others	Critical thinking	Social Intelligence	Psychology	Fluency of Ideas
3	People management	Creativity	Novel & adaptive thinking	Instructing	Active Learning
4	Critical thinking	People management	Cross-cultural competency	Social Perceptiveness	Learning Strategies
5	Negotiation	Coordinating with others	Computational thinking	Sociology & Anthropology	Originality
6	Quality control	Emotional intelligence	New-media literacy	Education & Training	Systems Evaluation
7	Service orientation	Judgement & decision making	Transdisciplinarity	Coordination	Deductive Reasoning
8	Judgment & decision making	Service orientation	Design mindset	Originality	Complex Problem Solving
9	Active listening	Negotiation	Cognitive load management	Fluency of Ideas	Systems Analysis
10	Creativity	Cognitive flexibility	Virtual collaboration	Active Learning	Monitoring

The Bakhski et al. (2017) report asks: “given the likely drivers of change in future labour markets, which occupations will grow or decline in demand by 2030 and what will their skills profile be?” (p. 19). This study presents separate findings for the US and the UK, with several skills, knowledge and abilities ranked according to the expected future demand for occupations in these two countries. The top ten of these are listed in Table 1. It is noteworthy that in both the US and the UK, originality and fluency of ideas are expected to be among the top 10 skills for employment in 2030, with a higher ranking in the UK, where fluency of ideas is in second place and originality in fifth. Complex problem solving also made it into the top ten for UK-based occupations. Originality and fluency of ideas are both widely considered to be characteristics of creative thinking (Guilford, 1986; Torrance, 1974) and, as noted above, complex problem solving may require creativity skills.

The P21 (2015) developed a ‘Framework for 21st Century Learning’, which identifies the skills and knowledge that students need to acquire to be well-equipped to face the challenges of the future. This framework includes four key “learning and innovation skills” which are increasingly recognised as “the skills that separate students who are prepared for increasingly complex life and work environments in the 21st century, and those who are not” (p. 3). These skills, which are referred to as the ‘4Cs’ are creativity, critical thinking, communication, and collaboration. According to this framework, ‘creativity’ includes the ability to think creatively, to work creatively with others, and to implement innovations. This framework also includes four “information, media and technology skills” (p. 5), which include information literacy, media literacy, and ICT literacy.

While the above is by no means an exhaustive review of the studies and reports that have been published on the skills that are expected to be in demand in the years to come, it is a clear illustration that creativity and related thinking skills, together with digital literacy, are widely believed to be key skills for the future. The focus on creative thinking supports the views of various authors, including the Lateral Thinking guru Edward de Bono, who maintains that “what is going to matter is the ability to design and deliver value. That needs creative and design thinking” (de Bono, 2005, p. 4), and of futurists Talwar et al. (2016), who state that:

We need to be equipping them [young people] with the skills that will allow them to take up these new opportunities when they arise. This means a far greater emphasis on social and collaborative skills, conflict resolution, problem-solving, scenario thinking, and accelerated learning (¶8).

Unleashing the creative potential of students can thus be seen as an antidote to the challenges that are being brought about by the changing environment. It enables the possibility of embracing change, dealing with uncertainty, fostering imaginative thinking and searching for innovative ways to resolve problems. It further enables increased possibilities for new ideas to be converted to start-up enterprises and for increased entrepreneurship opportunities. This is in line with the European perspective, where policy makers have identified “a sense of initiative and entrepreneurship” as a “key competence for life”. This key competence is described as:

An individual's ability to turn ideas into action. It includes creativity, innovation and risk-taking, as well as the ability to plan and manage projects in order to

achieve objectives. This supports individuals, not only in their everyday lives at home and in society, but also in the workplace in being aware of the context of their work and being able to seize opportunities (European Commission, 2006, p. 17).

3. Acquiring Skills

It is clear that students need to acquire the above-mentioned skills that will be useful today and in the future, but how can they do so? Traditional methods of teaching and learning are inadequate to impart these skills for the future, and new approaches and tools are therefore required. Such approaches should acknowledge that skills are not acquired merely through reading or understanding particular instructions. Reading a 'how to ...' manual can hardly develop the skills required to become, for example, a successful Formula 1 Grand Prix driver, an orchestra conductor, a world famous violinist, or an Olympic marathon runner. Skill acquisition requires deliberate practice, which involves focused, frequent and sustained efforts to improve performance (Ericsson, Prietula & Cokely, 2007). As noted by Klein (2003), "deliberate practice means not just practicing to practice, amassing experience randomly, but practicing with specific objectives in mind" (p. 37). These objectives should be related to competence improvement, or in other words at enhancing the desired knowledge, skills and performance (Unger, Keith, Hilling, Gielnik & Frese, 2009).

Muller (2015) addresses the question: "What kind of knowledge is 'know-how', and how might it vary?" (p. 414), followed by a discussion on what he calls "three different kinds of 'know-how' knowledge" (p. 414), these being inferential know-how, procedural know-how and personal know-how. There is, moreover, debate on how skills can be described for educational purposes, as Muller (2015) states in a paper that tackles the knowledge versus skills debate:

The problem of skills stipulation in STEM as elsewhere in education is that it is very hard to describe skills (or 'techniques' or 'outcomes' and other 'can do' surrogates) in other than general or generic terms, which right at the outset obscures the speciality and differentiation of the knowledgeable practice in question (p. 414).

Although this is an interesting and relevant debate, it would go beyond the aims of this paper to delve deeper into the knowledge versus skills debate or on the debate on whether skills differ from abilities and how they could be described in a less generic manner. Our focus is on transferable skills while simultaneously acknowledging the importance of theoretical knowledge that underpins so many subject areas.

Learning a skill involves various stages, starting from a novice and moving on towards becoming a Master or expert. Dreyfus (2001, 2009) outlines these stages as follows: (1) Novice – At this stage one experiences the first stages of a new skill such as driving, playing a musical instrument or learning a foreign language. Initially the novice learns some basic rules and information about the domain; (2) Advanced beginner – This stage involves elements of motivation as, for example, in learning some phrases in a foreign language that may be used for basic communication in particular contexts and applying certain rules that are learnt; (3) Competence – At this stage the learner feels that he or she has acquired a

reasonable amount of competence with the skill which allows for decisions related to relevance and discernment. It is often at this stage that a learner decides to either move on to the next stage or to retain this level of competence; (4) Proficiency – This is the stage between competence and expertise where experience gained is internalised and problems are intuitively resolved; (5) Expertise – Experts are easily recognised as they generally exhibit fluency and an element of effortless ability when applying a skill, particularly when there are goals to be achieved; (6) Practical wisdom – This is the level achieved by those who are recognised as sages, chess grandmasters, Olympic medallists, concert pianists or Formula 1 Grand Prix drivers, amongst others.

It is not a simple task to move up to the stages of expertise and practical wisdom and few people actually do so, as this would require an investment of a tremendous amount of time and effort. A widely accepted norm is that a minimum of 10 years' experience are required for the acquisition of expertise in a given domain (e.g., Weisberg, 1999). This so-called 'Ten-Year Rule' is sometimes interpreted in terms of the number of hours of practice required, estimated to be between 10,000 and 15,000 hours over a number of years (Sadler-Smith, 2008, 2010).

Although expertise is not easily attainable, most people are able to acquire various skills up to the competence or proficiency stage, where such skills become 'second nature' and part of one's unconscious way of doing things such as driving a car, swimming or using a keyboard to input data. This should be borne in mind when designing tools and approaches for skill acquisition.

4. Acquiring Creativity

What does it mean to be creative, and how can creativity be acquired? Senge et al. (2000) proposed an insightful description of what it means to be a creative human person:

Creative human beings try to conceive problem solutions differently, examining alternative possibilities from many angles. ... Creative people take risks and frequently push the boundaries of their perceived limits. They are intrinsically rather than extrinsically motivated.... Creative people are open to criticism, they hold up their products for others to judge and seek feedback in an effort to refine their technique. They are uneasy with the status quo (p. 201).

As the above quotation demonstrates, it is possible to outline what a creative person is. However, there is still a great deal of debate on whether creativity can be taught or whether it is an innate talent that only some people are born with. Our view is that creativity is a skill that can be taught, and therefore acquired, improved and internalised just like any other. We believe that all human beings are born with the potential to be creative – albeit to varying degrees – but this potential needs to be nurtured through regular, appropriate practice in a supportive environment in order to flourish. This is in line with the views of various creativity experts, such as Sir Ken Robinson (2006) who challenged the way the education system stifled creativity in his TED Talk entitled 'Do schools kill creativity?', and Edward de Bono, who has often made the claim that thinking is a skill (e.g., 1984, 2007).

Various methods are available which can be used to enable individuals to acquire and enhance creativity. One of the simplest exercises that can be carried out for this purpose is to apply divergent thinking to everyday objects. Divergent thinking refers to the generation of multiple responses or solutions to a particular stimulus or problem, by “making unexpected combinations, recognizing links among remote associates, transforming information into unexpected forms, and the like” (Cropley, 2006, p. 391). This is regarded as a key skill in creativity as it enables individuals to get into the habit of generating multiple ideas. Applying divergent thinking to everyday objects by, for example, thinking of many different (and unusual) uses for common items like a paperclip, a brick, a box, or a sock, is thus seen as a simple yet relevant practice for creativity.

Edward de Bono proposed a number of different methods and tools which include Lateral Thinking, the Six Thinking Hats, and the PoP (Power of Perception) Tools (formerly known as DATT: Direct Attention Thinking Tools). As de Bono had studied medicine and psychology before moving into the area of creativity, he outlines the manner in which his methods are based on the way the human brain functions in his publication *The Mechanism of Mind* (1969). He maintains that the thinking skills which he designed can be learnt through regular practice, and that they enable the broadening of perception which, in turn, leads towards increased creativity. Some may seem awkward or difficult to the uninitiated but, with practice, the skill can become second nature and it may then be applied to various domains.

There is no consensus on whether skills such as creativity should be taught independently of the curriculum or incorporated into particular subjects. There are, of course, advantages and disadvantages to both approaches, but it is beyond the scope of this paper to address this debate. As outlined in the introduction, this paper set out to discuss creativity and digital literacy as key skills for an uncertain future, and to explore how educators can capitalise on the manner in which students are engaged with and motivated by their digital devices in order to enhance their creativity. The sections presented thus far have focused on the first aspect of the paper. The second aspect is explored next.

5. Digital Technology, Games and Online Learning

Digital technologies available for online learning have evolved a great deal during the past couple of centuries. Today’s students are digital natives (Tkalac Verčič & Verčič, 2013), born into the internet age where active participation through online digital technology is a central part of their lives. They are raised in an environment where they encounter motivating and exciting online challenges on a daily basis, and they have easy access to devices such as mobile phones and tablets on which they can access multiplayer online games and virtual worlds.

McGonigal (2013) claimed that scientific research demonstrates the positive and negative impacts of games and how they affect users’ brains and bodies. In her view:

Games change how we feel, think, act, and relate to each other even during the hours we’re not gaming. Most game impacts are positive, some can be negative, and the design of the game — more so than the content of the game — is what makes the difference (¶4).

McGonigal (2010) strongly feels that better use could be made of the time which young people spend playing games online, such as attempts to resolve the world's most urgent problems. She has claimed that three billion hours are spent on online gaming each week. Although this may sound like an excessive amount of time, she suggests that much more time should be spent playing games online to resolve some of the world's most urgent problems:

If we want to solve problems like hunger, poverty, climate change, global conflict, obesity, I believe that we need to aspire to play games online for at least 21 billion hours a week, by the end of the next decade" (¶13).

Well-designed online games challenge and motivate gamers to approach failure and problem solving in a different way. Their imagination is often aroused as they strive to move on to higher levels of the game which require improved skills and increased collaboration. Gamers learn to be resilient and to achieve success by overcoming challenges, rather than becoming anxious, depressed, and frustrated, as often happens when they are faced by problems in real life. Games provide students with challenges with the consequence that their use of educational games which are well designed makes them enjoy learning through play. Students are today motivated and empowered by well-designed games that make learning enjoyable and foster creativity.

Some forms of online learning include strategies for the transfer of skills from the online environment into real life. In war game simulation, for example, participants experiment with various strategies and online training provides learning experiences for those involved. The same applies to virtual flight and medical simulations. This involves the concept of embodiment, which is closely linked to cognition, as Wilson and Foglia (2015) propose in their 'Embodiment Thesis':

Many features of cognition are embodied in that they are deeply dependent upon characteristics of the physical body of an agent, such that the agent's beyond-the-brain body plays a significant causal role, or a physically constitutive role, in that agent's cognitive processing (2015, ¶29).

The implication is that it is not only one's brain that operates when cognitive processes occur. Thinking does not involve a disembodied mind or brain. Learning, including online learning, involves a consideration of one's body, one's experiences and the context, situation or environment within which one is operating. Embodiment thus incorporates the successful interaction of mind, body and world and the manner in which these influence each other. This makes a great deal of sense when applied to online learning, where we do not ignore our body and life experiences. It is not possible to learn anything in a vacuum, without bringing one's thoughts, experiences and context into the picture. Kant's (1781, 2007) famous dictum outlines this interaction as he states: "Thoughts without content are empty, intuitions without concepts are blind" (A51/B76). The implication is that cognitive processes, particularly those that operate during the learning or experiential process, are not possible without any context, world or experience to draw one's thoughts from. Conversely, inputs from the world through our senses are incomprehensible without our capacity for thinking and reflection. Learning on online platforms does not mean that the learner's world,

experience, cognitive processes and sensations are left behind, rather, these are incorporated into the learning process and, vice-versa, affected by that which has been learnt.

6. The CREMO 'Academy for Creativity' e-Learning Platform

Another form of online learning that enables the transfer of skills from the virtual environment into real life is through the 'Academy for Creativity' e-Learning Platform, which was developed by academics from five countries (Denmark, Malta, Spain, China and the USA) over three years as part of the 'CREMO' (Creativity e-modules for Higher Education) project, funded through Erasmus+. This online platform, which is available at <https://academyforcreativity.com/>, aims to unleash students' potential for creativity through games which train users in creativity and idea generation. It enables the fostering of creative thinking skills, concrete problem solving, and digital literacy skills, which may be transferred to real life situations. Part of the dissemination process for this European project involved multiplier events for educators in Denmark, Spain and Malta held during the first half of 2018. These events involved an introduction to the Academy for Creativity platform for over 200 educators from various European countries who have the potential to use the games with thousands of students.

The Academy for Creativity e-platform allows for two types of profiles: Teacher (or educators) and student. Teachers may set up courses for their students and the tasks may involve up to 50 hours of creativity training. This is equivalent to 2 ECTS (in Europe) and it is designed so as to be easily incorporated into higher education curricula. Students using the Academy for Creativity platform select an avatar and take on the role of a robot working in an office. The story line which is adopted motivates users to use their idea generation and creativity skills to convince their co-workers that they are actually a human person and not a robot.

The e-platform consists of 11 games, 10 of which are specifically designed to train students through deliberate practice in at least two of the following core competences that are closely linked to creativity: (1) *Originality*: the ability to generate ideas that are unique, novel and surprising; (2) *Fluency*: the ability to generate numerous alternative ideas, possibilities or solutions; (3) *Flexibility*: the ability to direct thinking in different directions and this, moreover, incorporates the possibility of changing perceptions; (4) *Elaboration and persuasion*: the ability to further develop and persuasively communicate ideas; (5) *Imagination*: the ability to think of unusual, surprising, improbable and inspiring ideas; (6) *Creative self-efficacy*: the development of self-confidence when critically reflecting about or applying one's creative skill; (7) *Creative experience*: a quantification of the amount of time and effort spent on the Academy for Creativity platform.

Some of the above competences are based on the work of Guilford (1986) and Torrance (1974, 1984, 1990) who had initially incorporated the following four competences into creativity: originality, fluency, flexibility and elaboration.

The ten games, which are listed and described in Table 2 below, were created following numerous workshops and brainstorming exercises and they were beta tested by students at three European universities: University of Aalborg in Denmark, Universidad Complutense

de Madrid, Spain and University of Malta. Each game has between 30 and 90 rounds ranging over three levels of difficulty (easy, medium and hard), to enable learners to advance through the various stages of skill acquisition (Dreyfus, 2001, 2009). The extra (eleventh) game only becomes available after more than two hours of training as critical reflection on the training experience and on creativity training in general is required. This extra game focuses on developing in the student a sense of creative self-efficacy. The e-platform incorporates an evaluation system which is available for educators who set up courses for their students. This allows for insights on the students' performance including the total amount of time spent using each game and the number of ideas generated. Learners are awarded points based on effort and the gamification techniques built into the platform also award coins to users on successful completion of a game. Collecting a certain number of coins allows learners to move on to the next level of difficulty.

Table 2: Academy of Creativity Games Descriptions

Game No.	Game Name	Description
1	<i>Draw In One Stroke</i>	The avatar is asked to help a graphics team to draw specific items, but it is only possible to use one arm as the other is not working well, therefore the drawings need to be done in one stroke
2	<i>Cue Up</i>	The avatar is asked to support a colleague with cue cards for a speech and after the speech is over the avatar is asked to make creative and persuasive connections between one cue card and another
3	<i>Poster Perfect</i>	The avatar is asked to finish a campaign poster (which has already been started) for an advertising team. Once it is completed, the avatar is asked to generate an appropriate catch phrase for the poster which is expected to fit in with specific campaign objectives
4	<i>Director's cut</i>	The avatar is asked to write a script for a movie, using pre-recorded footage. As each piece of footage which is provided has no connections to the previous footage provided, the avatar is required to use the imagination to create a persuasive, original and interesting story line
5	<i>Figure it out</i>	The avatar is tasked with putting together different shapes which are provided by a design team. These may be moved, rotated and scaled in order to become specific pre-defined products. The provided shapes may change during the game and some of them may only be available for use once.
6	<i>Crazy connection</i>	As the avatar's real identity as a robot risks exposure in this game, the task is to create connections between disparate random objects to demonstrate (by means of creativity) that it is a human and not a robot.
7	<i>Sounds like an idea</i>	The avatar is asked to connect a particular sound to one of three objects and to provide an explanation as to how the particular object produced the odd sound.
8	<i>Language Lab</i>	The avatar is asked to produce original definitions for new words and to compose persuasive sentences in which the word is used.
9	<i>Race for the raise</i>	The task for the avatar is to compete with colleagues to identify the most creative ideas and to imagine meaningful scenarios for these ideas.
10	<i>Trend Spotter</i>	The avatar is asked to produce ideas for future products by combining products that are completely unrelated.

The Academy for Creativity platform combines creativity training with digital technology and gamification methods. By training students in creativity, it motivates students to ask questions, to explore possibilities, to foster the imagination and to build skill sets that are valuable and which will increase their future career prospects. As the platform links creativity to digital technology, it aims to motivate learners by means of gamification techniques and to demonstrate that training to improve creativity considered as a skill is possible.

7. Conclusion

Each generation possesses different values, attitudes, skills and ways of operating. Young people today are ambitious and self-confident. They have high expectations and seek new challenges. They are not afraid to raise questions if something is not clear. They tend to change jobs easily when not satisfied with the way in which they are treated, as they are willing to move around in their search for new opportunities and motivating challenges. These young people are the CEOs, entrepreneurs and workforce of the future, and they will play a key role in tomorrow's local and global economy. It is therefore important for today's educators to understand them and foster in them the skill sets that are relevant for their future. This requires an awareness of emerging trends and the design of appropriate strategies through the use of the best available technology.

In this paper, we have argued that there is a need to acknowledge creativity and digital literacy as essential skills for the future. The focus on skills is closely related to change and strategy, as Bakhshi et al. (2017) state: "History is a reminder that investments in skills must be at the centre of any long-term strategy for adjusting to structural change" (p. 16). Creativity is a transferable skill that fosters the imagination and motivates students to explore complex topics. In today's knowledge society there is an urgent need for people who have developed skills in creativity, people with flexible mind-sets who recognise opportunities, enjoy challenges and are prepared to take risks to benefit society and the economy. Creativity requires an element of knowledge, experience and reflection, together with an understanding of the topic being explored. Teaching creativity to students, either face-to-face or through a digital device, encourages students to ask questions, explore possibilities, foster the imagination and build skill sets that are valuable today and in the future.

We would like to emphasise the fact that traditional learning and expertise should not be dismissed. However, capitalising on digital technology and the digital literacy skills of today's young people can add great value to the process and outcomes of education. The Academy for Creativity e-platform provides an opportunity to do so through a number of games which enable the fostering of creative thinking and digital literacy skills which may be transferred to real life situations and concrete problem solving.

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