# Creativity as a gamification booster

**Inês ARAÚJO**[1]
[1]*University of Coimbra, Faculty of Psychology and Sciences of Education, LabTE*
*Email: inessaraujo@fpce.uc.pt*
*Orcid Id=0000-0003-0936-1411*

**Abstract**
In an educational context, gamification can promote students' motivation and engagement in learning activities. For teachers, the challenge of applying gamification can be complex. If on the one hand it is necessary to understand how to do it, on the other it is necessary to be creative. Creativity implies the act of creation, of producing something that may be the solution to a problem. Creativity helps to improve gamification particularly in the design process, but also during its application. During the planning of a gamified activity, teacher's creativity in the creation of the story, the diversity of challenges, the creation of surprise moments, can provide their students with a more engaging experience. But the gamified activity itself can also promote students' creativity, providing them with moments in which they can create solutions to the problems presented to them. Through a case study a teacher has been surveyed in the development of gamified activities. It was found that the creativity shown in the planning of the activities allowed students to have a high level of interest, but also expectation for the following tasks. Creativity was applied in the narrative that accompanied the challenges, but also in the diversity of the tasks proposed. Students were also asked to show their creativity in tasks where they had to achieve an unexpected goal, for which they had to find creative solutions. The whole experience increased the students' participation in tasks they did not carry out before. They even surprised the teacher with their solutions. Creativity worked as a booster in the gamified activities, i.e. the development of the story and the diversity of activities provided students with moments of enthusiasm. It is therefore considered that creativity can have a dual use in an educational context gamification, but also can provide students with a feeling of unexpected reward (booster) that increases their involvement.

**Keywords:** Gamification, creativity, education, motivation

## Introduction

Nowadays it is always important for teachers to find ways to engage students in learning, either through activities that capture their attention or through active methodologies. It is in the context of these new methodologies, increasingly adopted, that we find gamification (Araújo & Carvalho, 2022).

Gamification can promote students' motivation and engagement in learning activities (Xu & Hamari, 2022). But for teachers, the challenge of applying gamification can be intricate, several problems are identified when they are designing gamification (Xu & Hamari, 2022). If it is necessary to understand how to plan gamification, it is also necessary to be creative. Creativity is a complex ability that can be developed, but not always easy to accomplish. As part of a PhD research, several teachers were trained to apply gamification with their students. This highlighted a teacher where the creativity he applied in his activities provided more interesting results (Araújo & Carvalho, 2018, 2022).

Based on this study a question arose: How can creativity influence gamification? This paper aims to analyze the relationship between creativity and gamification, identifying possible ways they can influence each other.


O. Titrek et al. (eds.), *International Conference on Lifelong Education and Leadership for All (ICLEL 2023)*,
Atlantis Highlights in Social Sciences, Education and Humanities 17,
https://doi.org/10.2991/978-94-6463-380-1_17

**Gamification**

Gamification was firstly defined as "the use of game design elements in non-game contexts" (Deterding, et al., 2011 p. 9). This definition is the basis for many others that have emerged, adapting their characteristics to each context. For education context we got the Karl Kapp definition: "gamification is using game-based mechanics, aesthetics and game thinking to engage people, motivate action, promote learning and solve problems" (Kapp, 2012, p. 12). Gamification is a way of applying game design in different contexts, and it is carried out with the aim of creating a change. If in the marketing area the expected change is to attract new customers and keep them (Chou, 2015). In other areas, such as education, the change may be a change in behavior, increasing motivation or even engaging pupils in subjects that were otherwise boring (Kapp, 2012).

To explain how gamification can occur, Robson et al. (2015) created a circular model where they identified the three essential factors of gamification:

- Mechanics: "Decisions taken by the designers (the goals, the rules, the setting, the context, the types of interactions (i.e., opponents), and the boundaries of the situation to be gamified.)" (Robson et al., 2015, p. 413
- Dynamics: behavior that emerges in players due to the experience.
- Emotions - the emotional state and reactions that the experience provokes in the players - on from this depends on the permanence of the player in the experience.

At the center of the circular model, we find the subjects involved ranging from designers, to players, or even spectators or watchers. They are the essential elements in a gamified experience because it is through the emotion provoked that the objective is to be achieved. And it is these emotions that determine the continuation of the player/student in the gamified activity.

How these emotions can be activated is described by the Octalysis framework (Chou, 2015), which presents eight core drives that correspond to the motivations that can provoke interest in any individual (table 1).

**Table 1.** Core Drives described on Octalysis Framework (adapted from Araújo & Carvalho, 2022, p. 2)

| Core Drive | Explanation |
|---|---|
| CD1—Epic Meaning and Calling | "something that drives people to act because they believe that they dedicate their time to a greater goal" |
| CD 2—Development and Accomplishment | "the desire to reach the next level, the development of skills, the need to overcome challenges that motivates action" |
| CD 3—Empowerment of Creativity and Feedback | "the creative process through which players discover new things and try new combinations, e.g. Lego and art;" |
| CD 4—Ownership and Possession | "the need to own or control something, e.g. collecting items;" |
| CD 5—Social Influence and Relatedness | "all the social factors that impel the human being in the accomplishment of some-thing: mentoring, social acceptance, feedback, companionship, competition or even envy" |
| CD 6—Scarcity and Impatience | "wanting something just because it is extremely rare, exclusive, or immediately unavailable;" |
| CD 7—Unpredictability and Curiosity | "what drives the action stems from the fact of not knowing what will happen after;" |
| CD 8—Loss and Avoidance | "the need to avoid something negative, such as losing the game or losing objects collected by not performing tasks in a certain time" |

It is worth noting the existence of a core drive named "CD 3-Empowerment of Creativity and Feedback", were the subject have the liberty to apply his capacity to create something or solve some problem.

**Creativity**

"Creativity is an act arising out of a perception of the environment that acknowledges a certain disequilibrium, resulting in productive activity that challenges patterned thought processes and norms, and gives rise to something new in the form of a physical object or even a mental or an emotional construct" (Walia, 2019, p. 6).

Creativity involves the act of creation, that can be the creation of something that may be the resolution to any situation previously identified. To be creative a person must go beyond the norms or rules. It is necessary to think outside the box. In a society where people are supposed to be normalized, this is a characteristic that stands out. For it is through creativity that all innovation occurs, enabling the changes we have seen throughout history. It is therefore a characteristic that is intended to be promoted in the educational context (Morais e Miranda, 2021).

The Componential Model of Creativity, developed by Amabile (2013), suggests that creativity depends on the interaction of three components: domain-relevant skills (which include knowledge, talent, and technical skills), creative thinking skills (which involve flexibility, fluency, and originality), and intrinsic motivation (which refers to personal interest in and satisfaction with the task). In addition, the model considers the role of the social environment in influencing creativity, highlighting factors such as recognition, reward, collaboration, and challenge. Being some with positive impact on creativity and others with negative impact. "People are most creative when they feel motivated primarily by the interest, enjoyment, satisfaction, and challenge of the work itself – and not by extrinsic motivators." (Amabile, 2013, p.4)

The Systems Perspective, formulated by Csikszentmihalyi (2014), conceives creativity as a systemic phenomenon that involves the interaction of three subsystems: the individual (who possesses a set of skills, knowledge, personality and motivation), the domain (which represents the field of knowledge or activity where creativity manifests itself) and the field (which corresponds to the social group that evaluates, validates and disseminates creative contributions). According to this perspective, creativity arises when the individual produces a variation in the domain that is recognized by the field as valuable and original.

If for Amabile (2013) creativity depends a lot on the person and his interests suffering negative influence by extrinsic motivation. For Csikszentmihalyi (2014) the context or social groups can have a very positive weight on creativity, influencing the creative process itself. In other words, there is creativity through the very recognition of the social group.

To be creative a person must have characteristics such as autonomy, self-confidence, openness to experience, tolerance for ambiguity (keep a question open even if the solution has not been found), willingness to take risks, passion for what you do or persistence (Barbot, Besançon e Lubart, 2015; Costa et al., 2015; Morais e Miranda, 2021) These are interdependent characteristics as they relate to and influence each other in different ways (Morais e Miranda, 2021). All these characteristics are easy to recognize. Autonomy and self-confidence are also associated with intrinsic motivation (Ryan & Deci, 2000), since for it to occur an individual must feel that they have a choice and believe that they have mastered the task they have to perform. Characteristics such as being open to the unknown and willing to take risks are also associated, because when we are willing to undertake new tasks or think outside the box, we are willing to take risks. Tolerance of ambiguity, on the other hand, is a characteristic that does not relate to the educational context, since the goal of each teacher is that the problem is solved and does not remain open for an indefinite period (Morais e Miranda, 2021).

In an educational context it is possible to observe Creativity in two ways: a competence that is intended to be developed in students and a competence of the teacher that allows to create different experiences (Morais e Miranda, 2021). Machali and collaborators (2021) examines how teacher creativity drives student engeniusity and investigates the key role of entrepreneurship education in explaining this relationship. They shows that entrepreneurship education positively mediates the relationship between teacher and student creativity. This shows that teachers' creativity can have a positive impact on their own learning.

**Gamification and Creativity**

As mentioned earlier (table 1) creativity is something that can be enabled by gamification to motivate the player. An example of this is Core Drive 3 Empowerment of Creativity and Feedback (Chou, 2015). Also, gamification can stimulate students' creativity by providing challenges, goals, feedback, and recognition (Knutas et al., 2014). This allows students to take risks in the face of new experiences by seeking solutions to situations presented to them. It always requires a sense of autonomy, a personal willingness to participate, something that is characteristic of all gaming environments (Chou, 2015).

There are several gamification models that have been analyzed by Tondello et al (2016, p.317) and twelve dimensions have been identified that can be characterized as occurring in gamified experiences:

*Intrinsic Motivation Heuristics*

- "Purpose and Meaning"
- "Challenge and Competence"
- "Completeness and Mastery"
- "Autonomy and Creativity"
- "Relatedness"

- "Immersion"

*Extrinsic Motivation Heuristics*

- "Ownership and Rewards"
- "Scarcity"
- "Loss Avoidance"

*Context Dependent Heuristics*

- "Feedback"
- "Unpredictability"
- "Change and Disruption"

The dimension associated with the intrinsic motivation of Autonomy and Creativity was identified in most of the models analyzed. The aim of this dimension is to help users satisfy their intrinsic need of autonomy by offering meaningful choices and opportunities for self-expression. Thus, creativity is presented associated with gamification to fulfil the needs or interests of the players themselves.

This association of creativity is well documented through various authors, including those mentioned (Chou, 2015; Tondello et. al., 2016). However there is a question that arises, what is the impact of the game designer's creativity? Can being more creative, i.e. developing a more creative experience with out-of-the-box activities, also influence the effect of gamification?

During the doctoral research project that was carried out, one of the subjects stood out for his creativity as he presented very creative activities (Araújo, & Carvalho, 2018). This led us to raise a hypothesis: the creativity of the teacher when designing the gamified experience can positively influence the experience itself.

**Method**

For four months, a group of teachers undertook training to develop gamified activities under the title "Strategies and digital tools to motivate students to learn through gamification". Throughout the course teachers understood how they could apply gamification, were presented with different tools they could use, designed their gamified activity, and implemented it in the classroom. In the last session the experience was shared among all.

During the training course, data was collected through questionnaires, participant observation, video recording and analysis of documents produced by the trainees.

For the present paper we have chosen to analyze only one of the subjects who stood out for his creative ability throughout the design process. Through this case study, we aim to raise questions about how the teacher's creative capacity influences the gamified experience for students.

The subject is a male history teacher who taught 8$^{th}$ grade students (13-14 years old). I did not have a full timetable, i.e. I only taught twelve hours a week. He had some experience with games, with preferences for puzzle, strategy, and discovery types (Araújo, & Carvalho, 2018, 2022).

All collected data were analyzed considering the indicated characteristics such as autonomy, self-confidence, openness to experience, tolerance for ambiguity, willingness to take risks, passion for what you do or persistence (Barbot, Besançon and Lubart, 2015; Costa et al., 2015; Morais and Miranda, 2021). This allows us to investigate two moments: the planning and then the students' reaction to the activities. Checking if the added creativity influenced the pupils.

**Findings**

The subject used various digital tools. In total, the students had to complete five tasks. The narrative that initiated and contextualized the activities was available in the adopted Learning Management System, as well as the objective of the mission, the role of the students and the tasks to be done.

The students were studying the History of Portugal in the 18th century. Their challenge was to understand the policy of the Marquis of Pombal in the face of various political, economic, and environmental circumstances. One of them was the earthquake followed by the tsunami of 1 November 1755, which destroyed Lisbon leaving countless dead.

The first task was a treasure hunt using the Huntzz app. Pupils arrived in the room and had a message indicating that they should access the treasure hunt. The teacher was not in the room. From the narrative they were told that they were going to help the Marques de Pombal find his notes that went out of the window. They needed them for

the hearing with King José I where they would have to present him with solutions for the improvement of the kingdom. The scavenger hunt took place in the school space, where pupils in groups followed the clues. At the end they met the teacher dressed as King José I, and had to present the solutions they identified.

For all activity carried out, each group received coins that were recorded in the Flippity Progress Indicator. These coins were needed in the last task, where they had to invest in the project to rebuild Lisbon's architecture through the acquisition of buildings.

Most of the tasks required students to do role-playing games and find the motives that guided the Marquis of Pombal to make some decisions to govern Portugal during the 18th century. A creative narrative allowed this involvement in the role-playing activity, and aroused curiosity to continue the task.

In addition to subject and content related activities, students were challenged to demonstrate their connection with the course. For one of the activities, students had to draw the letter H with students outside the class during recess. In another activity, they had to ask someone to send a message to the teacher indicating what they thought about the course. In both tasks they had complete freedom to find the best solution to finalize the task.

The teacher reported that the pupils possibly thought the teacher was crazy, but nevertheless were always engaged in carrying out the tasks. They turned to the teacher to find out if the task was completed and talked about what the next task would be.

Based on this description it is possible to identify creativity in two moments: planning (teacher) and application (pupils).

During the planning the teacher applied his creativity in:

- Narrative: To engage in role playing game activities the narrative had to be captivating. For this the teacher's creativity was essential, creating a meaningful narrative that created the necessary mystery to want to unravel the next moment.
- Diversity of tasks: A wide variety of tasks were developed, some of them unexpected, surprising the pupils.
- Give freedom to achieve the goal: The pupils were given the instructions, giving them freedom to carry out the task and solve the challenges set.
- Creating moments out of the box: All the tasks were different from the normal running of a classroom.

During the performance of the tasks, pupils demonstrated creativity when they:

- Do not know what to expect: Pupils accepted risk-taking in the face of something that was unfamiliar to them. The teacher was not even present in the room, yet they joined the activity with commitment.
- Had the freedom to choose how to solve: The teacher just pointed out the goal, telling them that they could do whatever they wanted. They were able to achieve the objectives without any suggestion from the teacher.
- Thinking outside of the box: The students surprised the teacher by solving the problems in an unexpected way. One example was learners who were not usually interested in the classroom taking over the group and completing the tasks with great commitment.

By examining the indicated characteristics: as autonomy, self-confidence, openness to experience, tolerance for ambiguity, willingness to take risks, passion for what you do or persistence (Barbot, Besançon and Lubart, 2015; Costa et al., 2015; Morais and Miranda, 2021) it is possible to verify the presence of creativity (table 2).

**Table 2.** Identified characteristics.

| | Planning | Tasks given to students |
|---|---|---|
| Autonomy | Ignored for 2 weeks the fulfilment of the program contents | Instructions on what to achieve without indicating how to do it |
| Self-confidence | He believed it would be an excellent experience for his students | Encouragement messages |
| Openness to experience | He listened to the students' opinion and adapted some rules | The students, even though they did not know what was going to happen, went along without asking questions |
| Tolerance for ambiguity | | Students chose how to carry out the tasks, so there were different paths. Some of them tried |

| | | |
|---|---|---|
| | | several ways, leaving a task unfinished hoping to find the solution. |
| Willingness to take risks | He decided to take a risk, even though he did not comply with the program contents | The students, even though they did not know what was going to happen, went along without asking questions. |
| Passion for what you do or persistence | Always enthusiastic and passionate | Persistent students, even in the face of diversity, tried different solutions |

From table 2 it is possible to see that the way it was designed influenced the way pupils performed the tasks. We can see that there is a mutual influence. The creativity of the teacher drives creativity in the pupils. Even without knowing what the teacher has prepared, they take risks and follow the instructions trying to realize what awaits them. They get into the tasks and don't want to disappoint the teacher, so they try to find solutions. Because of the type of tasks the teacher provides and the freedom they feel, they know they have the freedom to perform. They also want to achieve the reward.

The teacher said that he had been surprised by the students, as there were learners he had not yet been able to engage in his lessons, but they had solved the challenges in their groups with great commitment.

All this described example raises the question of the mutual effect of creativity. But it is not only with a case study that we can reach conclusions. Further research is needed on this issue.

**Conclusions and Recommendations**

We noted that the whole experience increased the students' participation in tasks they did not carry out before. All students completed the tasks or tried various ways to complete. They even surprised the teacher with their solutions.

In this case, the creativity worked as a booster in the gamified activities, i.e. the development of the story and the diversity of activities provided students with moments of enthusiasm. They felt they had a different strength, enabling them to find the best solutions. Booster is a game mechanic defined as something the player has access to allow him to achieve a sense of winning (Chou, 2015).

Creativity can be applied in the development and planning of the gamified activity, as well as being provided to motivate learners. Diversity of activities as well as creativity applied to a narrative can work as a reward, as a sense of empowerment that Boosters give to players. Creating the feeling that they are taking a risk because they do not know what awaits them also creates this effect.

Just as in education a creative teacher can influence the creativity of students, it is expected that the same will occur in gamification (Machali et. al., 2021; Morais e Miranda, 2021). Therefore, we considered that creativity can have a dual use in an educational context gamification, but also can provide students with a feeling of unexpected reward (booster) that increases their involvement.

Further research is needed in the future to see if this hypothesis is verified.

**References**

Amabile, T. (2013). Componential Theory of Creativity. *Encyclopedia of Management Theory.* New York: SAGE. Available in https://www.hbs.edu/ris/Publication%20Files/12-096.pdf

Araújo, I., & Carvalho, A. A. (2022). Enablers and Difficulties in the Implementation of Gamification: A Case Study with Teachers. *Education Sciences 2022, Vol. 12, Page 191*, *12*(3), 191. https://doi.org/10.3390/EDUCSCI12030191

Araújo, I., & Carvalho, A. A. (2018). Gamificação no ensino: casos bem sucedidos. Revista Observatório, 4(4), 246–283. https://doi.org/https://doi.org/10.20873/uft.2447-4266.2018v4n4p246

Barbot, B., Besançon, M. e Lubart, T. (2015). Creative potential in educational settings: Its nature, measure, and nurture. *International Journal of Primary and Early Years* 43(4), 371-381. https://doi.org/10.1080/03004279.2015.1020643

Chou, Y. (2015). *Actionable Gamification: Beyond Points, Badges, and Leaderboards*. Octalysis Media.

Costa, S., Páez, D., Sánchez, F., Garaigordobil, M. e Gondim, S. (2015). Personal factors of creativity: A second order meta-analysis. Journal of Work and Organizational Psychology, 31(3), 165-173. https://doi.org/10.1016/j.rpto.2015.06.002

Csíkszentmihályi, M. (2014). *Creativity: Flow and the psychology of discovery and invention*. Harper Perennial.

Deterding, S., Dixon, D., Khaled, R., & Nacke, L. (2011). From game design elements to gamefulness: defining "gamification." *Proceedings of the 15th International Academic MindTrek Conference on Envisioning Future Media Environments - MindTrek '11*, 9–15. https://doi.org/10.1145/2181037.2181040

Galetta, G. (2013). The Gamification: Applications and Developments for Creativity and Education. In *Creativity and Innovation in Education*. https://doi.org/10.13140/RG.2.2.24817.68965

Knutas, A., Ikonen, J., Nikula, U., & Porras, J. (2014). Increasing collaborative communications in a programming course with gamification: a case study. In *Proceedings of the 15th International Conference on Computer Systems and Technologies* (pp. 370-377). https://doi.org/10.1145/2659532.2659593

Kapp, K. M. (2012). *The Gamification of Learning and Instruction: Game-based methods and strategies for training and education*. San Francisco: Pfeiffer.

Machali, I. Wibowo, A. Murfi, A. & Narmaditya, B. (2021) From teachers to students creativity? the mediating role of entrepreneurial education. *Cogent Education*, 8:1, DOI: 10.1080/2331186X.2021.1943151

Morais, M. F. & Miranda, L. C. (2021). Creative Practices in the Classroom and the Creativity of Teachers: An Exploratory Study in Elementary Schools, *Revista Iberoamericana sobre Calidad, Eficacia y Cambio en Educación*, 19(3), 61-76. https://doi.org/10.15366/reice2021.19.3.004

Ryan, R. M., & Deci, E. L. (2000). Intrinsic and Extrinsic Motivations: Classic Definitions and New Directions. *Contemporary Educational Psychology*, 25(1), 54–67. https://doi.org/10.1006/CEPS.1999.1020

Robson, K., Plangger, K., Kietzmann, J. H., McCarthy, I., & Pitt, L. (2015). Is it all a game? Understanding the principles of gamification. *Business Horizons*, 58(4), 411–420. https://doi.org/10.1016/j.bushor.2015.03.006

Tondello, G. F., Kappen, D. L., Mekler, E. D., Ganaba, M., & Nacke, L. E. (2016). Heuristic Evaluation for Gameful Design. *Proceedings of the 2016 Annual Symposium on Computer-Human Interaction in Play Companion Extended Abstracts - CHI PLAY Companion '16*, 315–323. https://doi.org/10.1145/2968120.2987729

Xu, H. & Hamari, J. (2022) How to improve creativity: a study of gamification, money, and punishment, *Behaviour & Information Technology*. https://doi.org/10.1080/0144929X.2022.2133634

Walia, C. (2019) A Dynamic Definition of Creativity, *Creativity Research Journal*, 31(3), 237-247. https://doi.org/10.1080/10400419.2019.1641787