The grit game

Gamification

The Center for Educational Research and Innovation (CERI) of the OECD - Organization for Economic Co-operation and Development (2019) has recently drawn attention to a central theme of pedagogical research, which is related to gamification and play. Play undoubtedly represents one of the most explored themes in the pedagogical literature; despite this, as a multiform and multifaceted phenomenon, the play-learning relationship continues to be an object of study and analysis, to explore educators' perspectives and beliefs. Many international works aim to explore educators' perspectives and beliefs regarding this complex combination.

The play has been carefully observed and studied by developmental psychology and pedagogy for a long time with a focus on educational and growth contexts with particular attention to early childhood and the role of play in children's development and learning.

Nowadays, playful experiences and, more generally, playful learning have been placed in a lifelong and life-wide perspective. This is in line with the above-mentioned document by CERI, which points out that "the connection between playful experiences and learning suggests playfulness can be an important complement for education throughout people's lifetime" (2019, p. 2). Empirical studies and research on the subject have spread incrementally, particularly in the last decade, underlining the value of playful approaches in higher education and, more generally, with adults. The introduction of *gamification* elements in teaching and learning, including within the university setting, is now common (Deterding et al., 2011). Thus, a playful approach is encouraged in the training and professional development paths of many professionals.

In this context, gamification is defined as "the use of game design elements in non-game contexts" (Deterding et al., 2011). It refers to the addition of game-play mechanics in non-game environments with the aim increase of fostering change of behaviour and/or increasing motivation (Kapp 2012; Marczewski 2015; Deterding et al., 2011). According to this definition, the gamified process is based on rules, has a quantifiable outcome, has varying values attached, triggers the players' effort, creates attachment to the outcome, and entails negotiable (real-life) consequences (Juul, 2003).

Equally widespread is the reference to *serious games*, a term introduced by Sawyer and Rejeski (2002) with reference to games designed and developed according to educational objectives that incorporate a pedagogical and educational dynamic into the gaming experience and which are configured above all as digital games.

The features described highlight that gamification, as a pedagogical approach, encourages the use of active methodologies in learning environments. Active methodologies are aimed to promote students' active participation and involvement. They work to enhance students' learning experience and performance (Bai, Hew, & Huang, 2020; Cechetti et al., 2019) and can play a pivotal role in turning students into active agents of their own education and learning tasks (Vanduhe, Nat, & Hasan, 2020): research shows that they increased motivation, engagement, soft skills and academic performance (Murillo-Zamorano, Sánchez, Godoy-Caballero, & Muñoz, 2021; Zainuddin, Chu, Shujahat, & Perera, 2020). Student-centred learning environment strongly relates to promoting meaningful and in-depth learning experiences as students become active agents of their own learning tasks (Vanduhe, Nat, & Hasan, 2020).

Escape room

Among the realm of gamification techniques, escape rooms represent a popular educational tool, initially originated in a commercial environment. In escape rooms, participants are locked in a specific physical or virtual space and by individually or collaboratively self-managing their knowledge and finding clues to solve puzzles, riddles, enigmas, or meet general challenges, they aim to accomplish specific goals within a set amount of time (Nicholson, 2018; Pitoyo, Sumardi, & Asib, 2020).

Because of their highly reflective and cognitively demanding nature, they have frequently used appeal in higher education. In particular, they have been used in two ways: as serious learning games and as gamified assessment tools. When using Escape Rooms as serious games, social or soft skills can be conveyed such as communication, collaboration, situational awareness, task division and specialisation, and leadership (Warmelink et al. 2017). Especially in disciplines like engineering science, this new method is suggested to have the potential of both conveying learning contents, such as soft skills that are less common to the traditional curriculum and assessing the students' knowledge on specific topics.

Within the GRIT project, gamification is being adopted to promote learning according to the skills framework described in the previous Chapter. A new escape room has been created with the aim of working in parallel on a set of Research Skills and on a set of more transversal skills. Via dedicated challenges, the game will, in parallel, promote learning and specifically assess grit through innovative methodologies based on artificial intelligence (as presented in the next Chapter).

Designing engaging learning challenges

The challenges within the escape room were created following the methodological proposal formulated by career guidance expert Tristam Hooley, who created a practical methodological approach that combines gamification methodologies, active engagement approaches and educational planning within the career education realm. This methodological proposal is valid both for face-to-face and online activities, referred to by the author as e-tivities. Within the GRIT project, the approach was combined with the escape room dynamics and the escape room storyline, which will be described below.

The design of the escape room began with the definition of the storyline and the main task to be solved:

Narrative: Alexander Gray - on the verge of a cure

The game will be based on the interactive dynamics of a classic digital Escape Room where, within a narrative of events that have happened within the story, the researcher will have to investigate and possibly solve a mystery.

The main focus concerns a research laboratory on curing a potentially epidemic disease. The professor leading the team of researchers was found dead. Many open science tools were used in the lab, and the studies focused on the One Health paradigm. Detective Danny Stone, with the help of a researcher, Monica Laurence, will eventually solve all the puzzles and figure out how to get the lost cure back. The app will also make use of a Telegram Bot, which will discover useful open science tools in order to unlock information inside the game.

Psychology

To make the situation more engaging, the game is narrated in the first person by Stone, the detective, who is called to investigate the mysterious death. This is the incipit with the story begins:

The small monitor in the room shows a temperature of 21.5 degrees. Outside in the corridor, the morning news on the corridor television reminds me that it is the hottest October in history, at least since we started taking measurements, that is, since the second half of the nineteenth century. Inside this room, under the neon lights, the skin releases heat and channels the cold.

This morning, at 6:43 a.m., the phone rang while I was struggling with the blankets—too many for this odd weather situation. Gordon from the station was alerting me that Dr. Alexander Gray had been found dead at the Global Institute of Health while he and his research team were busy developing a vital cure to counter a potentially catastrophic outbreak of Disruption.

Therefore, the first scene is set in a laboratory room, where Dr. Alexander Gray's sudden death suddenly halts the research to combat the Disruption epidemic that the group was carrying out under the leadership of the internationally renowned academic through his lime team and many Open Science tools.

So it happens that researchers playing the Escape will have to uncover clues, move through the lab, the closest and most trusted collaborators and try to solve puzzles, collect evidence to find Gray's murder and unearth the potential lost cure, all the while searching for answers to try and save lives.

The detail of the storyline was further developed as presented in the figure below:

Once the storyline's architecture; the focus was on identifying the objectives of each challenge included in the storyline and on a detailed definition of the learning outcomes.

In the GRIT project, the work done in the previous Chapter was considered the shared starting point and the reference in defining the learning objectives.

The gamified activities were then created to promote the development of the chosen learning objectives. Activities must be designed engaging users and, consequently, promoting exploratory, reflective actions and exercise critical skills capable of activating the individual. For the successful completion of an online activity, it is also crucial that its structure is clear not only in terms of resources, engagement, and interaction but also with respect to which tools and digital functionalities.

The GRIT escape room

The initial screen features the laboratory room where Dr. Gray's mysterious death occurred. The researcher will be able to walk around a series of locations that will be represented by as many screens and facts as possible where he can collect clues, discover facts, and meet characters. This first set of information will give access to discover other rooms and other places to investigate or hear about other characters.

Through buttons to be unlocked and frequent use of the Telegram bot where the researcher shares research with his staff, researchers will be able to test various features concerning their personal skills.

Here are some of the central elements of the game mechanics:

• Engaging Narrative: The game presents a story that unfolds through a series of quests and challenges. Players must explore mysterious locations, interact with fascinating characters and collect clues to solve the grand puzzle behind each adventure.

• Interactive Exploration: Players can explore different locations, such as ancient castles, dark cities, enchanted forests and more. Each location contains details and secrets to discover, and players must carefully examine the environments to find crucial clues.

• Puzzle Solving: The game features a variety of riddles and puzzles to solve. Players must use their wits and logic to decipher codes, solve puzzles, open locks and unlock new areas. Each puzzle solved brings players one step closer to the hidden truth.

• Dialogues and Choices: During the game, players interact with a series of non-player characters (NPCs) through dialogues and conversations. Players' choices influence the course of the story and can lead to different outcomes and revelations.

• Collecting Clues: Players must collect clues scattered around the game world, such as secret documents, hidden objects and cryptic messages. These clues help players connect the dots and solve the mysteries surrounding the game's plot.

• Open Science Tools: During the game, the researcher can learn about several Open Science tools that are useful in his or her journey, particularly through the Telgram bot.

• Engaging AI-driven graphics: The game offers attractive and detailed graphics, which create a mysterious and evocative atmosphere. Players will feel immersed in the game

world thanks to the quality of the images and animations.

Learning through play is one of the themes of Escape, but through this experience, one can also improve in a number of non-cognitive skills:

• Attention to detail: the aptitude to be accurate, diligent and attentive to what one is doing, paying attention to details and details

• Learning by playing: understanding that playing is also a way of losing stimulation towards new knowledge and that dissemination of research can also pass through formats such as this.

• Achieving goals: to move forward in the game, there are various intermediate steps that allow you to have positive reinforcement and to hold on to the end of the mystery.

• Information management: the ability to effectively acquire, organise, and reformulate data and knowledge from different sources towards a defined goal.

• Self-confidence: the awareness of one's own value, abilities and ideas beyond the opinions of others.

• Time management: Escape also has a time management system that tracks and encourages the player not to waste time solving the mystery.

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