BUSINESS GAME AND ITS RELATIONSHIP WITH CREATIVITY: A SYSTEMATIC LITERATURE REVIEW

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Abstract

This paper aims to analyze the relationship between the development of creative potential and business game. For this, we carried out a systematic bibliographical review of 157 articles hosted on the Scopus and Web of Science platforms and published between 1970 and 2016. The results present in the same scope the analysis of publications with different research approaches on the theme, connecting authors' studies which, until then, had not been interconnected; The use of business games as a positive return factor for the environment; The intrinsic relationship between creativity techniques and business games. We also found business games main objectives are the encouragement of collaboration skills development, the elaboration of strategic plans and the simulation of specific realities. Regarding the development of creative potential, the business games analyzed in the articles consider it as a secondary factor that manifests itself during the game.

Keywords: Creativity, Business game, Design learning, Innovation, Creative techniques

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1 INTRODUCTION

Creativity is one of the key elements of contemporary education due to the fact the creation of knowledge is much more important than simply replicate it (Gallos, 2009). Still, there is no standard concept to define the term, since different authors interpret it from different perspectives. Creativity is studied by several areas of knowledge, such as psychology (Csikszentmihalyi, 1999), administration (Amabile, 1988; Agogué et al., 2011), and engineering (Hesmer et al., 2011) and each interpretation considers key aspects of its application area.

To Amabile (1988) creativity is the product of new and useful ideas of an individual or small group of people working together. Also, creativity is an intricate concept generally recognized as an integral part of design and innovation processes (Valgeirsdottir et al., 2014), since it is necessary to promote product ideation, innovation and feed into other stages of the design processes (Sethi et al., 2001).

In the last decades there has been observed a new research field relating creativity with technological tools such as business games. This field seeks to investigate the cognitive and behavioral effects of games on players and their influence on individual and collective performance within organizations as a way to stimulate innovation. Hesmer et al. (2011) emphasize that using the game for the purpose of generating ideas is an efficient and productive way to carry out the innovation process.

Although there are various definitions for creativity and several authors relate it to the ideation process, this article approaches ideation as part of a global process of innovation (Rothwell, 1992) that contributes to generating useful ideas (Vaghefi and Huellmantel cited by Hesmer *et al*., 2011). To address this thesis some key authors were used as a guiding base to understand this theme, such as: Rothwell (1992), Csikszentmihalyi (1999), Hesmer et al. (2011), Bogers and Sproedt (2012) and Agogué et al. (2015).

Therefore, this study presents as research problem the following inquiry: how do business games relate to creativity? This article aims to connect these two important constructs, for the effectiveness of product design, through a systematic review of the literature on the subjects addressed. This article is structured in the following way: after this brief introduction, the research method is the second section, followed by the theoretical review on the themes of creativity and business games, in Sections 3 and 4. In the fifth, the results are presented and discussed through the interpretation of the data, and last, the final considerations are presented in Section 6.

2 METHOD

The method of this study was systematized in three phases. The first phase mapped the state-of-the-art on business game related to creativity. For this, the initial research on the theme used the terms *Business Game* and *Enterprise Game* combined with the topics *creative*, *creativity*, *creativity technique* and *creative technique*, whose combination returned 920 results between titles, abstracts and keywords found on the Scopus and Web of Science platforms and published until December 2016.

This result presented vast variety in the papers approach and required the establishment of filters to refine it, which constitutes the second phase. The criteria defined to configure the search were: 1) file type - articles; 2) subareas - engineering and business; and 3) objective - in which the articles directed to the universe of games, gamification, creativity and innovation techniques were selected. After this criterion, 73 articles were analyzed from which 64 proven to be useful.

On the findings section this paper presents the connection between business games, creativity and product design creativity. This connection is detailed through examples linking creativity techniques with games; creativity within the product design processes; design process in a game design context; and games with design and innovation.

3 CREATIVITY

Researchers from different areas of knowledge have studied creativity without achieving a universal definition. It is possible to point out, based on the systematic literature review carried out, there is no consensus among the authors regarding the concept of creativity, and its meaning can be categorized into two distinct currents of thought. Table 1 summarizes the concepts of creativity presented in the researches and demonstrates this diference of interpretations.

The concept of inherent creativity comprises the term as the fruit of people's intelligence or geniality, who were born with a different sensibility and worldview and in whom creativity comes from the behavior of the individual - is intrinsic to them and their personality. The second current understands that creativity means something can be learned and provoked through exchanges with the environment and appropriate stimuli, and it is possible to develop a creative potential.

Table 1. Evolution of creativity concepts

AUTHOR	YEAR	CLASSIFICATION		CONCEPT
		Inherent	Nurtured	
Torrance	1974		•	A process of being sensitive to problems, deficiencies, gaps in knowledge, missing elements, disharmonies, and so on; Identify the difficulty: to search for solutions, to make assumptions, or to formulate hypotheses about the deficiencies: to test and to retest them; And finally communicate the results.
Amabile	1989		•	Relevant competencies for creativity depend on training, through which they can be explicitly taught, or simply from the experience in generating ideas, through which an individual can develop his strategies of creative thinking.
Thompson	1991		•	Existing combinations and cliches need to be broken in order to form new combinations, combine ideas, and change existing patterns. Break the cliches.
Nonaka and Takeuchi	1995		•	The process by which new knowledge is created within the organization becomes the cornerstone of innovative activities. This process is dynamic and interactive.
Gurteen	1998	•		All are naturally creative and the need to create is a fundamental and guiding force of the human being.
(PDMA) Product Development and Management Association	2004	•		An arbitrary harmony, an expected amazement, a habitual revelation, a familiar surprise, a generous selfishness, an unexpected certainty, a formidable stubbornness, a vital triviality, a disciplined freedom, an intoxicating firmness, a repeated initiation, a difficult treat, a bet An ephemeral solidity, a unifying difference, a demanding satisfying, a miraculous expectation, and anguish accustomed.
Walfisz, Zackariasson and Wilson	2006		•	The process of bringing something new into life by becoming sensitive to the gaps in human knowledge and subsequently seeking to fill these gaps and communicate success.
McWilliam and Dawson	2008		•	The 'creative capital' and the combination of several pedagogical principles, when considered together, can constitute a framework to systematically orchestrate a learning environment that stimulates creativity.

However, we verify that such concepts have in common the comprehensiveness of the definition, considering creativity as something abstract, which lacks a method (Thompson, 1991; PDMA, 2004), as a goal-oriented approach (Nonaka and Takeuchi, 1995) or as a category of behavior not intrinsic to one's individuality (Torrance, 1974).

Normally research on creativity focuses on four main areas: process, product, people, and the creative environment (Bila-Deroussy et al., 2015), but these factors are not isolated and work together with other elements. For this reason, these authors analyzed creativity from the perspective of complex systems, addressing individual and collective creativity and the validation of creation through social, environmental and technical factors.

Yet, we identified other authors perceive creativity as part of the innovation process. Rothwell (1992) presented a model in the 1970s where innovation appears as a process of five steps: 1) Idea generation; 2) Development; 3) Prototype; 4) Manufacture; and, 5) Marketing and sales (Hesmer et al., 2011). Creativity then starts to be understood no longer as an abstract feature, but as part of a process of ideation

and development. Nowadays we know that creativity has an integral role in the design and innovation processes (Valgeirsdottir et al., 2014). More specifically, creativity is needed to promote product ideation and feed into other stages of design processes (Sethi et al., 2001).
Nonaka (1991) alerts the creation of knowledge feeds innovation, but knowledge per se does not. Therefore teams have a central role in creating content by promoting interaction and constant dialogue, and from this create new points of view that integrate different perception angles of the same issue from a collective perspective. Thus, the production of new ideas requires the recovery of existing knowledge, association of ideas and the creation of new knowledge (McAdam, 2004), besides its synthesis, transformation and transference (Lubart, 2001), therefore, according to Kryssanov et al. (2001) the creative process became analogous to the design process.
Our minds - or the cognitive processes it plays - reflect the social history in which the individual is embedded (Vygotsky, 1991), so the structure of each person's thinking is tied to their cultural universe and life experiences. In this sense, each mind is unique and the structure of the thought process tends to vary from one mind to another. Therefore, since creativity is not a plastered tool and is in constant flux, we understand there is no need in restricting the focus to one problem at a time.
Creative learning is identified as a process of collaboration and purpose (McWilliam and Dawson, 2008), and in this process the groups allow the creation of a synergism in which the whole is much more than the sum of the parts (Jones, 1999). However, it is possible to observe that the process of generating ideas faces large challenges to effectively manage the induction of knowledge and creativity in a collective activity (Nonaka, 1991).
Lau (2012) refers to Miller's research on creativity (1987, 1999) regarding the two ways to approach the matter in a group: through the use of linear approaches or intuitive approaches. The first focuses on helping the group understand their problem clearly and generate creative ideas through one or more pre-established techniques. The second expects the group to reach its inner state of calm to generate creative solutions, while the whole process happens without a fixed structure, allowing the use of varied techniques.
Due to lack of information about creative organizations there is a tendency to think the creative group in the same way as the creative individual, assuming similar considerations also apply to groups, their characteristics and processes (Walfisz et al., 2006, p. 491). However, the authors note that creative individuals are usually credited for their expression potential in given circumstances, while creative teams and organizations tend to be judged by the repetition of their performances. When members of a group feel comfortable with each other and share a high level of mutual trust, they work more creatively as a group (Tulenko and Kryder, 1990) and this level of trust allows for freer and less constrained associations. As Johns and Shaw (2006, p. 174) suggest "radically creative solutions are more likely to happen if a nonlinear research is performed".
Thus, it is plausible to note the direct relationship between the ideational process and creativity, as well as its contextualization in the scope of innovation and design processes. In addition, we observed how creative learning is a process of interaction that can be approached from different perspectives.

3.1 Creativity Techniques

According to Amabile (1988) the relevant skills to creativity can be developed in two ways: (a) training, through which they can be explicitly taught; or (b) experience with the generation of ideas, through which the individual is able to develop his strategies of creative thinking. According to the author, such skills include a favorable cognition to take new perspectives and explore new avenues in solving problems, in addition to persistent and energetic pursuit of the ideal solution. In this regard, Amabile (1983, p. 364-365) lists some key aspects of this cognitive profile, which include: (a) break perceptual set; (B) break cognitive set - or exploration of new cognitive paths; (C) keep response options open for as long as possible; (D) suspend judgment; (E) use "wide" categories when storing information; (F) remember correctly; And (g) break performance scripts.
There are several techniques to support the creative process. For Markley (1988) to employ visionary and transpersonal processes of knowledge is a means of gaining access to the relatively deep levels of intuition needed for problem solving. The author lists four techniques that make use of these processes: 1) Identifying the need; 2) transforming problems into opportunities; 3) evaluate strategies; And 4) transcendent exploitation, which explores the transcendence of intuition dimensions more deeply so that impediments can be removed (Markley, 1988, p. 86-93).

Factors such as time, space and resource limitation have a direct influence on individual creativity, being characterized as creativity inhibitors (Jalan and Kleiner, 1995). Thompson (1991, p. 45) addresses the issue of the creative environment with what he calls 'requisite variety', which means maintaining as much variety in a system as there is variety in the environment in which it is embedded
The author also says the continuous practice, learning and reflection of the 'requisite variety' increases the recognition of potential new combinations of things and ideas. The great variety of approaches to solving a problem involves generating as many views of the problem as possible, given the limitations of time and resources (Thompson, 1991, p. 45).
In turn, Jalan and Kleiner (1995, p. 20) propose exercises as a means to fully develop the creative potential in people and organizations: "programming management; the use of Fisher association lists; Games in small groups; and establish a reward program for creativity in organizations" (Jalan and Kleiner, 1995, p. 20). Within their studies the authors found using the Fisher List increased productivity and encouraged individuals to work longer on creative activity.
We thus perceive the variety of techniques available to encourage the creative development and performance and the natural propensity of humans towards creativity.

3.2 Creativity and Product Design

The presence of creativity in product design has becoming increasingly useful, since this process is also linked to creative thinking through an integration of creativity and innovation in favor of improvements in the area Product Design Development (Goel and Singh, 1998). Hsiao and Chou (2004) reiterate the importance of integrating these builders, and emphasize creativity techniques are important to improve the design performance of innovative products.
Among the ways in which the creative process happens in product design, one can mention the generation of ideas phase. According to Howard et al. (2008) the process of ideation is inserted not only in the creative process, but also in the design process, since product design must take place from an initial idea. The authors also delineate the categories of creativity and design and propose that understanding the nuances of the creative process will result in a better understanding of the resources distribution, and thus in the improvement of performance and the final quality of the product.
As far as the ways of exploring creativity are concerned, techniques are visualized as facilitators of the creative process. Therefore, McKoy et al. (2001) deals with the comparison between graphic and textual representation as a technique to foster creativity during the product design process. The study confirms that the use of graphic representations offers more benefits to the design process of generating ideas than the use of text alone. For instance, sketches allow the designer to have clearer thoughts, as well as facilitate spatial and geometric reasoning during the conceptual design phase of the product.
Li et al. (2006) state that design methodologies have a great impact on creative design, once the proper use of a design method can help inspire creativity. The authors also state that the application of creative product-oriented design aims to explore and improve the secondary function of the object, used in order to give the product a good acceptance in the market. Therefore, the results of their study presentes the most important attributes of creativity in creative design: styles of thought, knowledge, information, design methods and support tools.
Given this understanding, the insertion of creativity in the design process gives designers an escape from the usual thinking. Hence, it provides improvements and innovations to the product created, targeting the audience and the market in which it will be launched. In this way, the expectation is to produce increasingly creative and innovative products that can grant competitive advantage to the business market and / or benefits to society.

4 BUSINESS GAMES

Games are not a new form of interaction (Deterding et al., 2011). However, these authors understand the recent growth of interest from the academy towards the subject is directly connected to the gamification of learning. In this process game elements are used in contexts and platforms not directly related to games reality. These kinds of games are typically described as completely developed for non-entertainment purposes (Deterding et al., 2011) with the goal of transferring knowledge to a particular individual (Agogué et al., 2015), or they may be innovative educational tools to involve participants, let them feel both satisfied and develop new skills and knowledge (Ceschi et al., 2014). Games are also a

source of creativity, support for the development of social skills and a trigger for learning and innovation (Thomas and Brown, 2011).
Nevertheless, while playing is an unrestricted act games give the player a direction to follow due to existing orientations, goals and objectives, such as winning or advancing level (Bogers and Sproedt, 2012), but also the incentives to overcome them by re-evaluating the knowledge in question, a factor that explores all players potential of combining resources (Agogué et al., 2015). Games are generative in order to assist participants in generating ideas for future scenarios (Gudiksen, 2015).
Ahamer and Schrei (2006, p. 228) study the focus of these games and agree role playing invites the individual to lean out from their convictions without leaving them completely, and allows - but does not force - the understanding of facts from another point of view within the subject of interest and tension. In addition, the authors understand the virtual environment makes it possible to visualize the consequences of decisions without their sequels in the real world - "error free - consequence free - pain free".
The game perspectives are created based on requirements and constraints of a problem. After that, designers retrieve relevant information and knowledge from their minds in order to create initial design ideas, alongside perceptual stimulus that might help (Jin and Chusilp, 2005). This creative design process involves more iterations than routine design, since the designers need to think more in an iterative way to understand the situation and generate solution ideas (Jin and Chusilp, 2005).
During the game relationships emerge between players, since they need to either accept the perspectives given by the game or create new purpose for what they do and how they do it (Bogers and Sproedt, 2012). Thus, the authors believe players modify their perceptions and what they believe to be true because this process defies all expectations and involves conflicts and failures before reaching success.
Kolb and Kolb (2010, p. 47) understand the game as one of the greatest ways to experience learning in three fundamental ways: 1) the player assumes responsibility for their learning; 2) an equal value is delimited for the learning process and the result; and 3) the learning cycle is complete by allowing players to return to their familiar experience with a new perspective.
Djaouti et al. (2011) identified the main characteristics a serious game should have, in a general way: 1) simulation of reality and 2) role playing - factors that induce the immersion of the player in the virtual world. Agogué et al. (2015) complement this perception with the proposition of a third characteristic: 3) ability to sustain fast collaborations within the game.
In this context, Brandt and Messeter (2004) emphasize how the design of the game can facilitate collaboration. Corredor et al. (2014) add the game provides excellent support for learning, but per se it is not able to produce the desired effects, requiring the introduction of other elements (instructions, for example). Thus, the devices function only as tools to promote the creative process (Edmonds et al., 1995) and it is up to the individual to carry out the process.
There are several devices that offer support to create this immersive reality. These platforms can range from a sheet of paper to a complex video game, but the goal of both remains the same: engaging the player in a simulated reality (Djaouti et al., 2011). For them, these elements can facilitate to a greater or lesser degree certain specifications of this reality, such as the description of context, characters details, and game evolution in real time with the addition of difficulties or new players. Soeiro et al. (2016) identified in one of their studies that 53% of users list visual quality as the most important feature of a game, followed by ease of use (47%), addiction factor (33%) and story (32%). The researchers state all features related to the design and content of the game demand convergence of technology.
According to Illeris (2003), the games allude to the cognitive dimension of learning, the emotional dimension of mental energy, feelings and motivations, and to the social dimension of interactions external to the environment, such as participation, communication and cooperation. Thus, we can see the growing use of business games as educational and behavioral support tools. The perception that game aspects have a direct impact on the performance and involvement of the players with the performed task brings to light the need to obtain specific information about this tool in order to understand it in its totality.

5 RESULTS AND DISCUSSION

The progressive attention to the elements that compound business games as well as the identification of the game as a creativity technique (Jalan and Kleiner, 1995; Johns and Shaw, 2006; Hesmer et al., 2011)

demonstrate the direct relationship between the two areas of research. However, based on the analysis performed we can notice the game is not used specifically to promote creativity.

Through the stratification of the analyzed papers, we identified 51.6% of the research presented an interest focused on education, including aspects of cognitive, behavioral, business and technological education. In addition to these areas, studies with interest in companies, government, industry, and some with a purely theoretical focus were also identified. A few of these articles refer to more than one area, suggesting the themes correlation and diffuse division among the presented approaches. For example, the same study (Bogers and Sproedt, 2012) investigated a game under its cognitive and behavioural aspect and its purpose for business education, correlating the results found.

Therefore, we perceive games are widely used as a tool to simulate realities, but usually serve as an instrument of teaching and learning prior to the actual professional practice, or as a test mechanism for new academic and technological perceptions. The various researches referenced corroborate the grand relevance of business games within teaching and researching, being characterized by administration teachers as one of the didactic resources to be enhanced in the administrators training (Lopes, 2001).

Thereby business games have a didactic purpose since they transmit specific knowledge in a practical and experimental way, developing in the participants the ability to make decisions in the midst of a simulated environment, similar as much as possible to the real environment in which they will have to be actually fulfilled (Tanabe, 1977).

Accordingly, games are attractive due to the creation and sharing of knowledge happen at the same time of the emotional exchanges - which are natural for the human being (Minina and Nikitina, 2012). These authors also affirm that learning and playing are basic processes of human existence and reflect the development of skills needed to solve problems and act independently, among other factors.

Hence, we understand the game is a useful tool to foment education and a viable alternative for the traditional educational means of teaching, being already in use in different areas of knowledge, like marketing, management and administration. At the same time, creative techniques are used to exercise lateral thinking and indicate pathways to explore in order to find creative alternatives to solve problems, situations and create opportunities. The outline of both tools converges for their combined use, since the games and creativity techniques are interconnected in the player's own performance during a game activity.

Imagine a virtual scenario that simulates a reality and tells a story so the player goes through stages and arrives at the end of the game. To solve the problems encountered during the game the player needs to visualize this problem in his/her mind to understand it and to think of a resolution strategy - also visualizing the idea. Sometimes the first attempt does not work, and he/she has to try again by building the new idea from the observations made in the previous move. This process can be performed alone or in groups, depending on the platform and purpose of the game.

This short example applies to both leisure games and business games. In it, we observe some creativity techniques intrinsically contained in the act of playing, with no possibility to separate the processes, since these are interactive and happen concomitantly. The techniques are: 1) visualization of the problem; 2) visualization of the idea; 3) trial and error; 4) build upon the idea; 5) individual creativity; And 6) group creativity.

There are other examples of creativity techniques intertwined with game activity. The authors listed at Table 2 are only a few examples where creativity techniques were enabled through a game platform.

Table 2. Relation of creativity techniques and games

AUTHOR	Nakamura, Ohsawa and Nishio (2010)	Lau (2012)	Lhamaki (2014)
AREA	Cognition in concept processing	Learning and Creative Training	Game design process
GAME'S NAME	Analogy Game	Active World	Seaway Trailand others.
CREATIVITY TECHNIQUES	Ideation; Trial and Error; Build upon the idea; Games; Analogical thinking.	Ideation; Build upon the idea; Group Creativity; problem incubation; Variety of ideas; Drawing; Imagination; Games; Analogical thinking; Ideas checklist; Mind map; List of attributes; Force field analysis; Morphological synthesis.	Ideation.

These are basic techniques identified within the analysed articles and present in the vast majority of games. We notice the creativity is already inserted within the universe of games being one of its main elements, because it is the factor of direct connection between the player and the act of playing. Thus,

in general terms games already stimulate the player's creativity and lateral thinking. However, in the analyzed articles, creativity is a secondary factor in the process, since business games have other main objectives such as stimulating the development of collaborative capacities (Schwartz and Teach, 2002), strategic thinking (Schweiger et al., 1985; Jones, 2007), planning (House, 1970; Bots and Hofstede, 2004), management (Savolainen, 1997; Fumarola et al., 2012) and simulation specific realities (Bos et al., 2006).

6 CONCLUSION

The purpose of this article aimed to build the state of the art about creativity related to business games. Also, we intended to connect the elements in common between these areas in order to present the relevance of business games as a stimulus technique towards creativity. We accomplished this goal also connecting them to product design processes, stating the use of creativity techniques within games and the connection of creativity with product design processes. For that, we carried out a stratification of the research and presented the main application area of business games, characteristics and techniques of creativity; and its relation with design.

In addition, this paper contributes to the development of the literature connecting authors from different research areas under the same prism, through applications in the educational, business, technological and governmental areas as well as detailing the main authors to approach the theme. Thus, we perceive a two-way relationship regarding creativity and games: in one side, the increasing insertion of business games as a tool to foster a previously established goal, commonly related to cognitive and behavioral aspects; on the other side it also makes use of creativity techniques as support for ideational performance.

We also developed a thorough investigation which evidences the presence of creativity techniques in the game performance, identifying its paradox elementary role in the actions performed and secondary role in the researcher's objectives, since as previously evidenced, companies and institutions have been using this tool to stimulate specific features that do not include the development of creative potential.

As for the direct correlation between business games and the creative process, investigated in different areas of knowledge and evidenced by several researches here presented, it was possible to evidence its positive performance in people learning, stimulating social and cognitive characteristics and with great potential for results. However, it is still necessary to investigate the subject in depth to show a response pattern that allows the generalization of the results, linked to determinant and broader statistical analyzes.

In what concerns creativity and design process we can directly compare its functional structures and corroborate about their role in the innovation process. Besides, understanding the creative process and inserting it in the product design process results in enhancing the product design process and its final quality in addition to a better acceptance of the product in the market.

We should also clarify this study is a systematic review of the literature and didn't test the results in the field. Although for future studies we propose to go to the field in order to investigate the considerations observed through the creation and application of a business game whose primary objective is to foster creativity, conducting its tests in both an academic and business environment, with audiences of different genres and ages.

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