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Illustrations of Best Practices in Building Creativity Skills in Adult Learners

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Abstract

This article is based on a literature review aimed at highlighting the need for the development of creative skills in adult learners, which are essential for personal and professional self-innovation, flexibility, adaptability, progress, and development in the current and future labor market. The literature review also revealed that adult educators need current, innovative, interesting, and engaging training and instructional materials to foster creativity in adult learners. Based on the results of the literature review, the authors selected a set of best practices for building creativity skills in adult learners that are applicable in various fields such as education, mathematics and computer science, and humanities. The proposed best practices take the form of methods for building creativity skills in adult learners that can be used by educators in formal and non-formal education programs in a variety of settings. Each method description is accompanied by an illustration that shows how the method can be used effectively.

Key words: 21st-century skills, creativity skills, learner needs, professional and personal development, adult learners, method, best practice

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1. Introduction

The official documents of the European Union are a guide and a basis for professionals in the field of education. The documents COUNCIL RECOMMENDATION of 22 May 2017 on the European Qualifications Framework for lifelong learning and repealing the recommendation of the European Parliament and of the Council of 23 April 2008 on the establishment of the European Qualifications Framework for lifelong learning (2017/C 189/03)[2] and COUNCIL RECOMMENDATION of 22 May 2018 on key competences for lifelong learning (2018/C 189/01)[3] define a wide range of concepts related to education, skills and creativity in a more general sense.

The main objective of these recommendations is to contribute to the modernization of education and training systems and to improve the employability, mobility and social inclusion of workers and learners. As a result, the recommendations take a practical approach to definitions, mainly from the perspective of education and the future of employment.

Competence is a "combination of knowledge, skills and attitudes" appropriate to a given context, "the demonstrated ability to use knowledge, skills and personal, social and/or methodological abilities in work or study situations and in professional and personal development" (EC, 2018/C 189/01). The EC sets out eight specific key competences considered equally important for the successful integration of individuals into a globalized society and labor market, as well as for personal fulfillment and development, active citizenship, social inclusion and employment. The eight key competences identified by the European Reference Framework are: "1) Communication in the mother tongue; 2) Communication in foreign languages; 3) Mathematical competence and basic competences in science and technology; 4) Digital competence; 5) Learning to learn; 6) Social and civic competences; 7) Sense of initiative and entrepreneurship; and 8) Cultural awareness and expression" [Annex to the COUNCIL RECOMMENDATION of 22 May 2018 on key competences for lifelong learning (Text with EEA relevance) (2018/C 189/01)].

Skill refers to one of the elements from the structure of the competence. In European Qualifications Framework (EQF) it is defined as: 'the ability to apply knowledge and use know-how to perform tasks and solve problems'. In the EQF, skills are classified as follows: cognitive skills (which involve the use of logical, intuitive and creative thinking) or practical skills (which include manual dexterity and the use of methods, materials, tools and instruments). *Knowledge* is the prerequisite for building and training skills and is another element of the competence structure defined in the EQF as "the result of assimilating information through learning", a "set of facts, principles, theories and practices related to a field of work or study"; knowledge can be theoretical and/or factual.

Creativity skills fall into the category of *cognitive skills*; cognitive skills are among the descriptors for the competence component (along with the knowledge and responsibility and autonomy components) *in all 8 levels of learning outcomes* defined in the EQF. A *learning outcome* is a statement of what a learner knows, understands and is able to do on completion of a learning process. The EQF unifies the national qualifications systems and frameworks of different countries around a common European reference in its eight reference levels. The levels cover the whole scale of qualifications, from basic (level 1, e.g., high-school diploma) to advanced (level 8, e.g. doctorate). *Creativity*, along with problem solving, critical thinking, teamwork and adaptability, is one of the *soft skills* identified in the 2016 New Skills Agenda for Europe as one of the goals of today's education (along with innovation) and part of all 8 key competences defined in the above European Reference Framework mentioned above: "Problem solving, critical

[2] https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:32017H0615(01)&from=EN. Web March 27th 2021.
[3] https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32018H0604(01)&rid=7 . Web March 27th, 2021.

thinking, collaborative skills, creativity, computational thinking, self-regulation are more important than ever in our rapidly changing society [....] the tools to apply what we learn in real time to develop new ideas, new theories, new products and new knowledge" (EC, 2018/C 189/01). *Creativity* is considered as a manifestation of imagination, a higher order psychological mental cognitive process and thus a foundation for essential mental activities such as learning, playing, working, communicating and creating. In other words, creative skills support all those human activities that ensure a person's continuous personal and professional progress and development, with the ultimate goal of socio-professional integration and progress, as well as autonomy.

This paper is based on research conducted by the partners of the Erasmus+ project GAME-ED. The aim is to provide teachers and educators of adults with a set of teaching materials that focus on fostering creativity in adult learners. These include a collection of methods for fostering creativity in adult education, a collection of good practices for fostering creativity in adult learners, a methodology for selecting game mechanisms suitable for fostering creativity, and an educational game.

2. Theoretical framework

As stated above, fostering creativity in learners is one of the goals of education. *Creativity* is one of the essential skills of digital literacy (the ability to use, access, filter, evaluate, create, program, and share digital content; manage and protect information, data, and digital identities; and recognize and deal effectively with software, devices, artificial intelligence, or robots) and entrepreneurship (imagination, strategic thinking and problem solving, critical and constructive reflection in the context of evolving creative processes and innovations, the ability to collaborate both as individuals and in teams, mobilize resources (people and things) and sustain activities, communicate and negotiate effectively with others, and manage uncertainty, ambiguity, and risk to make informed decisions) (idem.). As a soft skill, creativity manifests as a habit, a personality trait that shapes the way someone works alone or in a team. Creativity is the use of imagination to come up with original ideas and solutions based on some prior knowledge and by activating certain skills; one of the synonyms for creativity is inventiveness, so demonstrating creativity skills is actually demonstrating one's own inventiveness.

The literature review revealed the extent to which educators in formal and non-formal contexts are concerned with identifying and selecting innovative methods and techniques to build the competencies that people in general need to adapt to the diversity of the world in which we live and to integrate successfully socially and professionally. The authors' interest in identifying and elaborating current methodological approaches to building creativity, among other skills and abilities, in learners of all ages has already been reflected in a number of articles, books, and guides (Boghian et al., 2019; Boghian et al, 2020; Mâță et al., 2020; Mâță & Cojocariu, 2011). The literature search revealed a number of works by Romanian authors, alone or in collaboration with co-authors from other countries, which clearly show the interest in the topic of building creativity and the importance given to creativity by national teachers and researchers (Corcheş & Oroşan, 2013; Damian et al., 2007; Dumitrescu, Covaci & Popescu, 2009; Olaru, 2016; Gadoularov & Romanică, 2006; Neagu, 2010; Organizația Națională Cercetaşii României, 2013; Stoica-Constantin, 2004).

A relevant number of studies at national and international levels have highlighted game-based learning as a "catalyst for creative learning" (Michalko, 2010; Shabalina et al., 2016), with games proven to increase intrinsic motivation in learners of all ages and contribute to building general and domain-specific skills and abilities (Bergersen & Sviggum, 2020; Bevčič et al., 2020; Boghian & al, 2020; Mâță et al, 2020; Reiners & Woods, 2015; Stieglitz et al., 2017). A number of arguments support the use of gamification in learning, highlighting the skills and abilities that

gamification fosters when used in teaching-learning activities, where creativity is either directly or indirectly one of the learning outcomes:

(a) Skills related to the thinking process: a. Creative thinking (approaching a question or problem from different angles); b. Analytical and reflective thinking (analyzing and evaluating what is happening);

(b) Practical/organizational skills (planning work, organizing resources, dealing with crises and solving problems, completing tasks, measuring progress, taking calculated risks);

(c) Self-related skills (focusing for extended periods of time and thinking critically about the purpose and goals of learning; acquiring, processing, and assimilating new knowledge and skills; seeking guidance and support; self-management skills (being self-motivated, acting with confidence, directing and evaluating one's own learning, showing flexibility, taking initiative);

(d) Skills related to others: Collaboration during the learning process; b. Improving social and communication skills; c. Interpersonal skills: Empathy, consensus building, negotiation, diplomacy, conflict management - resolving conflicts, respecting others, team player skills; d. Cultural awareness and expression skills (Anderson et al., 2009; Bellotti, 2013; Charlier et al., 2012; Clark et al., 2015; Cojocariu et al., 2017; Connolly et al., 2012; Connolly & Stansfield 2006; Erhel & Jamet ,2013; Ince, 2018; Keesee, 2012; Milczynski, 2011; Rugelj, 2015, 2016, 2018; Sawyer, 2002; Seaborn et al., 2012; Whitton, 2012; Tsekleves et al., 2014; Vlachopoulos & Makri, 2017).

There is a need to develop teaching methods and strategies to foster creativity in learners of all ages, including adults, so that they can successfully integrate into society and the labor market and achieve their personal development, active citizenship, social inclusion, and employment. Since fostering creativity in adult learners is an under-researched topic, we set out with the partners of the Game-ED project to investigate teaching methods and techniques for fostering creativity in adult learners.

In conducting applied research, we asked ourselves the following questions:

- What are the most effective methods for building creativity in adult education?
- What are some examples of best practices for building creativity in adult education?

The purpose of the study was to identify the best practices for building creativity in adult learners. The objectives were as follows:

O1: identify some of the most effective practices for building creativity in adult education;

O2: describe some of the best practices for building creativity in adult education.

3. Results

Based on the literature review, we have identified and selected a number of methods that can be used to build creativity skills in adult learners. In addition, we present a description of each method along with a best-practice suggestion for how it can be used in adult education. Search terms included "creativity," "creativity skills," "adult learning." Documentation was conducted in online electronic databases. The electronic databases we used for our literature search include: PsycARTICLES, ERIC, EdITLib Digital Library, and Academic Search Premier. The literature search yielded a relevant number of papers on methods for building creativity and adult learning and gamified learning, some of which are available in full text online.

To O1 - Identify some of the most effective methods for building creativity skills in adult education: The literature offers a wide range of teaching methods and approaches that can be used efficiently to build creativity skills in adult learners: game design-based learning (Spieler & Slany, 2018; Zapušek & Rugelj, 2014, 2021); game-based learning (Plass, Homer & Kinzer, 2020; Prensky, 2001); collaborative learning (Kelly, 2018); project-based learning (Baihaqi, Sarwi, & Ellianawati, 2020; Thomas, 2015); problem-based learning (Hsu & Hsu, 2020; Mills, 2006; Peterson, 2004); learning with story-telling games (Dillon, 2004); creative writing (Jackson, 2017; Samuel, Mateas & Wardrip-Fruin, 2016).

In the context of O2, we have selected 6 best practices to promote creativity in adult learning. The best practices we have selected to present and illustrate in more detail have several advantages: they foster creativity; they stimulate learner motivation by providing challenges and intrinsic rewards; they build a variety of skills and abilities (critical, analytical, logical, strategic thinking, collaboration, cooperation, communication, research, leadership, initiative, entrepreneurship, problem solving, empathy, etc.); they are flexible and adaptable, making them suitable for different learning domains and also different age groups. However, there are also a number of disadvantages of such methods. The most commonly mentioned ones are that they are time-consuming, that there may be conflicts between students, and that students may miss the educational goal of such an approach.

3.1. Negative brainstorming (reverse brainstorming)

This method, also called reverse brainstorming (Evans, 2012; Gurteen, 2010), focuses on problems and on identifying potential problems, not solutions. It is based on our natural critique and ability or cultural model to see the problems and flaws in the landscape, not the solution. It is useful for preventing potential obstacles during a process and provides an opportunity to creatively transform a problem into an opportunity or solution to challenges. The method is particularly useful for activities that involve problem solving and focus on an investigative, reflective, and critical thinking approach. It is very useful when we get stuck in finding solutions because it helps us to identify errors/possible flaws in our approach. The method has high potential for use in gamified learning because challenges can be approached as game tasks.

Negative brainstorming is a group method and can be used for a group of maximum 12 people for 20-45 minutes (Bregnova, 2012). Resources needed are markers, flipchart paper/whiteboards or whiteboard-like applications (example: https://miro.com/templates/reverse-brainstorming/). Be sure to follow the rules for group work. Make sure that all participants contribute their own (negative) ideas about the topic. The typical rules of classic brainstorming must be followed, such as no criticism of ideas; new and unusual (negative) ideas are fine; describe clearly when making a negative point; use concrete ideas instead of metaphorical expressions.

Algorithm of use: explain the method to all participants and give an example of how it works; divide participants into small groups and ask to appoint a facilitator who will be able to collect the worst ideas from each participant; after 10 minutes, ask facilitators to bring the flipcharts in front of the group in the room and all participants can review the ideas; all participants work to select the relevant or popular ideas and make a list with them and we need to proceed to the next steps for negative brainstorming (Figure 1).

Figure 1. The steps of negative brainstorming

Instead of asking ourselves, "*How do I solve this problem?",* or *"How do I prevent this problem?",* in reverse brainstorming we ask, "*How could I cause a problem?",* or *"What could go wrong with this…?"*. Also, instead of asking, "*How do I achieve this solution*?", we ask, "*How could I achieve the opposite effect/ how can I make it worse?".* Instead of "*How could I improve this?", "How can I make it bad?".*

The benefits of negative brainstorming in adult education are as follows: The group process can be engaging, stimulating, and fun; more unexpected ideas can emerge; there is no pressure to "be creative"; it encourages analytical thinking in learners. Also:

- It can be easier to find the negative things and mistakes than the positive ones;
- It can be a good starting point for an innovative approach and can lead to provocative results;
- It is predictive and can identify problems and challenges that can be turned into goals.

There are also a number of limitations to the method:

- Participants may have difficulty turning negative things into a positive solution;
- It may take more time than other methods;
- It requires good facilitation and task orientation.

Then, some examples of application are formulated:

- The problem: How can we improve this game used for my educational goals?
- Reversing the problem: How can we make this game useless for my educational goals?
- Ideas: Use unclear rules; Do not give explanations when people ask this; Do not make connections with curricula and competencies, etc.
- Evaluate the ideas: Witch of this is the worse/unproductive idea/s? Why?
- Select the idea/s: *Do not make connections to curricula and competencies etc.*
- Reverse the idea (it can become a goal): Make *connections with curricula and competencies*
- *Identify the solution: Find out what the most important competencies are for the target audience; are there resources for building these competencies? Where do they exist? What is their nature? Are they accessible? Etc.*

The method is useful for stimulating creative processes to solve or avoid problems. It uses skills such as critical thinking, thinking ahead, dialectical communication, problem solving, etc. In learning processes, it encourages taking a step back and looking at the task from a new and challenging angle. By working with the worst-case scenario, the method prevents mistakes and helps develop a realistic goal for the learning/intervention approach. Based on criticism and a forward-looking analysis, the method offers the opportunity to be creative and pragmatic at the same time.

3.2. The use of immersive worlds and microworlds to develop creativity

The development of technology (in the broadest sense, not only ICT) has brought with it the development of e-learning tools of all kinds. Among these, games occupy a special place. Games are capable of providing important learning experiences, and new forms of gaming are widely used in leisure-oriented and informal learning contexts. This aspect is important given the expectations and demands of learners and the global culture of collaboration based on online communities. Serious games and virtual worlds enable their users to express themselves creatively, take responsibility, find and solve problems, learn with peers, and motivate themselves (Han, 2019). According to (de Freitas, 2006), the terms "immersive worlds" and "microworlds" are defined as follows:

a. *Immersive worlds*: The term is used for simulations, games, and other interactive, often virtual, 3D spaces or crossover spaces (e.g., between virtual and real).
b. *Microworlds*: The term refers to worlds created with objects and artifacts to allow learners to explore a specific imaginary or seemingly realistic realm or environment with open-ended outcomes.

Serious games were developed in the 1980s and have gradually grown into a substantial industry. Nowadays, there is a "serious games movement" that brings together academics, developers, and instructional designers with the goal of developing effective applications. The specific design is required to create virtual creative environments that are intended to provide

users with new experiences, fun, and a playful and/or experimental atmosphere (Graessler & Taplick, 2019). Virtual worlds are the natural extension of 2D technologies (Traub, 1994), where inhabitants can interact with other inhabitants as they do in the real world. Virtual worlds are online communities where beliefs are shared among residents, new ideas are developed, and even inventions are made (Metros, 1999).

Games that use "immersive worlds" and "microworlds" are applications that use the features of video and computer games to create engaging and immersive learning experiences to convey specific learning objectives, outcomes, and experiences. They can serve as metaphors for promoting higher cognition in microworlds and open-ended spaces for experimentation and as tools for practicing skills.

The advantages for using games based on immersive worlds and microworlds are the following:

- the games based on/or using immersive worlds and microworlds are mostly perceived as part of recreational activities;
- their potential to reach non-traditional learners, including adults;
- they empower learners to create their own content, which encourages and invites creativity; and
- they stimulate collaboration;
- learners are encouraged to combine knowledge from different areas;
- the games are challenging (Malone, 1981).

Among the limitations of such an approach is the fact that games based onor using immersive worlds and microworlds are usually perceived as recreational tools. When games are inadequately used or incorrectly embedded in practice, there is evidence that this can lead to negative learning experiences (de Freitas, 2006). "UniGame - Social skills and knowledge training" is a relevant example whose concept is described by Pivec and Dziabenko (2004). To illustrate possible applications of the UniGame framework, the authors present several examples. One of them, called "Tunnel building" defines a context in which learners must actively think about interdisciplinary consequences and ethical behavior of engineers. The goal of the game is for 4 teams to compete against each other to create the best bid and the best technical solution for the construction of a tunnel at a given location. The solution should take into account various parameters such as the financial framework, deadlines, technology used, environmental acceptability, etc. During the game, teams can "buy" knowledge from other experts. Teams are also expected to be able to respond to unexpected new conditions, e.g. new emission laws or laws for an area near the tunnel that has been declared a nature park, etc. The teams use the preparation time of the game to work out their solution. During the general discussion, various important issues should be discussed and a consensus reached on which solution is most appropriate (Pivec & Dziabenko, 2004).

3.3. The Mathematical Modelling Method

A current need in the learning process is to expand the use of modern, active methods that promote thinking and creativity, investigative skills, independent work, and the ability to apply what is learned in practice. Efficiency is increased by the use of such methods in mathematics education, which have a great formative value, stimulating the development of the most representative forces of intellectual activity (creative and original thinking, intelligence, constructive imagination). These methods are characterized by their active-participatory character, which generates in the students an activity conducive to the exercise and use of their intelligence. Modeling is a form of discovery based on the exploration of objects and phenomena in nature and society using models.

At the school level, the development of mathematical creativity is not an easy task, but according to Chamberlin and Moon (2005), it can be observed, for example, in the search for a

nonstandard solution to a problem that cannot be solved using a standard method. Chamberlin and Moon (2005) define creativity in mathematics as an unusual ability to develop novel and useful solutions to simulated or real applied problems using mathematical modeling. Posamentier, Smith, and Stepelman (2010) consider that solving a problem is like inventing something new. Ervynck (1991) considers solving an old problem in a new way as an example of creative mathematical activity

Mathematical creativity at the professional level can be defined as the ability to produce original work that adds significantly to the body of knowledge, or as the ability to open paths to new questions for other mathematicians. Mathematical modelling refers to models that basically interpret problems of everyday life by mathematical means. An everyday problem can be formulated mathematically, then a mathematical model is formed. Using mathematical language, we can arrive at the results, which are then interpreted in terms of daily life. The term model refers to the process of simplifying reality in order to adapt it to deductive reasoning. The model reflects only the essential determinations (elements, relationships, factors) that we absolutely need to explain or demonstrate a conceptual structure. Creating such a prototype requires first of all a thorough knowledge of the proposed problem, but also creativity. Creativity also means having a different perspective to solve real-life situations and problems in a different way than other people (Nadjafikhaha et al., 2012). Mathematical modelling could be a solution to this.
The steps in applying the method are as follows:

- formulation of the problem in the language problem;
- determination of the variables and parameters involved;
- building the mathematical model of the system by translating the problem into the mathematical language;
- solving the mathematical problem;
- experimentally testing the model by comparing the predictions with the available observations or data and improving the model and solution methods;
- drawing conclusions based on the model and testing the conclusions against previous or additional data that may be collected.

Considering that one of the main goals of the mathematical activity is to develop critical thinking, this method can successfully help to achieve this goal. In order for the mathematical activity to be attractive and stimulating for students, the actual problem should be the main focus, or a teaching approach based on this aspect can be much more motivating for students. Although it is a time-consuming method, this time can be used for deeper learning that allows each student to work at an individual pace

After a knee surgery, a physical therapist advises his 12 patients who have undergone the surgery to exercise regularly. He then asks everyone to record the time spent on exercise in minutes. After recording all this information centrally, he calculates the average of the time spent on physical exercises (xi) and relates it to the recovery time of each individual, expressed in days (yi). He obtained the following data:

i	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
$\mathbf{x_i}$	**24**	**35**	**64**	**20**	**33**	**27**	**42**	**41**	**22**	**50**	**36**	**31**
$\mathbf{y_i}$	**90**	**65**	**30**	**60**	**60**	**80**	**45**	**45**	**80**	**35**	**50**	**45**

Based on the data collected, can you estimate what the recovery time is for an average time of 38 minutes? Based on the same data, can you estimate what the recovery time is for a patient who did not perform the suggested physical exercises at all? A first challenge is to reinterpret the formulation of a real-world problem in a way that facilitates reference to the mathematical tool and translation of the problem into mathematical language. The applied nature of the problem will encourage students to find the best estimation model. Starting with the model concept, students can brainstorm what it means to approximate a process defined by previously collected data.

The following questions are discussed: what does the phenomenon of approximation involve? When is it necessary to approximate real phenomena? What criteria are considered in the search for the optimal model? Modelling, as an associated method, contributes significantly to the mastery of analogical thinking by establishing the relationship between the particular and the general and between the concrete and the abstract, essential aspects in the performance of a mathematical activity. In the phase of developing models for our real-world problem, the teacher acts as a cognitive coach and should guide students in asking appropriate questions to construct the optimal mathematical models.

3.4. MATEC

The method is part of the creative approach, which is used with a pragmatic goal to solve a real problem authentically and effectively. At the same time, it can be used as a creative training to develop the creative potential of a group (pupils, students, teachers, employees of a company). The starting point is the volume *Techniques et méthode de créativité appliquée ou le dialogue du poète et du logician* published in 1974 by J. P. Sol. The method combines the divergent approach (a broader range of approaches, ideas) with the convergent approach (filtering, selecting the final solution to the problem) and makes complementary use of higher cognitive processes, imagination (generating unique perspectives) and reasoning (crushing the problem and analysing the aspects step by step to select/generate the solution). The method is presented only in Romanian by Ana Stoica-Constantin and is part of the volume Creativity for students and teachers, published in 2004.

The MATEC method is a heuristic method for solving matrix type problems. A table/matrix is constructed (Table 1) in which a stepwise progression is made from the known to the unknown based on the identification of relevant criteria, desirable/undesirable features, and relevance markers. The method includes 2 main phases: Phase 1 - generation of the matrix (according to Table 1) by a group of specialists in the field of the problem to be solved (subphases a-b); Phase II - intervention of a group of 4 people trained in the field of methods to stimulate creativity, using specific methods (semantic, playful, heuristic, identification, association, sorting, combination), offering partial solutions or the final solution to the problem (subphases c-f). The steps in the application of the method are as follows:

a. Identification of the problem to be solved;
b. Generation of a matrix;
c. Realization of primary associations;
d. Realization of secondary associations and phonetic associations;
e. Intersections of associations;
f. Presentation of the final solution set, final sorting, selection of the solution.

Table 1. A model of creative association matrix

No.	Criterion	Desirable features	Relevance mark	Undesirable features	Relevance mark
1.					
2.					
3.					
n.					

Several advantages of the method can be highlighted. Use of the creativity of the individual and the group; allows the definition and combination of criteria of interest or the desired characteristics; can lead to the generation of a large number of solutions to the problem to be solved, more or less consistent with the established criteria; outperforms the 2 classical variants of

creative problem solving (weaker in terms of the quality of the creative solution - the name of the inventor or the anagram).

The main limitations / restrictive factors relate to the relative subjectivity of the criteria of interest or the desired characteristics; the dependence of the way they are defined on the training and competence of the team creating the matrix; the need to form a solid working team, prepared for the problem to be solved, but also sufficiently heterogeneous; difficulties (perhaps) in identifying the 4 people trained in the field of methods to promote creativity.

Applying the method involves going through two stages (Stoica-Constantin, 2004):

Stage I:

a. problem: The French biscuit factory (Dijon) wishes to change its name;
b. matrix generation;

Table 2. An example of creative association matrix – The French biscuit factory Dijon

No.	Criterion	Desirable features	Relevance marks	Undesirable features	Relevance marks
1.	Concept (objectives)	Sale of services Sale of products Sale of biscuits	10 9 7	-	-
2.	Meaning	Services Food for children	10 8	Meaning of biscuit, cookie	-8
3.	The suggestion in the mind of the beneficiary/client	Force Dynamism	10 9	Collectivity	-6
4.	Pronunciation (easy to remember)	France, Belgium Holland, Germany Scandinavian countries	10 9 7 7	Should not lead to colloquial or vulgar misunderstandings	-8
5.	Beneficiaries	Administrators Parents Children	10 8 7	-	-
6.	Morphology	3-4 syllables 5-9 letters one word only	9 7 10	-	-
7.	The image promoted in society	Dynamic enterprise; Enterprise in the service of the community	8 10	-	-

Stage II:

a. Realization of primary associations - sorting, selecting;
b. Realization of secondary associations and phonetic associations - sorting, selecting;
c. Crossing of associations, two by two (resulting in 2000-4000 names) - sorting, selecting;
d. Presentation of the final set of solutions, final sorting, selection of the solution - after repeated sorting, out of the 4000 names, only 10 were selected and from these, NERGICO was finally chosen.

The MATEC method proves to be a special approach that can help to improve training in adult creativity methods, with heuristic and playful potential and pragmatic impact (NOT just a

simple exercise, but actually a creative way to solve real life problems). It works more successfully in adult education than in the formal education process.

3.5. FRISCO

The method was proposed by the research team of the Four boys of Frisco (the four boys of San Francisco). The purpose of the method is to identify complex and difficult problems related to a specific topic and solve them in a simple and efficient way (Sacară, 2009). The Frisco method requires empathic skills, critical thinking, and stimulates thinking, imagination, and creativity. In the Frisco method, participants take on a specific role to approach a problem from different perspectives: exuberant, conservative, optimistic, pessimistic. The exuberant participant looks into the future and expresses seemingly impossible ideas that he can apply in practice. In this way, he provides an imaginative-creative, innovative framework and encourages the other participants to look at things in this way. It is based on a phenomenon of contagion. The conservative has the task of appreciating the merits of the old solutions and deciding to keep them, without excluding the possibility of possible improvements. The optimist illuminates the shadow left by the pessimist and encourages participants to look at things from a real, concrete and achievable perspective. He finds realistic bases and ways to achieve the solutions proposed by the exuberant and encourages participants to think positively. The pessimist is the one who does not have a good opinion of what is being discussed and censors the initial ideas and proposed solutions. He exposes the unfortunate aspects of all improvements. The roles can be approached individually or, in the case of large groups, the same role can be played simultaneously by several participants forming a team.

To apply the method, one must know how it works. The Frisco method is based on two procedures: the checklist and the staged brainstorming. The main moments of an activity involving the Frisco method are described by Stoica-Constantin (2004). The organizer divides the group of participants into two teams: the first team, called the inquiry team, consists of ten to fifteen students and the inference team consists of five to six members. The checklist is applied to the members of the inquiry team, and the participants formulate written responses. The inference team identifies the problems, critically comments on them, and proposes solutions. The inference team members proceed in the following steps (Sacară, 2009):

- identification of the problem, which consists in naming a problem situation related to the proposed topic and selecting a real problem to be analyzed;
- distribution of roles (conservative, exuberant, pessimistic, optimistic) and the participants who will play them;
- collective debate, which involves interpreting the role chosen and supporting the point of view associated with it;
- systematization of the ideas given out and formulation of conclusions regarding the solutions found.

There are also other approaches to the method FRISCO (Payan-Carreira et al., 2015), based on the six cornerstones:

- **F**ocus - indicates the main issue underlying the analysis;
- **R**easons - highlights the reasons to evaluate the facts and their relevance;
- **I**nferences - refers to the steps that guide the reasoning and thorough evaluation of an argument or solution;
- **S**ituation - includes the evaluation of the situation to define the context of the problem;
- **C**larity - for clear articulation of proposed solutions;
- **O**verview - corresponds to the final critical evaluation of the situation and the proposed solution.

The advantages of the method are many: it provides the opportunity to manifest different points of view, as well as the empathy capacity and the critical spirit; contributes to the

development of communication skills, thinking, imagination and creativity; favors the stimulation of the relational capacity of the participants, supports the development of respect for the opinion of others, facilitates the development of the ability to argue and counter, depending on the role played. There may be some disadvantages, such as: the possibility of conflicts between students; the lack of adequate solutions to the problem, depending on the role played; the lack of participation of all participants in the activity.

3.6. SCAMPER

The SCAMPER brainstorming technique uses a series of targeted questions to solve a problem (or seize an opportunity). It can also transform an outdated idea into something new and different. SCAMPER is a checklist that includes questions to stimulate ideas through a creative thinking process. The stimulation comes from an effort to answer questions that would not normally have been asked. The questions were first proposed by Alex Faickney Osborn in 1953 and then compiled into a mnemonic by Bob Eberle (1996). The technique SCAMPER aims to provide seven different ways of thinking to find innovative ideas and solutions (Serrat, 2009).
Each of the seven letters of the acronym SCAMPER is the initial letter of the English words:

- **S**—Substitute (e.g., components, materials, people);
- **C**—Combine (e.g., mix, combine with other assemblies or services, integrate);
- **A**—Adapt (e.g., alter, change function, use part of another element);
- **M**—Magnify/Modify (e.g., increase or reduce in scale, change shape, modify attributes);
- **P** – Put to other uses;
- **E**—Eliminate (e.g., remove elements, simplify, reduce to core functionality);
- **R**—Rearrange/Reverse (e.g., turn inside out or upside down).

The main advantages of the SCAMPER method are the following:

- Generation of new ideas: The SCAMPER method allows new ideas to be generated and developed, even when they encounter obstacles, to create an improved product;
- Building and fostering creativity: the SCAMPER method can be used by educators to influence the emergence of creativity by using the process to foster creative thinking. The process has also been widely shown to enhance children's constructive problem-solving skills by encouraging their minds to work around obstacles in order to overcome them.

A number of disadvantages can also be defined, such as requirement of the right environment. The SCAMPER method needs a specific environment for it to prove effective. For the process to truly impact creativity, both teachers and learners must be in an environment that truly promotes and encourages new ideas, whether the ideas are deemed useful or not.

The method SCAMPER includes the following steps:
determine the problem or topic on which the mental process of creative thinking is taking place.

- ask the SCAMPER questions for each step of the problem or issue and find out what new ideas have emerged.
- examine the ideas that have emerged: Are they feasible? Can they be used to create a new product or enhance an existing product?

We will explain the questions of SCAMPER in more detail and show how it can be applied in adult education on the topic of innovative educational strategies. The goal of using the SCAMPER method is to find ways to innovate the teaching process.
The substitute technique focuses on the parts of the product, service, or solution that can be replaced by others. During this part of the discussion, the discussion platforms focus on making decisions to replace one part of the process with another.

Replace one part of your audience's problem, product, or experience with something else. You can replace things, places, processes, people, ideas, and even emotions. The questions asked in this part are:

- Can I replace a person involved? (For example, can I eliminate a co-trainer in a course and use a young actor instead?);
- Can the rules be changed? (For example, can I play a particular game for children from the city with children from the village?);
- Can I use different ingredients or materials? (For example, can I make a game out of edible parts?);
- Can I change the shape (for example, can I use a cup-shaped sheet instead of a score sheet on an A4 sheet?);
- Can I change the color, roughness, sound, or smell? (For example, can I change an ordinary invitation to a white envelope with a lavender-scented cloud-shaped invitation?);
- What if I changed the name of the project/product/etc.? (e.g., instead of the evaluation form, would you call it Opinion Cup);
- Can I replace something with something else? (e.g., I can replace a business card with a bookmark or a roulette wheel with the contact information);
- Can I change my feelings or attitude about the challenge? (For example, can I give up the seriousness with which I give a meditation or yoga class?).

The substitution technique usually offers alternative solutions to decision makers so that they can evaluate different solutions to arrive at a final decision. Combination questions involve analyzing the possibility of merging two ideas, process phases, or products into a single, more efficient outcome. In some cases, combining two innovative ideas can lead to a new product or technology that strengthens the market. For example, combining telephone technology and digital cameras resulted in a new, revolutionary product in the telecommunications industry. Think about combining two or more parts of your challenge to create a different product or process. Much of creative thinking involves combining ideas with elements that have nothing to do with creating something new. Discussion of the combination technique may include the following questions:

- What ideas or elements can be combined? (For example, can I combine the idea of the carnivore with the idea of the brand so that Brandivor comes out?);
- Can I combine with other objects? (e.g. I can combine the idea of a deck chair with the idea of a grass and get a wooden deck chair with grass);
- What can be combined to increase participation? (For example, can I make toys out of museum pieces that increase children's interest in the exhibits they cannot touch?);

What materials can be combined? (E.g., paper, fabric, clay, glass, acorn wood?) Can I combine different talents to enhance the idea? (I can pair a cartoonist with a storyteller for a presentation to convey an idea both verbally and visually.).

Customize refers to a brainstorming discussion aimed at adapting or tweaking a product or service to achieve a better result. This adaptation can range from small changes to radical changes to the entire project. Adaptation is one of the most efficient techniques to solve problems by improving the existing system. Adapt an existing idea to solve the challenge. Remember that all new ideas and inventions are borrowed to some degree. The adaptation technique brainstorming session may include the following questions:

- Is it something similar but in a different context?;
- Are there solutions from the past?;
- What could I copy, borrow, or steal?;
- What processes can be adapted?;
- What ideas outside my area of expertise can I incorporate?.

The technique of modifying/minimizing/magnifying refers to changing the process in a way that unlocks more innovative capabilities or solves problems. This change is more than just an adjustment because it focuses on the overall process. For example, it may be aimed at reducing

the project process or changing our perspective on the problem. Think about scaling up or exaggerating the idea. This may increase the perceived value or give you new views on which components are most important. Questions to ask in this section include:

- What can be magnified or exaggerated? (For example, a bookmark that is a meter rather than the standard size);
- Can I add additional features or add value? (For example, can I create a video explaining what is happening in my project? Like a storyboard or an explanation of a small section that might be of interest to participants);
- Can I increase the frequency?;
- What can be exaggerated or overstated?.

Other-use questions are about how the current product or process can be put to another purpose or how the existing product can be used to solve problems. For example, you can use this technique to figure out how to repurpose an existing product to a different market segment or user type. Consider what you can reuse in your own context from what other organizations have already done. For example, this could be events, merchandise, materials, projects, etc. The questions in this technique can be the following:

- What projects did I like that I could use something from for my challenge? (For example, a social, environmental, or cultural project in another country).
- What experiences would a child have that relate to what I want to offer? What about an older person? A person with a disability?;
- Can I use the idea in another area or for other people? (I can bring attention to some communities I have not thought of, e.g., parents, young people without parents, those who work in the cinema, etc.).

The Eliminate/Enhance phase aims to identify the parts of the process that can be eliminated to improve the process product or service. It also helps to explore the unnecessary parts of the project. Think about what might happen if you were to eliminate or reduce some of your ideas. What if you simplified, reduced, or eliminated sections/components? Questions related to this part include:

- Can I change the rules? (For example, can I use a slice of carrot instead of a peel);
- Can you eliminate the rules completely? (For example, can I counsel a patient without meeting them live in the office?);
- What is really essential that I cannot give up even in my head? (For example, I can not give up coffee at a coffee store);
- What is less important and can I give up? (e.g. what could I do without in a class? Sheets of paper, pencils, a thawing device, etc.);
- What if I did a more compact or smaller project than I intended? (For example, can I do a single section of an online course that I can test quickly instead of an entire course?).

In some situations, the unnecessary resources or steps in the process place an additional burden on the project to achieve innovation and creativity. Eliminating these resources expands the ability to innovate and provides more resources for creativity within the organization. The final phase, Reverse/Reposition, explores the innovative potential when the sequence of the process in the production line is changed. Reversing the process or part of it can help solve problems or produce a more innovative output. Questions in this part include:

- What are the causes and effects of my challenge?;
- What would it look like if things happened in a different order? Can I change the pace? Can I replace the positive with the negative? Can I reverse the situation? (E.g. Instead of boredom, participants are excited? Instead of seriousness, they expected a very relaxed or joking environment or a person who greets them with surprising messages to guide them). Can I change the schedule or location? (e.g., have the event at a different location instead of the most appropriate room?);
- What about doing the exact opposite of what I originally thought?

Since this problem-solving tool is very easy and quick to implement, we can say that it is quite effective. The great thing about it is that if it does not work the first time, you can use it again. According to studies, the SCAMPER method can lead to positive results in up to 80% of cases. This was proven by ESADE Business School in one of their surveys. In addition, it was found that the more people use the method, the more useful it is, because it is easier to implement. In summary, as Edward de Bono (1992, 2015) said, creative thinking in the sense of idea creativity is not a mystical talent, but a skill that can be practiced and cultivated.

4. Conclusions

The methods presented in this collection aim to foster creativity in adult learners. There are a variety of interactive teaching methods available. The challenge, however, has been to find, select, and present methods that place a strong focus on activating the mental processes associated with creativity in adult learners: analytical and critical thinking, imagination, sourcing information, reorganizing and restructuring information, generating new ideas and products, transforming outdated products into new, innovative products, giving new shape and form to old but useful resources. The methods we have chosen to describe and illustrate have a number of playful features that make them suitable for the pedagogical goal of fostering creativity; these playful features include the following

- Action: the learner's activity is linked to the learning objectives;
- Challenge: the learner is assigned a specific mission, task, or challenge to complete within a specific time frame; this also implies a healthy dose of competition;
- Reward: the learner receives a reward or some kind of feedback for successfully completing the desired activity (European Youth Foundation, 2018, pp. 13-14).

According to the literature, if the teaching-learning method includes a number of game elements, then it is likely to help learners build the following skills: Skills related to the thinking process (creative, analytical, and reflective thinking; practical/organizational skills; self-related skills; skills related to others: (collaboration, communication, interpersonal skills, empathy, consensus building, negotiation, diplomacy, conflict management, cultural awareness, and expressiveness. These game elements are (Reiners & Wood, 2015: 5): play (this provides the opportunity to explore and fail within safe boundaries); exposure (on the one hand, stories are created for learners and on the other hand, they are encouraged to create their own stories); choice (giving learners the opportunity to choose for themselves during the activity is an important stimulus for their intrinsic motivation, enhances self-esteem and autonomy); information (game design and game elements should be used to encourage and support learners to discover and acquire new information); engagement (learners are encouraged to learn from each other); Reflection (helping learners connect to their interests and life experiences to promote learning and engagement).

In other words, any modern teaching and learning method can be adapted to foster curiosity, stimulate imagination, track progress and provide feedback, stimulate competition, create challenges, encourage discovery and adventure, enhance teamwork, promote knowledge sharing, solve problems, create a sense of ownership by allowing learners to adapt certain elements of the activity and make choices; all of which imply skills directly or indirectly related to creativity. They increase intrinsic and extrinsic motivation, and thus learner engagement, and contribute to the development of a variety of skills (Prensky, 2001), such as creativity, leadership, teamwork, meeting deadlines, and improved self-awareness (self-efficacy and autonomy).

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