

**IMMERSION IN A COOPERATIVE GAME TO CULTIVATE SOFT SKILLS:
SYSTEM, MEANINGS AND ACTION**

**IMERSÃO APLICADA A UM JOGO COOPERATIVO PARA CULTIVAR SOFT SKILLS:
SISTEMA, SIGNIFICADO E AÇÃO**

**INMERSIÓN EN UN JUEGO COOPERATIVO PARA CULTIVAR HABILIDADES BLANDAS:
SISTEMA, SIGNIFICADOS Y ACCIÓN**

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ABSTRACT | This article spans from a master's research project aimed at designing a serious game for developing soft skills. The developed game-prototype consists in a fictitious environment with a gastronomic motif, populated by predetermined ingredients to be iterated by multiple players throughout the game. Such iterations are expected to pave meaning-making achieved through cooperative gameplay. It is also expected that such achievements may have a positive impact in personal and psychosocial terms for the players in terms of cultivating the mentioned skills. This article presents a literature review on three dimensions that can be found in immersive learning environments: systems, narratives, and agency. After describing the prototype and its operation we will analyse it based on our previous theoretical ground, more specifically reflecting on game system, player involvement, game narrative, and agency.

KEYWORDS: Non-technical Skills, Game Based Learning, Tabletop-games, Serious-games.

RESUMO | Este artigo parte de um projeto de pesquisa de mestrado que visa a conceção de um jogo sério para o desenvolvimento de *soft skills*. O protótipo de jogo desenvolvido consiste num ambiente fictício com a temática gastronómica, povoado por ingredientes pré-determinados a serem iterados por múltiplos jogadores ao longo do jogo. Espera-se que tais iterações facilitem a construção de significados alcançados por meio de jogabilidade cooperativa e que tais significados possam ter um impacto positivo em termos pessoais e psicossociais para os jogadores no que diz respeito ao cultivo das aptidões mencionadas. Este artigo apresenta uma revisão da literatura sobre três dimensões que podem ser encontradas em ambientes imersivos de aprendizagem: sistemas, narrativas e agência. Depois de descrever o protótipo e o seu funcionamento iremos analisá-lo com base nesta base teórica em específico, sobre o sistema de jogo, o envolvimento do jogador, a narrativa do jogo e a agência.

PALAVRAS-CHAVE: Aptidões não-técnicas, Aprendizagem baseada em jogos, Jogos de tabuleiro, Jogos sérios.

RESUMEN | Este artículo parte de un proyecto de investigación de maestría apuntado a diseñar un juego serio para el desarrollo de habilidades blandas. El prototipo de juego desarrollado consiste en un entorno ficticio con una temática gastronómica, poblado por ingredientes predeterminados que serán iterados por múltiples jugadores a lo largo del juego. Se espera que tales iteraciones faciliten la construcción de significados logrados a través del juego cooperativo y que dichos significados puedan tener un impacto positivo personales y psicossociales para los jugadores con respecto al cultivo de las habilidades antes mencionadas. Este artículo presenta una revisión de la literatura sobre tres dimensiones que se pueden encontrar en entornos de aprendizaje inmersivos: sistemas, narrativas y agencia. Después de describir el prototipo y su funcionamiento, lo analizaremos en base a esta base teórica concreta, sobre el sistema de juego, la implicación del jugador, la narrativa del juego y la agencia.

PALABRAS CLAVE: Habilidades no técnicas, Aprendizaje basado en juegos, Juegos de mesa, Juegos serios.

1. INTRODUCTION

This article takes root in a master's research project aimed at designing a serious game to help players develop their soft skills. Skills are the ability to act or react, physically or mentally, in an adequate manner, e.g., self-control is nurtured by establishing long-term personal objectives, values by which they are achieved and ways to conduct needed to persist in this realisation (Romiszowski, 1981), i.e., cultivating skills requires worthy objectives, and the resilience to act to achieve them, aspects that, in our mind, are also common in game experiences.

As such, our research aimed at cultivating soft skills leveraged by the game's medium holds promise, but also raise the following questions:

- Which phenomenology can a game evoke so that it becomes a ground for cultivating soft skills in the lives of its players?
- What are the soft skills that can be cultivated through a game operation?
- How can this be operationalized and integrated into a game?

Finding responses to this questioning depends on practical development of the prototype, (currently on its fourth iteration) while considering three grounding dimensions for game learning immersion: a) the game system, the reasons for the players' involvement, b) the game narrative, whose meanings calls for actions by the players, c) the horizon of game agency, which makes the experience tangible and fulfilling for players (Morgado, 2022).

The relevance of this study and prototype hinges on essential "survival skills" that grew in demand due to ongoing technological advancements and shifting work dynamics. To increase the chances for future employment individuals must nurture critical thinking and engage in knowledge creation grounded on existing infrastructures and in collaboration with others similarly domain oriented (Romiszowski, 1997). Bearing in mind the notable focus on social skills development relevant to the employment market, we identified a niche focal point that allocates the benefits of nurturing soft skills to the betterment of the community, independently from the work environment. With these concerns and relevance in mind this article aims to contribute with knowledge for developing game prototypes for individuals to cultivate soft skills.

2. LITERATURE REVIEW

Cultivating skills demands from individuals to deliberately live by a reframing of their personal values and attitudes to achieve such goals (Romiszowski, 1981). In a nutshell, to cultivate skills individuals have to be willing to pave their cognitive development. A condition for a game to be used to cultivate soft skills is being imbued with characteristics, features and procedures so it also becomes a learning environment, a context where learning takes place. Learning environments can be physical, online, or unfold in computer networks. They can be digital, analogue or hybrid and combine diverse kinds of spaces, actors, and participants. They can also be multimodal, combining different modes of interaction and operation (Schlemmer et al., 2020). In other words, we associate the concept of learning environments with spaces where meanings are acquired, constructed or reformulated, i.e., where multiliteracies are cultivated. Literacy today is about mastering different mediums to understand and communicate information or to make a stand for your perspective. The new literacies encompass multiple disciplines and modes

of expression, allowing the creation of diverse meanings (Kress, 2005). Games, in turn, are bridges to new pedagogies able to complement the education of new literacies and the development of new meanings in a sound and fun way (Gee, 2004).

Immersive learning occurs at the intersection of learning and immersion, the latter being a conscient but profound state of communion with an experience by an individual, to the point of alienating his physical surroundings. To this end three dimensions are key for being immersed in learning: a) System, the underpinnings for feelings of being enveloped, b) Narrative, the contextual meanings that draw individuals into the experience, c) Agency, a wide horizon of allowed actions which make the experience tangible and fulfilling (Morgado, 2022). Embodied immersive learning methods such as simulation, roleplaying and games have similarities and distinctions (Leigh, Courtney, and Nygaard, 2012), yet they underpin what soft skills education should be about: self-motivation and the enaction of behavioural change that may lead to the desired objectives (Mystakidis & Lympouridis, 2023). In this aspect, simulation can be considered an important ground for our self-reflective, conscious brain superpower, for e.g., as the key for redesigning and bettering our performance, and a way of changing our perspectives (Gee & Zhang, 2022).

Honing of new skills and abilities by facing and conquering fears, weaknesses, or challenges is increasingly difficult to apply and practice today, namely for creativity, which hinges upon soft skills, however, tabletop role-playing games can become the instruments for such changes (Hill, 2023). Fantasy board games such as Dungeons & Dragons (Tactical Studies Rules, Inc., 1974) can be used as structured, fun, learning challenges for game development students to cultivate their internal soft skills, such as creativity and critical reflection, and interpersonal soft skills, such as communication and collaboration (Veldthuis, et al., 2021).

The potential for promoting these specific soft skills is corroborated by another study which advances other psychological and cognitive stimuli that favours teaching and learning, such as, memory, empathy, self-confidence, and well-being. Interestingly, this same study highlights that learning does not necessarily occur if the educational matter is tied to the game mechanics or dynamics, but rather when it is aligned with a game's theme (Sousa, et al., 2023). Further, research focused on the differences between the same game both in digital and traditional board form, posit the later as adequate to entice visceral, behavioural, and reflective levels, allowing players to feel intimacy, vivid imagery, sympathetic responses, and satisfaction during gameplay (Fang et al., 2016), i.e., tabletop board games can facilitate the adequate psychological immersion for deep reflection.

Still, according to James Gee Game/Affinity Paradigm (2017), for games to be able to act as grounds for problem-solving, they need to be both well designed and mentored. The concept of GAP roots on the concept of a place where a passion can be shared beyond the boundaries of race, socio economic class, gender, disability, age, where proficiency, and knowledge levels coexist and are encouraged, where everyone is entitled to take part in the interaction and in shaping content and value in diverse ways. With this in mind internet-enabled passionate affinity spaces, like the online game Portal (Valve, 2007), can be seen as breeding grounds of 21st Century skills for individuals to find their true passion, sense of self-worth and to develop a broad and deep education (Gee, 2017).

Through qualitative data research on serious games market movement, there is a prominent ongoing number of team-building initiatives promoted by corporations to enhance their workers' non-technical skills and interconnections. A series of communication games, commonly nominated as *ice breakers*, are modified and implemented in recreational days administered by a company, with the purpose of motivating collaborative and communicative growth amongst their employees. These indications are often beneficial to the individuals, providing a space to meet co-workers figuratively outside of work obligated tasks. Simulation of a work free circumstance, however, proves to be a precarious endeavour ascribed to internal factors that may influence the immersive state of the mind. Conditions of workload, stress and communication levels amongst co-workers must be taken into account to ensure the effectiveness of team-building exercises. It is chiefly beneficial for a company to develop a healthy workplace environment, minimising the chances of developing contempt among individuals. Through this course of action, subsequent leisure initiatives have the potential to be fruitful for every party involved. (Fodor & Balázs, 2020)

While the corporate initiatives mentioned above intend to create a healthier work environment for employees, a surging work intensification throughout the past years is conspicuous amongst recent reports (Green, et al., 2021). With the prevalence of work-related issues, aggravated by the effects of the covid-19 pandemic, there is a necessity to identify aspects of engagement that provide closure from obligation. Measures must be implemented to ensure there is a work-life balance, via the stipulation of healthy work dynamics that allow people to engage in amateur interests. We have established that playing tabletop games yields an ideal environment for sustaining immersive experiences in which players are actively learning interpersonal skills while having fun, disconnected from external obligations. This phenomenon is assisted by the voluntary state of mind in which individuals engage with playing games (Blumenfeld, 1941) in a casual circumstance, being open to develop new acquaintances and to confront challenges and unexpected developments. An open state of mind means that a player's brain is readily agreeable to enter a simulated environment where they are introduced to a parallel universe with new rules of engagement.

3. METHODOLOGY

To ground the analysis of our game artefact, we chose to use complementary theoretical and practical methodologies and protocols. The overall methodological strategy is that of Research through design, as it acknowledges our discipline as a valid form of inquiry that explores and bridges theory and hands-on practices to improve the design of pedagogical interventions (Easterday & Gerber, 2017). We carried a literary review to distil relevant information from published accurate sources to inform the current study. Concurrently we are prototyping the fourth game iteration, as it is the critical, physical realisation of a product concept, allowing designers to test their ideas and get feedback from stakeholders (Martin & Hanington, 2019). Due to the limited scope of this article, we did not span our systematic literature review but, instead, we'll focus on analysing this prototype iteration according to the three-dimensional immersion perspective proposed by Morgado (2022) with the purpose of improving the game design and the accuracy of the test sessions. Therefore, in the context of this article we will only unveil our latest prototype and carry the mentioned analysis.

Early prototyping focused research on games that could stimulate or sustain cooperation among players. This research was carried across renowned tabletop game databases such as *boardgamequest*, *dicebreaker*, *ign* and *wargamer* by focusing on games that could “improve social well-being”, an initial effort which we detailed elsewhere.

In the following analysis we provide a description of the game prototype under study and as well as its basic operation digest. The process of constructing the cooperative board game began with the delineation of a narrative that supports the investigation on the contributions of cooperative play to the development of personal, non-technical attributes. With an interest in implementing a familiar and pleasant activity that amplifies the coordination of a group of people, a daily activity was identified that combined sociability, co-operative activity and synaesthesia, and there is no other human activity that combines these characteristics more spontaneously and naturally than gastronomy. Thus, the narrative of this board game functions through the process of finding ingredients and cooking a meal to participate in a food festival.

The process also encompasses the comprehension of the foundations of play in the context of the category. Considering that cooperation addresses a number of variations of coordinated play (Engelstein & Shalev, 2022), this investigation specifies it’s focus on the design of a cooperation-based type of game in which all players must function as a team throughout the session in order to achieve a common goal, and act against the game engine. For that purpose, players must contribute as a whole to decision making, problem resolution and task completion. The physical components that sustain this prototype’s operation are presented in Figure 1.

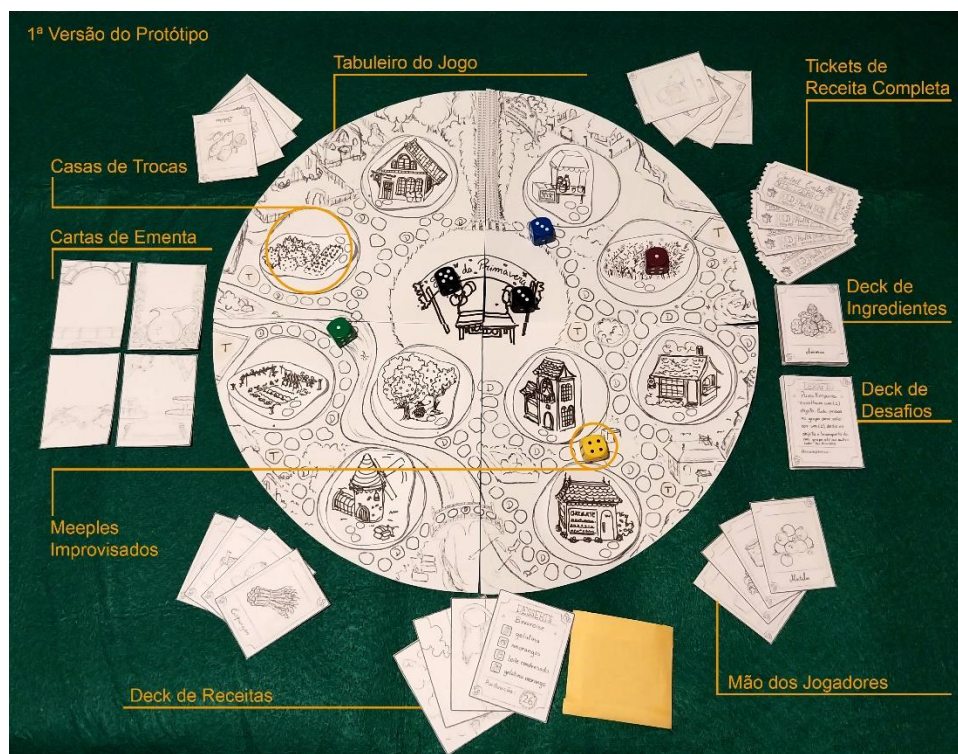


Figure 1 Visual catalogue of the physical components of the second iteration of our cooperative board game.

The board game, in its fourth iteration, is composed of: 1) a circular board, 2) a deck of character cards, 3) a set of meeples, 4) a deck of recipe cards, 5) a deck of ingredients, 6) a deck of challenge cards, 7) a deck of encounters, 8) three time-limit cards, 9) one cutting board, 10) skill tokens, 11) four contest tickets, 12) a secret envelope where the recipe of the engine stays hidden throughout the game.

Players enter the roles of a group of friends who have applied to win a food contest, happening during the seasonal food festival of their village. They travel the village looking for fresh ingredients and tips from other non-player characters in order to create an excellent menu that might win the contest. Throughout the gameplay, the team faces challenges and encounters with non-player characters that contain rewards or limitations to their progress. There are special tiles distributed on the board that provide skill rewards to the team, increasing the quality of their food once they reach the cooking phase. Storyline events are shuffled through the deck of encounters and provide short insights into the lives and secondary stories happening in the universe of the game.

4. RESULTS

4.1 Immersion through System

First, we consider Morgado's perspective on the three-dimensional phenomenon of immersion, the system implemented in the game under study is a strong contender for immersion under the conditions set by the game structure itself. All mechanical elements of the game are constructed in order to engage the players in regular interactions that pertain to the gameplay. The recurring challenges of the game require that players be aware of their in-game environment, most importantly on the disposition and physical cues of the players around them. Players' in-depth engagement with the game begins near instantly, since challenge and encounter tiles are spread through the board. When landing in these tiles, the team of players retrieve a challenge or encounter card and confront the contents of said card. These may contain riddles, physical challenges, funny limitations to gameplay, among other tasks and events that keep the team engaged not only in the game's universe but also in their interactions with each other. The recipes allocated to the team at the beginning of the session also have rules of engagement. The ingredients must be placed on the cutting board in a specified sequence provided in the recipe card. Furthermore, only one ingredient may be added at a time. Skill token rewards motivate the players to move into the special tiles on the board. These are won by completing a challenge card according to the special parameters specified by the tile. Token rewards are used to improve the recipes once the cooking phase is underway. Time within the game passes by with the use of card indicators. A set of three time-limit cards is inserted into the deck of challenges, and the players must coordinate their moves so that all the ingredients are collected and sent to the cutting board before the last time-limit card is retrieved from the deck. By turning time into an active mechanism in the system, players are motivated by urgency to concentrate on the universe they have entered at the beginning of the session.

4.2 Immersion through Narrative

The game under study yields into the storyline developed to dress the system since the environment created provides constant visual and cognitive cues connected to the narrative. As mentioned before, the session begins with the exposition of the event that brings all the characters together. Players learn that they are to become a team of friends who signed up for a food contest happening during the food festival of their hometown. Time plays an essential role both in the system and in the narrative. It sets the environment for weather conditions, a glimpse of the time of year and an orientation of the passing of time, for players to gather their assets and progress in the session. Action management and clear communication within the team become key ingredients in the success of the players in reaching their common goal. To keep a consistent immersion stimulation via narrative means, encounter cards were introduced to the gameplay. Theirs is the role of acquainting players with non-player characters and slice-of-life events that happen while the main storyline is occurring. Players are then able to construct a progressive picture of the universe, commonly known as lore, through the facts they learn from these events and through their experience.

In order to enhance the effectiveness of immersion through narrative, the main subject of the storyline consists in the implementation of a deep-rooted social and cultural aspect that bridges the knowledge of every potential player in the game (Fernandes, et al., 2019). Although some players may have less experience in the practical aspects of culinary arts, the physical and emotional expression and savouring of food has a comprehensive reach. The visual narrative provided by the illustrations within the game function as a visual mnemonic device that stimulates players' memories, allowing for a deeper involvement in the narrative through pattern recognition.

4.3 Immersion through Agency

As mentioned above, within the narrative, players get to know pieces of information about the characters they play, as well as the non-player characters they encounter through the game and the environment itself. This only happens under the circumstance of progression, since the information is purposefully spread through the decks. Players may face predicaments such as an NPC requesting to borrow an ingredient for an infinite or finite amount of time. This requires precise decision making that preserves the team's playing hand while interacting with NPCs to get residual rewards. The experiences of the collective, achieved through their actions and reactions to the challenges offered by the game, construct new branches from the primary storyline. Players can become active members of the community by solving encounter cards and contributing to the overall festival preparations and ongoing events. Although the universe of food within the game is fairly ambiguous, players' emotional investment in the game relies on the situational and cultural remembrance of individual experiences (Fernandes, et al., 2019) with food through their life. Some ingredients may present specific appeal to an individual for triggering a pleasant childhood memory. Another player may find a recipe compelling for being a combination they are especially fond of. Food is a thorough conductor of memory and sensory stimulation, encompassing sight, smell, taste, touch and often auditory engagement.

According to the information gathered during test sessions with the prototype, food is an encouraging subject for its accessibility beyond background or personal preferences. In fact, players demonstrated passionate reflections concerning the recipes and ingredients presented in the game. This reaction led to advantageous developments in the game system optimization such as the application of an ingredient card assortment with varied quantities of specific ingredients and additional game tension prompts, namely consequences like the termination of stock of an ingredient. The subjective affinity of players towards the recipes allotted to the team also contributes to the speed at which cards are exchanged and a recipe is completed. Let us consider four principal circumstances that may affect this phenomenon, according to the analysis of player interactions during testing: 1) the ingredients in the recipe are fairly common in the deck, alleviating the tension of the recipe's completion; 2) there are common ingredients among the recipes of the team; 3) a player is not particularly fond of the recipe that they are in charge of completing; 4) the player(s) are invested in a specific recipe(s) in the team's game. We emphasise that these aspects may come into play simultaneously.

In the first circumstance, one or more of the recipes randomly sorted to the team at the beginning of the game may be composed of ingredients that exist in large numbers in the ingredient deck. Once players understand this facilitated path, they are faced with three potential alternatives. Players can contribute to finishing said recipe as quickly as possible to focus on the subsequent game; leave that recipe as a last resort in the gameplay; or delegate that recipe to one party of the team, balancing the quick resolution element with a continuous resource gathering.

In the second circumstance, an ingredient might correspond to more than one recipe in the team's hand, requiring the performance of cooperative skills like compromise, diplomacy and problem solving to figure out the best course of action. This mechanism compels players to negotiate the order in which they are going to solve the recipes. Factors such as bonus cards or residual rewards received after encounter cards come into play when this situation arises.

The third circumstance is the most subjective of all. A player may find a recipe less agreeable to them, be it by simple lack of interest or due to an aversion to an element or all elements in its composition. In this case, emotional intelligence and open-mindedness are drawn upon to decide how to proceed. If the player shows availability, they might choose to keep contributing to said recipe, however, they are free to choose not to. The team must promote an active listening system, not only in the recipe resolution but also during the challenge rounds.

As for the fourth circumstance, the players may find one or more recipes more fun to scavenge for and conclude. Through clear communication they can decide what order sounds more fun to play, maximising their enjoyment of the gameplay.

5. DISCUSSION

Considering the subjective nature of players' empathy and interest towards a game, specifically a cooperative board game, it's indispensable to analyse how we can ascertain the resulting game's efficiency in creating an immersive environment endowed with the building blocks of new methodologies of educational programs, along with a didactic gameplay that equips individuals with ample skills through personal and interpersonal experiences (Morgado, 2022). Our

practical research method consisted of a heuristic approach mobilised by a series of game prototype tests simultaneous to its development. During the game session tests, we observed and annotated the players' decisions and perceptible visual cues related to psychological disposition and body language. Through short feedback questions presented to the present players and subsequent analysis of live action and reaction to game exposition, we were able to comprehend how players become engrossed in the gameplay once they start to achieve challenge rewards and finding ingredients corresponding to their recipe cards. The setbacks of testing our cooperative game as an immersive experience while in its developing stages reside in the occasional interference of the results by questions raised to the observing researcher. Once players reached a patchy section of the game, the fantasy simulation was broken, and their attention turned towards questioning the mechanics of the game. However, one of the dynamics ascribed to our research through design model anticipated an open discussion with our audience, working alongside players to ensure our game is able to connect with as many people as possible. From the issues identified in our audience analysis method we infer that the opportunity to contribute with feedback in a developing project that players are invested in promotes cooperative skill growth. During tests with experienced board game players, this materialises as in-depth discussions about game mechanics from several existing games that are potential contenders to use in cooperative games. When testing the game with recreational players, the discussion develops into personal experiences related to culture, career and interests that would be of interest in further explorations of our game.

As mentioned in the analysis circumstance in section 4.3, the administration of a learning environment based on an approachable primary subject motivates players to hone skills and relationships with their peers. The educational purposes of our game connect inconspicuously through the fun dynamics embedded in the game system, transforming a learning experience into stimulating feedback to the brain. We propose that executing a practice of transfiguring intellectual, psychological and physical challenges into practical exercises with a reward system may increase the motivation and investment levels of any configuration of student, whether they are academic or recreational learners.

6. CONCLUSIONS

The theoretical-applied research presented in this article has a discernible exploratory nature, and its object of study, despite being in its fourth iteration, still has a promising amount of information to be collected and dissected. Nevertheless, in its current state and according to the analysis carried out in the context of this article, it presents relevant headway in the implementation of cooperative, immersive methods of play that contribute to an ingrained educational system. Working closely with groups of people undertaking a co-created project by providing a practical and fun model, allows us to assess how a positive stimulation of the senses can turn learning into a pleasant experience for most individuals. Even in cases where players have more affinity with a competitive method, the redirection of combative urges towards tackling a problem that is external to the group provides adequate satisfaction to the player. When subjects are introduced to a scenario that is capable of retaining their psychological investment, they exhibit strong tendencies towards constructive productivity. By assessing players' visible psychological cues and body language before, during and after a session, paired

with qualitative feedback requested during the respective session moments, an advisor can gauge the effectiveness of the model in use and how to enhance it to promote the growth of the people involved.

Given the prevalence of competitive board games in the industry, it would be safe to assume that such an approach to skill development would be the most significant course of action. Although this method delivers clear educational contributions that must be kept on-going for diverse purposes, our research demonstrates how shifts in power dynamics to collective frames of work present promising results to the betterment of both the individual and the group. This knowledge equips any kind of advising figure with a hybrid method between play and serious learning that can be applied to other projects and research.

7. IMPLICATIONS

Building upon the conclusions retained from our research on the application of immersion in cooperative games to nurture non-technical, group-oriented skills, we are capable of raising questions from which we can deepen our understanding of the potential of the prototype in this context. In other words, similar to what is evidenced by Schlemmer et al. (2020), how can this potential be expanded by technological advancements? By transcoding the analogue prototype into digital format? Through the expansion of the range of agency actuated by human players, or potentially analogue or digital automatons? Or by adapting the prototype to cultural contexts other than our original aim?

The translation of our board game into a digital format would introduce a whole new dimension of questioning into the immersive state of play. For instance, we would have to comprehend how the digital presence of players influences their ability to read each other's cues and calls to action. Furthermore, physical challenges would have to be reformulated into a mechanism potentially functioning through numerical countability methods and fictitious prompts relying on the players' imaginative and immersive state. Such is the case of rolling for stats in the game *Dungeons & Dragons* (Tactical Studies Rules, Inc., 1974) to ascertain a character's level of ability. Opening the world of our game to a wider range of agency could potentially be materialised in our further studies into a sandbox situation, where players have freedom to choose which mechanisms of the game to play with, going as far as experimenting the game with only one element of its composition. This line of assessment is already under development as peripheral applied research which will enter its testing phase after the main prototype of our game has completed an iteration test with minimal feedback with request for improvements. Cultural context is a strong pivotal point that can contribute to the creation of several iterations of our game. Specifically, when it comes to the significance of food for each community. Food can be as much of a universal subject as it can carry particular cultural and social meanings that may be expanded on through conscious, ethical research.

Finally, we should point out that, the hypothetical resolutions to the questions raised in this section have fairly approachable applications to diverse sectors of study. We emphasise the potential of cooperative, immersive experiences as vehicles for fine communication and education. Ultimately, we project running specified tests that will supplement the determination of our applied research within the questioning above.

ACKNOWLEDGEMENTS

This work is funded by national funds through FCT – Fundação para a Ciência e a Tecnologia, I.P., under the project UIDB/04057/2020

REFERENCES

- Blumenfeld, W. (1941). *Observations Concerning the Phenomenon and Origin of Play. Philosophy and Phenomenological Research*, vol. 1, no. 4, pp. 470–78. JSTOR, <https://doi.org/10.2307/2103148>
- Easterday, M., Lewis, D., & Gerber, E. (2017). The logic of design research. In *Learning: Research and Practice*. Accepted for Publication. Doi: 10.1080/23735082.2017.1286367
- Engelstein, G., & Shalev, I. (2019). *Building Blocks of Tabletop Game Design: An Encyclopedia of Mechanisms*. E-book. CRC Press.
- Fang, Yu-Min & Chen, Kuen-Meau & Huang, Yi-Jhen. (2016). Emotional reactions of different interface formats: Comparing digital and traditional board games. *Advances in Mechanical Engineering*. 8. 10.1177/1687814016641902.
- Fodor, S., & Balázs, B. (2020). An empirical study on key factors affecting user engagement in a gamified team building environment. *International Journal of Serious Games*, 7(3), 81-95
- Gee, J. P. (2004). "Learning by Design: Games as Learning Machines." *Interactive Educational Multimedia* 8 (8): 15–23. <https://doi.org/10.2304/elea.2005.2.1.5>
- Gee, J. P. (2017). GAMES, PASSION, AND "HIGHER" EDUCATION. In *The Role of Games and Social Media in Higher Education*, edited by William G. Tierney, Zoë B. Corwin, Tracy Fullerton, and Gisele Ragusa, John Hopkins University Press, Chapter 7, pg 171.
- Gee, J. P., & Zhang, Q. A. (2022). A Sensational View of Human Learning, Thinking, and Language. *Literacy Research: Theory, Method, and Practice*, 71(1), 233–248. <https://doi.org/10.1177/23813377221100163>
- Green, F., Felstead, A., Gallie, D., & Henseke, G. (2022). Working Still Harder. *ILR Review*, 75(2), 458–487. <https://doi.org/10.1177/0019793920977850>
- Hill, Ryan A. (2023). "Exploring the Use of Tabletop Role-Playing Games (TRPGs) to Highlight and Develop Creativity Competencies". *Creative Studies Graduate Student Master's Projects*. 370. <https://digitalcommons.buffalostate.edu/creativeprojects/370>
- Kress, Gunther R. (2005). *Literacy in the New Media Age*. E-Book. New York: Routledge.
- Leigh, E.; Courtney, N.; Nygaard, N. (2012). The Coming of Age of Simulations, Games and Role Play in Higher Education. In *Simulations Games and Role Play in University Education*; Libri: Farringdon Oxfordshire, UK.
- Martin, B., & Hanington, B. M. (2019). *Universal Methods of Design, Expanded and Revised: 125 Ways to Research Complex Problems, Develop Innovative Ideas, and Design Effective Solutions*. Beverly, MA: Rockport Publishers.
- Morgado, L. (2022). Ambientes de Aprendizagem Imersivos. *Video Journal of Social and Human Research*, 1(2), 102–116. <https://doi.org/10.18817/vjshr.v1i2.32>
- Mystakidis S, Lympouridis V. Immersive Learning. (2023). *Encyclopedia*. 3(2):396-405. <https://doi.org/10.3390/encyclopedia3020026>
- Romiszowski, A.J. (1981). *Designing Instructional Systems*. Kogan Page, London
- Romiszowski, A. (1997). Web-based distance learning and teaching: Revolutionary necessity or reaction to necessity? In Khan, B. (Ed.), *Web-based instruction* (pp. 91-111). New Jersey: Educational Technology Publications.

- Schlemmer, E., Morgado, L. C., Antônio, J., & Moreira, M. (2020). Educação e transformação digital: O habitar do ensinar e do aprender, epistemologias reticulares e ecossistemas de inovação. *Interfaces da Educação*, 11(32), 764–790.
- Sousa C, Rye S, Sousa MS et al (2023) Playing at the school table: systematic literature review of board, tabletop, and other analogue game-based learning approaches. In *Frontiers in Psychology*. 14: 1160591. Accepted for Publication. <http://hdl.handle.net/10454/19402>
- Veldhuis, M.; Koning, M.; Stikkolorum, D. (November 2021). A Quest to Engage Computer Science Students: Using Dungeons & Dragons for Developing Soft Skills. In *Proceedings of the 10th Computer Science Education Research Conference*, Virtual Event, The Netherlands, 22–23; ACM: New York, NY, USA; pp. 5–13.