UNLOCKING LATENT CREATIVITY WITH RAPID PROTOTYPING

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The purpose of this paper is to better understand the role of group-based prototyping workshops in unlocking latent creativity or stimulating creative expression in adults. Our findings indicate that hands-on exercises might be an effective way to unleash creativity in adults who perceive themselves predominantly as non-creatives. The heterogeneity of groups positively affected the level of creativity as a collective process.
Keywords: *creativity, rapid prototyping, design thinking, workshop, education*

Namen tega prispevka je bolje razumeti vlogo skupinske prototipne delavnice pri spodbujanju latentne ustvarjalnosti. Rezultati nakazujejo, da so lahko praktične vaje učinkovit način za spodbujanje ustvarjalnosti pri odraslih, ki se sami sicer pretežno dojemajo kot neustvarjalne. Na stopnjo ustvarjalnosti kot skupinskega procesa je pozitivno vplivala heterogenost skupin.
Ključne besede: *ustvarjalnost, hitro prototipiranje, dizajnerski pristop, delavnica, izobraževanje*

INTRODUCTION

In many scientific disciplines, creativity is one of the most popular terms of the 21st century, and the diversity of its understanding, researching and practical enhancing makes agreeing on a common definition impossible. The debate over the definition of creativity has existed since the 1950s, when Joy Paul Guilford (1950) proposed that creativity could be studied scientifically. Studies report on more than 100 definitions (Smith 2005). However, at least in psychology, education and general creativity studies, Morris Stein's standard definition from the 1950s is still among the most used:

> The creative work is a novel work that is accepted as tenable or useful or satisfying by a group in some point in time [...] By "novel" I mean that the creative product did not exist previously in precisely the same form [...] The extent to which a work is novel depends on the extent to which it deviates from the traditional or the status quo. This may well depend on the nature of the problem that is attacked, the fund of knowledge or experience that exists in the field at the time, and the characteristics of the creative individual and those of the individuals with whom he [or she] is communicating. (Stein 1953: 311–312)

Managerial, economic and educational circles (fields in which the authors are active) share a general understanding that it is possible to create conditions that foster and nurture creativity (Burke 2007) and that creativity should be developed in all subject areas of education (Gustina and Sweet 2014; Likar et al. 2015). This is especially important because

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creativity and divergent thinking are regarded as the key catalysts of change and development (Thompson 2003). However, while children show very high levels of creativity (in Stein's sense), adults' ability to creatively tackle problems decreases dramatically with age (McCrae et al. 1987).

However, researchers (including the authors of this paper) also agree that even if creative expression, or at least self-perception about the creative potential, in adults is lower than in children, latent creativity – an unconscious or dormant potential which requires proper conditions to emerge (Yong 1994; Kraft 2005) – is still present. According to studies (Ainsworth-Land and Jarman 1993), almost everyone was creative as a child and our assumption is that we all possess latent creativity, which is only rarely given an opportunity or the proper conditions to emerge. The aim of this paper is to present one of the methods which could be used to unlock latent creativity or stimulate creative expression in adults. It will provide an indication of the usefulness of handwork or, more specifically, rapid prototyping exercises through the case study of an exercise developed to promote creative problem solving. The goal of the exercise is to test whether it is possible to invoke creativity in a short period of time by making people think with their hands. After thoroughly describing the theoretical debates over creativity and experimentation, as well as the prototyping exercise and its results, the authors provide ideas about ways in which various organizations (e.g. municipalities, schools, companies) benefit from providing proper settings and opportunities for hands-on experiments to foster personal and group creativity.

CREATIVITY AND EXPERIMENTATION

The importance of creativity and the role of the educational system in its development (Guilford 1950; Robinson 2011; Cankar et al. 2013) is an old agenda and has remained an important part of scientific debate for over half a decade (Gustina and Sweet 2014). Studies arguing that creative thinking declines with age (Kim 2011) further support the need for additional understanding of this field.

Especially for psychologists and other disciplines that focus more on the individual than society, creativity is predominantly assumed to be a complex psychological phenomenon (Plucker and Zabelina 2009) important in all aspects of personal and societal life and is not only the domain of artists (Mumford 2003). Csikszentmihayli (2009) lists curiosity, openness and perseverance as the three key characteristics of creative people and Rogers (1954) states that an internal locus of evaluation, openness to experiences, and the ability to toy with elements and concepts play a crucial role in establishing an individual's creativity. Besides being a psychological phenomenon, creativity is perceived as a sociological phenomenon (Runco 2004), as it is an interaction between one's abilities, one's current cognitive processes, and an environment in which an individual or a group designs a product socially perceived as creative (Casakin 2007).

Barron (1969) has divided the study of creativity into three categories, thus widening the debate: characteristics of the creative process, characteristics of a creative product and characteristics of a creative personality. As the creative process cannot be excluded from the direct and indirect effects of one's social environment and the study of personal characteristics is necessary to fully understand creativity, this becomes a multidisciplinary field in which an interplay of psychological, sociological, anthropological and several other fields is necessary to fully understand it.

The creative process is seen as one that should be managed (Fernandes et al. 2009) by the inclusion of certain tasks and a logical framework which supports the development of a solution to a given problem. The educational environment as a whole must nurture creativity (Warner and Myers 2009; Cankar et al. 2011; Esjeholm 2015). Instructional techniques require proper motivational approaches, which would improve creative skills (Daly et al. 2014) and teachers must find a way to explain what is perceived as a "creative" solution (Beghetto 2005) and support the culture of learning from failures (Kapur 2008; Edmondson 2011; Fouché 2013). An appropriate environment is needed, one which encourages the emergence of new ideas and curiosity. Runco (2004) defines this well, for he says that creativity is an interactional interplay of abilities, processes and the environment based on which an individual or group realizes an acceptable product within a particular social context which is both original and useful. The impact of both the so-called narrow environment, such as current group members when performing a creativity-based task, and the wider environment, such as family members and society as a whole, is important in supporting or limiting creative behavior.

On a general level, creative learning environments are connected to motivation, engagement, enthusiasm, creative thinking, emotional development and social skills (Davies et al. 2013). Additionally, studies show that the use of more playful approaches in the classroom supports the development of creative skills, critical reflection, dialogue and actionable outcomes (Hinthorne and Schneider 2012; Davies et al. 2013). Therefore, a thorough understanding is needed of the ways in which creativity is nurtured and of the instructional techniques that provide a suitable environment and motivation to unlock and develop creativity. Among the instructional approaches being proposed to develop creativity, building and testing models through experimentation or prototyping has received increased attention.

PROTOTYPING AS A METHOD OF ENHANCING CREATIVITY

Creative improvisation or "serious play" is at the core of creative thinking (Schrage 1999), and nowadays serious play and serious games research is an emerging discipline, receiving increased attention in scientific discourses (Mayer et al. 2016; Bush 2017). Experimentation through prototyping has been recognized as an effective creativity-based development tool (Boehm et al. 1984; Thomke and Reinertsen 1998) encouraging learning from failures

(Thomke 1998; Coughlan et al. 2007). Similarly, Poddiakov (2011) concludes that experimentation as an instructional technique leads to creativity and has significant potential to encourage creative behavior. Carrol et al. (2010) add that the experimental culture of prototyping advances creative learning because it allows for the quick testing of one's ideas and for the building on others' ideas.

Houde and Hill (1997) define prototypes as low- or high-fidelity representations, regardless of the medium, used to explore or demonstrate some aspect of the future artefact. Prototyping starts with early rough representations used to create a shared understanding. They encourage people to behave in new ways, to behave differently and to perceive changes as a sign of progress (Coughlan et al. 2007). In turn, this may result in higher motivation and an expression of creative potential. To achieve conclusions as to whether a prototype meets the requirements, high-fidelity representations are used later in the prototyping process (Hannah et al. 2012).

Prototyping as a teaching method is widely used in various educational settings, as a method of both developing general skills and solving specific problems. Prototyping and creative environments have been strongly connected to the unlocking of cognitive mechanisms linked to the emergence of new knowledge, especially in engineering (Berglund and Leifer 2012). Through the use of simple and concrete physical models, people communicate, give meaning and create stories about what were previously invisible thoughts (Hadida 2013). Access to a prototyping infrastructure has already been recognized as an effective solution by numerous communities, which are setting up so-called "makerspaces" or "hackingspaces" in public places such as academic institutions and libraries (Slatter and Howard 2013; Kurti et al. 2014). A makerspace is a place where a large array of tools is publicly available for people to create, collaborate, and work together on solving problems. To unlock creativity, the bringing together of people with different backgrounds and diverse ways of thinking is highly encouraged, as groups should consist of members with different specialties as loosely connected as possible to develop a novel synthesis (Harvey 2014). Additionally, an environment that provides feedback will challenge individual and group syntheses of novel solutions.

A CASE STUDY: PROTOTYPING WORKSHOP FOR STIMULATING LATENT CREATIVITY

Several studies concluded that creative thinking is declining both over time (Kim 2011) and with age among adults (McCrae et al. 1987) and students (Cheung et al. 2003). While studies show that creativity significantly decreases over time, authors investigating the development of creativity within adults also find the phenomenon of latent creativity (Evans 1967; Yong 1994; Herne et al. 2013) – creativity that exists in an unconscious or dormant form but has the potential to be expressed. The gap we are addressing is a lack of

investigation into the role prototyping plays in unlocking latent creativity within adults. Culturally speaking, this is an extremely important research field, as cultivating creativity is vital to cultural development in today's culture of conformity (Sternberg and Lubart 1995).

The authors of this study, who are all educators involved since 2004 in teaching creativity and problem solving at different levels of the educational system, have identified a need to develop creative thinking among adults.

In search of a best-practice case, the authors came across Design Thinking, a problem-solving methodology underpinned by academic work since the 1980s at Stanford University's design school and operationalized for use in institutions by the design firm IDEO. Action-based courses relying on the Design Thinking methodology have been introduced at different levels of the educational system, from kindergarten to university, to overcome problems with the traditional approaches. The Design Thinking methodology consists of five phases: empathize, define, ideate, prototype and test (Brown 2008; Scheer et al. 2012; Cassim 2013). Design Thinking has developed a strong framework in theory and practice (Carlgren et al. 2016), but in 2004, when we started developing workshops to enhance creativity, relatively few teaching tools and exercises were available. Therefore, we developed several teaching tools and exercises to teach and develop different aspects of the Design Thinking process.

Among them was the "spork" exercise, which the teaching team developed in late 2007. This exercise was designed to teach the process of ideation, prototyping and testing, using a real-life everyday problem. The exercise's main goal was to teach students techniques for rapid prototyping. It was designed as a simple two-hour workshop that would help students understand the benefits of rapid prototyping with minimal requirements for special equipment.

The workshop begins with a short introduction of a simple problem. Six slides are presented showing a young mountain climber ascending a remote mountain alone. He has plenty of equipment, which he carries in a heavy backpack, but he refuses to adapt his eating habits to the specifics of the environment; he likes to eat as if he was at home. He carries a set of stainless steel cutlery that he uses to keep his hands clean. However, the cutlery is heavy and impractical and could damage his backpack. The participants are first asked to identify as many problems as they can from the given story. They do this through a brainstorming session, which is followed by a brief discussion of the potential solutions to the identified problems. This first part is intended as a brief practice of observation and empathy and also as a warm up for the rest of the workshop.

To narrow the workshop's aim and define the problem, participants are presented with a design brief asking them to develop a new tool. This new tool should include all the functionalities of traditional cutlery and tackle all key issues with the existing solution.

In the next stage, participants initiate a brainstorming session to search for novel solutions. They cannot use internet-enabled devices to look for existing solutions. Participants form groups of up to four members and sketch three different ideas, then present them to the classroom.

The exercise's most important phase comes next. After presenting their initial solutions, participants receive simple prototyping materials, such as plastic cutlery, ropes, aluminum foil, Post-it notes, cardboard, etc. They are asked to make rapid prototypes of the proposed solutions that they will show to the rest of the classroom.

The developed prototypes are presented to the classroom and each group is required to test the developed prototypes on members of other groups, using the feedback to improve their prototypes. Finally, the final prototypes are presented and discussed with the rest of the classroom. The lecturers conclude the session by emphasizing the key learning points.

As described above, the workshop was initially designed to teach participants about different tools and techniques of rapid prototyping (e.g., sketching and building prototypes) and to emphasize its role in testing different aspects of the proposed solution. However, the workshop gained other unexpected results and we became interested in studying them. We discovered that the workshop also has strong effects on participants' creative behavior. To study the effect of rapid prototyping on unlocking latent creativity, we used an experimental approach in which we systematically monitored the process and gathered data about its results.

Since its conception, the workshop has been repeated 29 times in various settings, with participants ranging from elementary school children to university professors. In total, 1,779 registered participants have developed more than 400 prototypes.

We carefully monitored different phases of the process. After each iteration, we systematically discussed the different phases and modified them to better fit the workshop's goals. Throughout the process, the backbone of the workshop has remained more or less the same, with some improvements to make the workshop more efficient at delivering the key learning points.

In what follows, we present a pre-experimental one-shot case study (Campbell and Stanley 1963) of a workshop which took place on April 24th, 2017. It was the sixth module of a 12-module voluntary program for an interdisciplinary group of young unemployed graduates from different disciplines, designed to increase their employability. Twenty-four participants attended the session along with three lecturers and two junior members of the faculty where the research took place. The results of the workshop are compared to the average results of all previous workshops and the implications are discussed.

"SPORK" WORKSHOP CASE #29

The workshop began at 17:00. There was no introduction to the workshop's outline or goals. Participants, who voluntarily visited a soft skills development program, were presented with six slides describing the problem (see Figure 1). The process was repeated to ensure that participants understood the story. Storytelling finished at 17:10.

Participants were given five minutes to individually identify as many problems as they could from the story given. The identified problems were written on a whiteboard. Twenty-one problems were identified, covering different aspects of the presented story, such as:

Figure 1: Problem description. Original construction (Photos: R. Stritar).

the climber is alone, his backpack is too heavy, he is not physically fit, etc. An additional 15 minutes was allocated for a group discussion of the identified problems and for a group session that proposed solutions to the identified problems. This concluded the workshop's first part, which was designed to create an understanding of and identify the problem and to practice brainstorming. It also served as a warm up for the exercise's central part.

The central part of the workshop began at 17:31. From this stage on, the workshop focused on only one problem – the impractical, space-consuming and heavy cutlery. In the next exercise, participants were introduced to the written design brief. They were organized into seven groups of three to four participants. Each group had a brainstorming session in which its members proposed solutions to the presented problem. The results of the brainstorming session were presented in front of the other participants. Nine potential solutions were presented in the form of drawings in front of the classroom. Each solution was evaluated for novelty, which is hard to measure because the literature has proposed no universally accepted measurement scale. For this study we combined the approaches of two highly cited papers, which both propose a three-level measurement scale for categorizing products into different levels of creative output. Howard et al. (2008: 175) constructed a three-level scale of creative output:

- A creative output: An idea that is both original and appropriate.
- A creative design output: A design output containing at least one creative output at the systems' level under study.
- A routine design output: A design output containing no creative output at that particular systems' level.

System, in our case, was defined as the product or service being designed. Because Howard et al. (2008) propose no operationalization of measuring the level of creative output, we turned to Carbon and Leder (2005), who propose three levels of innovativeness

to measure the novelty of proposed products: "low", "medium" and "high levels of innovativeness". Novelty is measured according to the evaluator's personal perception. Combining both approaches, we used the following measurement scale to assess the novelty of solutions (products or services):

- "Low levels of creative design" were ascribed to solutions that were very similar to those that already exist.
- "Medium levels of creative design" were ascribed to solutions that were similar to solutions developed in previous iterations of the exercise (but that do not really exist).
- "High levels of creative design" were ascribed to those solutions that were significantly different from what already exists and from what has already been seen in previous iterations of the exercise and that presented completely novel solutions to the problem.

As in similar studies, novelty was measured according to the evaluator's personal perception, although we recognize that this method poses some serious problems. First, it relies on the judges' subjective view of the prototypes' innovativeness. Second, it can put subsequent participants in uneven positions. Last but not least, participants can consider their prototype to be innovative, since they have not seen it before, yet the judges might not agree with them. The debate over assessing creativity within different educational contexts is active in the scholarly literature (Penaluna and Penaluna 2009a), but our aim is not to add to this debate. Based on the abovementioned shortcomings we propose that future research use additional assessment methods and compare results with other methods to assess which methods should be used in the long term. Our intention with the workshop was not to actually develop new marketable products, for which more complex methods of assessing workshop outcomes would be required. Instead, the workshop's goal was to help participants express their creativity using physical prototyping – a rarely used method in such educational contexts – rather than simply thinking about or drawing their ideas.

Therefore, after the prototypes were completed at various stages of design, the two lecturers acted as judges of the proposed solutions. They rated each solution according to a three-level scale based on the definitions listed above. The inter-rater reliability was adequate (seven out of nine assessments were identical, i.e., a 78 percent agreement). In only two instances could the judges not agree on the level of creative design, so a third evaluator was called in to mediate the discussion and ultimately reach a conclusion as to where to classify the product. Among the nine presented drawn solutions, five groups showed very "low levels of creative design", four offered "medium levels of creative design" and no group presented solutions showing "high levels of creative design".

At 17:45, the initial presentations concluded and participants received a stack of low-cost prototyping material. Boxes containing the prototyping material were placed on the floor in the middle of the room and everybody could use any material to create a functional prototype of their idea. Participants were also allowed to use any material (such as empty bottles) available in the room. Until that time, participants did not know they would be creating physical prototypes, so the first reaction was shock, followed by vivid

action. Groups partially split up, with several individuals creating their own prototypes. The initial round of prototyping resulted in 20 prototypes. Not only did the number of developed solutions significantly increase, but so too did the proposed solutions' level of creativity. The teaching team graded eight of the developed prototypes as having "low levels of creative design", being very similar to solutions currently on the market or being a simple recombination of the prototyping material. Seven prototypes were graded as having "medium levels of creative design", as they included functionalities that have been developed during previous iterations of the workshop. Five prototypes included concepts and solutions that have never been developed during the 28 previous workshops, and they proposed totally new functionalities. Those five were rated as solutions with "high levels of creative design". Figure 2 shows all 20 prototypes and their rating regarding the level of creativity, with highly creative in the right column and low levels of creativity in the left column.

At 18:20, the participants regrouped and tested the developed prototypes with the other groups that had the task of identifying the prototype they assessed as being the most promising. At 18:30, they started another round of prototyping with the goal of enhancing and upgrading the most promising prototype. This resulted in six developed prototypes, which were significantly enhanced compared to the initial solutions.

At 18:40 the participants started testing these enhanced prototyped solutions with other participants. Each group tested its prototype with two other groups, gathered feedback and improved its prototype. A final round of improvements based on the users' feedback began at 18:49. At 19:00 the groups began preparing short presentations of their prototypes in the form of a play emphasizing the developed prototype's key attributes. The workshop concluded at 19:20 with a wrap-up given by the lecturers.

THE RESULTS: CREATIVITY UNLEASHED

Careful monitoring of the process that unveiled itself during the workshops and systematic gathering of the data related to the achieved results have led to several interesting observations of the prototyping process and to new insights into the effects of rapid prototyping on participants' creative behavior.

First, as anticipated, upon introduction of the design brief, the participants' reaction was typically non-enthusiastic, as participants regarded the exercise as childish. Participants frequently reached for their internet-enabled devices to search online for existing solutions, which was not allowed.

Second, after the initial brainstorming session, the variety of ideas and proposed solutions was fairly small and the quality of presentations was typically low. Our data show that less than one-fifth of the presenters used anything other than a verbal presentation to describe the initial prototypes. When encouraged to show their proposed solutions to the rest of the classroom, participants used simple drawings, and the proposed solutions' level of development was very basic. This resulted in a low level of interest among other participants in terms of seeking to understand the other groups' solutions.

Figure 2: Level of creativity. Original source (Photos: R. Stritar and B. Zupan).

Third, the introduction of simple physical prototyping material and the requirement that participants actually build something with it triggered an intensive creative process. After their initial shock upon learning what they were expected to do, the vast majority of participants rapidly engaged in intensive prototyping. The initial barriers were broken and latent creativity was unleashed. This resulted in two outcomes: a drastically increased number of developed prototypes and an increase in the level of creativity of the developed prototypes. Furthermore, the room rapidly filled with vivid activity accompanied by laughter – an atmosphere that would remain until the end of the session. This indicates the importance of playfulness and enjoyment to creative work. When asked to test the prototypes, the participants proudly showed their products to the other groups and defended their features so passionately that the moderator had to remind the participants that they were testing the product, not selling it.

Finally, the level of creativity of the developed prototypes exceeded what was expected during development of the workshop. Our data shows that 85 percent of groups develop prototypes with features different from most products currently existing, and that after 29 repetitions of the workshop with 1,779 participants, over 20 percent of the developed prototypes still include concepts completely different from anything developed in previous workshops (e.g., a portable 3D printer for food, an apron for carrying cutlery, solar-powered drones and others).

We found the results presented above to be unexpected and intriguing. In the Design Thinking methodology, prototypes are developed to test the viability, desirability and feasibility of the proposed solutions; they are not intended to play an important role in triggering latent creativity. However, our study suggests that "thinking with your hands" was one of the key triggers for creative behavior.

The number of novel concepts developed in each session provides for the argument that most of the participants have high latent creative capacities. The ability to playfully create new physical prototypes seemed to be an efficient trigger for the development of new products. We are often presented with radical out-of-the-box solutions that go well beyond new forms of cutlery, such as helicopter food delivery services, recyclable gloves that keep one's hands clean, electronic kitchen gadgets, etc. This indicates that rapid prototyping might be an important catalyst for triggering creative behavior in the educational environment.

Another important aspect that can be gleaned from the workshop results is the power of playful behavior and atmosphere. Blanchard (1995) defines play as a behavioral form having both behavioral and cultural dimensions that is difficult to define at the exclusion of all other behavior. Yet, a variety of traits distinguish it. It is pleasurable, voluntary and often unreal. The data gathered from the studied workshop suggests that playful behavior leads to interesting results with higher levels of creativity and more participant engagement. We believe this has strong implications for course designs, suggesting that courses should include more playful situations to boost creativity and performance.

For all educators using the Design Thinking methodology in their course design, our findings emphasize the importance of quickly moving through different phases of the design process and repeating more than one iteration of every phase. The gathered data show that rapid prototyping has resulted in a wider variety of ideas than the brainstorming session, which was intended to generate a large number of out-of-the-box ideas.

Our study also points out one possible hazard of the "literature review" process in terms of developing creative solutions. In the scientific method, the literature review is a means of gathering information about existing discoveries to produce conditions for new discoveries, as well as to avoid re-discovering that which previous researchers have already discovered. Similarly, students often receive instruction to first carefully study what the competition is doing and then to propose products and services that have a competitive edge over what the market currently offers. However, this is a very delicate process; often, the act of studying what others do limits methods of addressing problems and therefore leads to a failure to develop creative solutions. On the other hand, preventing participants from studying previously developed solutions results in a situation in which some of the products are similar to existing ones while others are novel solutions. This is not to say that, when developing new products and services, designers should be ignorant of existing solutions. Our observation suggests that the best results are gathered through a two-step process. First, participants seek novel ideas without reviewing and assessing existing solutions. Next, they test their prototypes, compare their functionalities to the functionalities of existing solutions, and upgrade their prototypes accordingly.

CONCLUSION

From observing group dynamics and creative flow, we found it evident that specific processes (e.g., the use of prototyping techniques) propel creativity, and that creativity is a process by itself with the goal of producing solutions which include at least some level of novelty. The end output cannot be attributed to any particular individual and also includes a recombination or transformation of existing ideas, products and services. As this is a group activity, we observed the ways in which interaction between people from different disciplines affects the group dynamics and the level of the group's creativity. According to the model of learning communities, when people from different backgrounds work on common assignments, the social and intellectual connections between students grow stronger (Zhao and Kuh 2004). As new knowledge is constructed through social activities and depends on social resources (Phillips 1997), a multidisciplinary approach reportedly has a positive effect on the quality of group work (Veryzer and Borja de Mozota 2005), as has already been reported in the case of a Slovenian co-working community (Poljak Istenič 2015). Therefore, working on multidisciplinary teams might increase the chances of the development of a successful solution (Florida 2002); this is another of the observations

from our workshops, in which groups heterogeneous in terms of educational background produced prototypes that were equivalent or superior to prototypes provided by more homogeneous groups. Specifically, the combination of people with a technical background and people with a background in the arts seemed foster the creation of superior prototypes in terms of creativity, as all but one of the solutions graded as highly creative and only one solution graded as low in creativity were developed by heterogeneous groups. The sample was too small to perform any rigorous statistical analysis, so this remains an observation in need of further confirmation on a larger sample.

Nevertheless, the findings from our research have important implications for contexts in which creativity must be induced. Our study shows that rapid prototyping is a promising tool for stimulating creative expression in adults. Considering latent creativity and possible ways to unleash it – including the diversity of participants and the heterogeneity of the groups involved in a process – might be an important piece of the puzzle for companies seeking to innovate new products and services (Penaluna and Penaluna, 2009b; Setnikar Cankar and Petkovšek 2013) and for urban areas (Poljak Istenič 2016) or regions (Ravbar and Bole 2007; Klun and Setnikar Cankar 2013; Kozina 2016) seeking to revitalize their communities, spaces or creative industries. The same applies to the educational environment, where the introduction of rapid prototyping might induce creative behavior and create a constructive atmosphere for the development of novel ideas. Therefore, the results indicate that rapid prototyping workshops might be a valuable addition to all settings requiring creative behavior.

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SPODBUJANJE LATENTNE USTVARJALNOSTI S HITRIM PROTOTIPIRANJEM

Ustvarjalnost je že vrsto let tema tako strokovnih kot znanstvenih razprav v različnih disciplinah, v poslovnih in izobraževalnih krogih pa obstaja soglasje, da je ustvarjalnost mogoče in potrebno razvijati za družbeni napredek. V tem kontekstu so pogosto omenjeni tudi elementi igre in eksperimentiranja - prototipiranja kot učinkoviti načini spodbujanja ustvarjalnosti. Namen tega prispevka je bolje razumeti vlogo skupinske prototipne delavnice, ki temelji na metodi oblikovalskega pristopa (angl. design thinking*) pri spodbujanju latentne ustvarjalnosti – to je ustvarjalnosti, ki jo imamo vsi, a so le redko primerne okoliščine, da bi jo ustrezno izrazili. Ocenjevalca sta po tristopenjski lestvici spremljala vpliv različnih nalog na ustvarjalni odziv udeležencev. Ugotavljamo, da se ustvarjalnost udeležencev spodbudi s pomočjo hitrega prototipiranja, ki v primerjavi z opisovanjem in risanjem zamisli poveča raven ustvarjalnosti rešitev.*

Rezultati nakazujejo, da so praktične vaje izjemno učinkovit način za spodbujanje generiranja raznovrstnih zamisli in ustvarjalnosti pri odraslih, ki se sicer pretežno dojemajo kot neustvarjalne. Poročamo tudi o vrsti konkretnih, praktično uporabnih opažanjih. Prvič, udeleženci se pri nalogah, ki spadajo v okvir tako imenovanih resnih iger (angl. serious play*), tudi izrazito skupinsko in individualno angažirajo ter zabavajo ob reševanju predstavljenega izziva. Drugič, podatki kažejo, da kljub 29 ponovitvam delavnice vsakič še vedno približno 20 % udeleženih skupin izdela rešitve, ki imajo elemente, ki jih ni razvila še nobena skupina pred njimi (npr. prenosni 3D tiskalniki hrane, predpasniki za prenašanje pribora, brezpilotno letalo na sočni pogon in podobno). Tretjič, na stopnjo ustvarjalnosti kot skupinskega procesa pozitivno vpliva tudi heterogenost skupin. Četrtič, raziskovanje danih možnosti je pri ustvarjalnih nalogah lahko dvorezen meč, saj nas opazovanje danih rešitev lahko hkrati informira in omeji pri lastnem razmišljanju zunaj okvirov. Pri prototipni delavnici smo uporabili dvostopenjski proces, pri čemer v prvi fazi udeležencev ne spodbujamo k pregledu razpoložljivih rešitev, temveč k samostojni graditvi prototipov, v drugi fazi pa prototipe primerjajo med seboj in z drugimi, že razpoložljivimi rešitvami, in jih nadgradijo.*

Vaje hitrega prototipiranja oziroma uporaba teh pristopov v kombinaciji s heterogenimi skupinami udeležencev so lahko učinkovit dodatek pri razvoju ustvarjalnih rešitev pri konkretnih družbenih in poslovnih problemih.

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