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Universitat Autònoma de Barcelona

Final Degree Project

Design and implementation of a creative card game to promote creativity and critical thinking in primary education

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Resum

Aquest Treball de Fi de Grau presenta el disseny i la implementació d'un joc de cartes educatiu anomenat *Solve It*, orientat a fomentar la creativitat i el pensament crític en alumnes d'educació primària. La proposta es basa en activitats obertes i reptes de resolució de problemes que requereixen imaginació, adaptació, presa de decisions i justificació d'idees.

El treball segueix una metodologia qualitativa basada en la revisió bibliogràfica i en el disseny d'una proposta educativa. Es van analitzar diferents investigacions sobre creativitat, pensament crític i aprenentatge basat en el joc, així com jocs existents com *Dixit* o *Story Cubes*. A partir d'aquest procés es va desenvolupar el joc *Solve It*, estructurat mitjançant Situation cards, Object cards i Condition cards.

La implementació es va realitzar amb quatre infants d'entre 8 i 10 anys en un context educatiu extraescolar. Els resultats mostren un alt nivell de participació, motivació i generació d'idees creatives. Finalment, el treball conclou que els jocs educatius basats en reptes oberts i estructurats poden esdevenir eines útils per promoure la creativitat i el pensament crític a primària.

Paraules clau: Creativitat; pensament crític; gamificació; aprenentatge basat en el joc; educació primària; resolució de problemes; joc educatiu.

Abstract

This Final Degree Project presents the design and implementation of an educational card game called *Solve It*, aimed at promoting creativity and critical thinking in primary education students. The proposal is based on open-ended activities and problem-solving challenges that require imagination, adaptation, decision-making, and justification of ideas.

The project follows a qualitative methodology based on literature review and the design of an educational proposal. Different studies on creativity, critical thinking, and game-based learning were analysed, together with existing games such as *Dixit* and *Story Cubes*. Based on this process, the game *Solve It* was developed around Situation cards, Object cards, and Condition cards.

The implementation was carried out with four children aged between 8 and 10 years old in an extracurricular educational context. The results showed high levels of participation, motivation, and creative idea generation. Finally, the project concludes that educational games based on structured but open-ended challenges can become useful tools for promoting creativity and critical thinking in primary education.

Keywords: Creativity; critical thinking; gamification; game-based learning; primary education; problem-solving; educational game.

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1. Introduction

Primary education is described as a key stage for the development of children aged 8 to 12, a period in which imagination and artistic sensitivity should become important points in the construction of knowledge. However, classroom practices often reveal a more restrictive reality: so-called creative activities within the arts area continue to focus on closed visual outcomes and the reproduction of models proposed by the teacher. This tension between competency-based discourse and a product-oriented school culture forms the basis of this Final Degree Project, which is framed within the thematic area of Art, Education, and Innovative Projects of the Faculty of Education Sciences.

My interest in this issue arises both from my experience during the teaching internship and from my academic training throughout the degree in Primary Education. During school placements, it was observed that many creative tasks were formulated through instructions such as “draw a house with two windows and one door,” “make a collage following this example,” or “decorate the material like this.” In these cases, students followed predefined procedures that limited decision-making and turned creativity into an essentially reproductive exercise. Questions regarding the purpose of the activity, its audience, or the social and cultural implications of the artistic work were rarely addressed, making it difficult for art to be understood as a space for thinking rather than merely as a product to be done.

This critical view was especially reinforced through the Land Art project developed in the subject Music and Visual Education. In this project, artistic practice was understood as a shared process in which students explored the environment, experimented with natural materials, discussed ideas, and presented their artworks to others. This experience helped me understand that artistic work can also be a learning process, where students generate ideas, make changes, justify their decisions, and share their work publicly. This process-based approach directly inspires the present project, which aims to apply this process-based approach through a playful educational resource for primary education.

Specifically, this Final Degree Project consists of the design of a creative card game aimed at fostering creativity and critical thinking in primary education. The project includes a theoretical framework on creativity and critical thinking in arts education, the design of the game and its dynamics, and a classroom implementation in a primary school setting to collect evidence on its functioning, analyse its strengths and weaknesses, and introduce improvements based on the results obtained.

This Final Degree Project is directly linked to the specific competences of the Arts Education area within the Catalan curriculum. Specifically, the proposed card game aligns with competence 2, as it encourages students to investigate and analyse the contexts presented on the cards, creating opportunities for reflection and decision-making.It also addresses competence 3 by promoting creativity, imagination, narrative construction, and the generation of original ideas through open-ended challenges and communicative situations. Finally, the game also contributes to competence 4, as it situates learning within a collaborative design process based on dialogue, role-taking, and critical evaluation of the creative process. This connection demonstrates that the proposal is not merely a playful material, but a didactic tool aimed at competency development and at understanding artistic practice as a space for thinking and making decisions.

The central problem of this Final Degree Project is the following: **school-based artistic activities that focus on final outcomes and model-following hinder the development of genuine creativity and critical thinking in the classroom.**

In this sense, the development of critical thinking becomes especially relevant, as it is considered a key competence for both personal and social life. As highlighted by Facione (2013), without critical thinking, individuals are more vulnerable to manipulation in political and economic contexts. Similarly, Yonanda (2019) emphasises that individuals are required to develop critical thinking skills in order to effectively face the challenges of contemporary society. For this reason, several authors argue that critical thinking should be explicitly taught in schools (McPeck, 2017; Lastriningsih, 2017), as it provides long-term benefits for students' development. In particular, these skills support learners in managing their own learning processes, making informed decisions, evaluating the credibility of information sources, and contributing creatively to their future professional contexts (Sulistiani & Masrukan, 2016).

Several studies indicate that creativity and critical thinking in primary education can be fostered through open pedagogical practices and active learning approaches. According to Craft, Cremin, Hay, and Clack (2013), primary schools that promote creativity not only enhance students' ability to generate new ideas but also develop critical thinking skills, as students actively participate in decision-making, reflect on their choices, and justify their decisions in process-based activities. In the same line, Ben Cheick Souguir (2025) points out that arts education stimulates the generation of creative ideas and supports students in analysing, interpreting, and justifying their decisions within artistic activities. Furthermore, Bulut, Samur, and Cömert (2022) show that educational games have a positive effect on

creativity and critical thinking, as they promote problem-solving, learning motivation, and social interaction within educational contexts.

In coherence with this framework, the proposed game is based on real-life situations and structured challenges that require players to generate, adapt, and justify creative solutions. In each round, players must propose a solution that responds to a specific Situation and clearly integrates a mandatory Object. After presenting their idea, they must adapt it to an unexpected Condition within a short time. The situations and conditions presented throughout the game address different types of challenges related to areas such as safety, sustainability, inclusion, cooperation, or problem-solving. The game can be played individually or in small groups, and it is designed to promote creativity through constraint-based problem-solving and to strengthen critical thinking through reasoning, adaptation, and decision-making.

Beyond its playful format, the game will be tested in a real classroom setting in order to evaluate whether its structure works as intended and to identify possible improvements. The implementation will allow me to observe if the rules are clear, if the card combinations generate meaningful challenges, and if the time limits are appropriate. The aim of this classroom trial is not only to analyse students' responses, but also to refine the design of the game itself. Based on the results obtained, adjustments may be made to the rules or types of cards to ensure that the final version of the game is coherent, functional, and effective.

2. Objectives

The main objective of this Final Degree Project is to design an educational card game aimed at fostering creativity and critical thinking in primary education through constraint-based challenges and rapid problem-solving.

To achieve this objective, the following specific objectives are proposed:

- To analyze theoretical and empirical research on creativity, critical thinking, and educational games in order to establish a solid conceptual foundation for the design of the game.
- To analyse existing educational games that promote creativity and/or critical thinking in order to identify their main characteristics, strengths, and limitations, and to determine the elements that differentiate the proposed game.
- To design a card-based game structured around situations, required objects, and unexpected conditions that encourage functional coherence, adaptation, and decision-making under time pressure.
- To implement the game with primary education students in order to evaluate its clarity, coherence, level of engagement, and effectiveness in generating meaningful creative challenges.

To achieve these objectives, the Final Degree Project will be structured around a theoretical framework, the contextualisation of the target group, the design and implementation of the game, the analysis of results, and final conclusions with their pedagogical implications.

3. Theoretical framework

3.1. Importance of encouraging the development of creativity and critical thinking in children

Creativity has been conceptualised as “a cognitive state that integrates all forms of intelligent human endeavor” (Ziaee et al., 2024, Introduction). This definition moves beyond understanding creativity as a purely artistic skill and frames it as a complex cognitive process linked to reasoning, problem-solving, and innovation. Within educational contexts, creativity therefore involves generating ideas, analysing situations, making decisions, and adapting solutions to specific constraints. However, recent research highlights that understanding creativity only as a cognitive ability is limited, as it also involves metacognitive, socio-emotional, and cultural dimensions (Celume & Zenasni, 2022; Pantaleo, 2024). In this sense, creativity is not only about thinking, but also about how students feel, interact, and relate their ideas to their context. Studies show that elements such as empathy and cultural responsiveness play an important role in children’s creative development, as emotional sensitivity and socially situated experiences influence how children engage with tasks and generate ideas (Smees et al., 2024; Woolrych et al., 2024). According to Clouder et al. (2012), “we are born creative, capable of imagining and inventing, and of seeing things from multiple perspectives.” However, the authors also explain that this creative talent can progressively become “dormant and blocked” if it is not actively encouraged through meaningful educational experiences. These perspectives reinforce the importance of promoting creativity from an early age and understanding it as a natural human capacity rather than as an exceptional talent limited to artistic contexts. In primary education, particularly between the ages of 8 and 12, fostering creativity is closely connected to the development of critical thinking, as both require students to move beyond the reproduction of models and engage in reflective and autonomous processes.

Furthermore, although creativity is often assessed through indicators such as fluency or originality, this approach may overlook other important aspects, such as identity, emotional experience, and social interaction. This narrow view can reduce creativity to a measurable product, ignoring its more holistic nature, which is closely connected to affective experiences and contextual understanding.

Craft, Cremin, Hay, and Clack (2013) argue that primary schools that actively promote creativity enhance students’ ability to generate new ideas, reflect on their choices, and justify their decisions. In this sense, creativity and critical thinking are intertwined, since students

are encouraged to participate actively in learning rather than following predefined instructions. Process-based activities and open pedagogical practices create opportunities for students to take responsibility for their decisions and to develop reasoning skills within meaningful contexts. This idea is connected to Clouder et al. (2012), who affirm that “ready traditional answers to pedagogical questions that fail to respect the fundamental need for freedom of enquiry only propagate the mistakes of the past.” This highlights the importance of creating educational environments in which students can explore, experiment, and generate their own ideas instead of merely reproducing predetermined and guided products. This perspective is also connected to Aguirre’s (2005) view that creative educational experiences should encourage students to actively construct their own interpretations, ideas, and meanings, allowing them to participate more autonomously and imaginatively in the learning process rather than simply reproducing predefined responses.

Promoting these capacities during the middle and upper cycles of primary education (ages 8–12) is particularly relevant, as students at this stage are expected to assume greater autonomy and engage more consciously in decision-making processes. Promoting creativity and critical thinking during this period helps students become more critical thinkers, improves their ability to solve problems, and reinforces their capacity to reflect on their own actions.

In addition, research emphasises that developing creative thinking in primary education is essential to preparing students to face new and unexpected situations. Creativity supports the ability to adapt, explore different perspectives, and construct solutions in changing contexts (Development of Creative Thinking of Primary School Students, 2022). This adaptability is closely linked to critical thinking, as students must analyse information, consider possibilities, and select the most proper response. Moreover, contemporary educational research considers creative thinking to be a key competence in the current education systems, highlighting its importance not only in artistic contexts but also in broader learning processes that involve problem-solving and innovation (Creative thinking in global primary education, 2025). As Clouder et al. (2012) explain, “the power we have to change things and people by means of creativity (via ideas, devices, processes…) is crucial in finding solutions to the challenges we face on a daily basis.” In a similar way, Aguirre (2005) states that “la experiencia artística favorece procesos de interpretación, reflexión y producción de sentido.” From this view, creativity is not limited to artistic production, but becomes a necessary ability for adapting to problems, improving situations, and responding flexibly to unforeseen events of everyday life and of life.

Through the analysis of different educational and artistic programmes, Iwai (2003) also observed that students participating in creative and arts-based activities obtained better results in creative thinking tasks. The studies reviewed by the author suggest that these experiences can improve students' ability to generate ideas, explore alternatives, think flexibly, and adapt responses to different situations. This connection between creativity, flexibility, and problem-solving is especially relevant in educational contexts that aim to promote active and reflective thinking processes.

Furthermore, in a review of international studies on arts education and child development, Iwai (2003) explains that artistic and creative educational experiences can positively influence students' confidence, self-awareness, motivation, and participation. Iwai highlights that students involved in these types of activities often showed greater enthusiasm and interest in learning, while also developing a stronger understanding of themselves and greater confidence in their own abilities. This perspective supports the statement that creativity is not only linked to cognitive processes but also to emotional, social, and personal development.

Accordingly, creativity and critical thinking should not be understood as separate abilities, but as interconnected processes that develop simultaneously through activities that require students to think, decide, and adapt their ideas. In this sense, educational approaches that combine structured challenges with opportunities for open-ended responses are particularly effective, as they allow students to generate ideas while also evaluating and refining them. This perspective reinforces the importance of designing learning experiences that go beyond simple reproduction and instead engage students in active, reflective, and decision-making processes. Clouder et al. (2012) also emphasise that children "have an insatiable curiosity, the courage to think differently and a lively imagination," qualities that should be encouraged within educational contexts through activities that value experimentation, divergent thinking, and creativity.

Critical thinking is a fundamental skill in education (Tilak Raj et al., 2022). It is defined as "the capacity to think clearly and reasonably about what to do or believe" and involves processes in which students investigate, interpret, and evaluate information. In this sense, education should not only focus on the acquisition of knowledge, but also on developing students' ability to think independently and apply what they learn to solve problems. As Tilak Raj et al. (2022) explain, a critical thinker is able to use knowledge effectively, evaluate ideas with awareness and refinement, and form reasoned judgments instead of simply following others. Developing these skills is especially important during childhood, as it promotes key cognitive and personal benefits.

Critical thinking enhances students' curiosity about the world and stimulates their creativity, encouraging them to generate original ideas and explore multiple solutions. It also fosters self-reflection and self-awareness, helping learners understand their own viewpoints while increasing their confidence and autonomy. In addition, it strengthens problem-solving abilities, as students learn to analyze information critically, distinguish between facts and opinions, and propose reasoned and unbiased solutions. These skills are particularly relevant in today's society, where individuals are expected to adapt to change, analyze complex information, and make informed decisions. However, Clouder et al. (2012) also warn that creativity can be inhibited by emotional and personal barriers. According to the authors, "there are three factors that conspire to hold back a pupil's heartfelt yearning": fear of failure, modesty, and awareness of one's own limitations. This suggests that educational contexts should promote confidence, experimentation, and freedom to make mistakes in order to support creative and critical thinking development.

Moreover, critical thinking contributes to the development of essential life skills such as organization, planning, open-mindedness, and communication, while also supporting more efficient and thoughtful decision-making in everyday situations. As highlighted in the article, "the quality of our lives… is directly proportionate to the quality of our brains," which emphasizes the importance of developing strong thinking skills from an early age (Tilak Raj et al., 2022).

Critical thinking should be intentionally developed through meaningful learning experiences, as it helps students evaluate ideas, solve problems, make decisions, and respond flexibly to different situations. Therefore, education should not only transmit knowledge but also develop creative and critical individuals capable of interpreting information, considering different perspectives, and making informed decisions (Aguirre, 2005).

3.2. Current artistic practices in primary education

Despite the recognised importance of creativity in education, research suggests that artistic practices in primary schools are not always developed in depth. Alter, Hays, and O'Hara (2009), in their study on creative arts teaching and practice, report that interviewed teachers indicate there is insufficient time dedicated to arts education. According to their findings, subjects such as language and mathematics tend to dominate the school day, which leads to arts instruction being reduced or carried out in a superficial way (Alter et al., 2009, Findings/Results, pp. 10–11). This situation limits the implementation of rich and creative artistic practices and provides a basis for arguing that creativity and critical thinking are not always effectively promoted within primary education contexts. When arts education is

marginalised or compressed, opportunities for experimentation, reflection, and deeper engagement are also reduced. In contrast, Clouder et al. (2012) highlight the positive impact that artistic and creative experiences can have on children's development, stating that "young people with low socio-economic status who received an arts-rich education demonstrated better academic achievement than their low-arts-engaged peers." These perspectives suggest that creativity and artistic practices can contribute not only to emotional and personal development, but also to motivation, participation, and broader educational outcomes.

This limitation highlights the need for alternative pedagogical approaches that can promote creativity and critical thinking in a more active and meaningful way. In this context, educational games emerge as a potential resource to address these challenges.

3.3. Educational games as a resource for creativity and critical thinking

Educational games have increasingly been recognised as powerful tools for learning, as they create environments in which students actively engage with knowledge rather than passively receive it. As Squire and Jenkins (2003) explain, games place learners in situations where they experiment, explore, and solve meaningful problems, allowing them to develop strategies that can be transferred beyond the game context. In this sense, game-based learning moves away from memorisation and promotes a deeper understanding, since "they don't memorize facts; they mobilize information to solve game-related problems" . Moreover, games function as complex learning environments, or "microworlds," where students understand how different concepts and processes are interconnected and develop a more holistic view of knowledge. Another key aspect is their strong motivational component, as this approach stimulate curiosity, imagination, and active participation, encouraging learners to experiment, discuss, and reflect. This idea is reinforced by Clouder et al. (2012), who state that "children can learn more effectively when they can also be active and creative." In a similar way, Aguirre (2005) argues that educational experiences should promote "formas de pensamiento abiertas, flexibles y divergentes." From this perspective, educational games become meaningful learning environments because they combine movement, participation, imagination, experimentation, and decision-making processes.

Additionally, games are based on decision-making processes, requiring players to make choices, test ideas, and adapt their thinking according to the outcomes, which reinforces both problem-solving and critical thinking skills. This type of learning is important because it

is based on experience and it allows students to learn through action rather than through passive instruction, making the learning process more meaningful and effective.

Furthermore, games promote collaboration and communication, as students often need to share ideas, justify their reasoning, and learn from others, creating opportunities for peer-to-peer learning. They also allow learners to explore different scenarios and strategies, helping them develop flexibility and adaptability when facing new challenges. Importantly, research shows that learning through complex problem-solving contexts improves both knowledge retention and performance, reinforcing the educational value of games.

Finally, the impact of game-based learning goes beyond the game itself, as students connect what they learn in the game with other learning experiences, highlighting the potential of games as a powerful and versatile educational resource (Squire & Jenkins, 2003).

Building on this idea, educational games have been identified as potentially valuable and positive tools for fostering creativity and critical thinking.

Ziaee et al. (2024), in their systematic review on the effect of educational games on creativity, state that “educational games possess the capacity to create an appropriate environment for fostering critical thinking, problem-solving, and the generation of innovative ideas” (Introduction). Through structured challenges and playful dynamics, learners “encounter challenges and puzzles that necessitate innovative thinking and meticulous analysis” (Ziaee et al., 2024, Results – Theme 1). This suggests that well-designed games can create conditions in which students are required to reason, adapt, and think flexibly.

However, the same authors emphasise that the effectiveness of educational games depends on careful design and implementation. They conclude that “educational games can function as efficacious instruments for augmenting students' creativity, contingent upon their design and implementation being meticulous and grounded in sound educational principles” (Ziaee et al. , 2024, Conclusion). This highlights that play alone is not sufficient; rather, creativity emerges when games include meaningful constraints, clear structures, and cognitively demanding tasks.

This idea is reinforced by research on educational games and critical thinking, which affirms that educational games are a suitable option for elementary school students because children at this stage still enjoy playing. From this perspective, play is not an obstacle to learning, but can become an effective means of achieving educational objectives. In fact, educational games have been described as possessing six main characteristics: “fantasy, rules/objectives, sensory stimulation, challenge, mystery, and control” (Garris et al., 2002).

These elements are especially relevant because they show that educational games are not simply entertaining activities, but structured systems that combine engagement with cognitive demand.

Furthermore, Wulandari, Susilo, and Kuswandi (2016) explain that educational games should follow several principles. First, they must be educational, so they can help students achieve the expected competencies. Second, both the design technique and the content must be appropriate and aligned with curriculum requirements. Thirdly, attention must also be paid to the visual and formal aspects of the game in order to capture students' attention. These principles are especially important in school contexts, where a game must not only be enjoyable but also pedagogically meaningful and connected to the activity's learning objectives.

Participants in their study also highlighted that “through the playful design thinking process, the students discovered that fun can have serious and positive consequences” and that learning through play was more memorable (Arnab et al., 2019, p. 190). Play was described as “a key element to help retention of new knowledge” (p. 190). These findings suggest that structured playful experiences can support not only engagement but also deeper cognitive involvement and meaningful learning.

Other authors also reinforce that educational games must be carefully designed to ensure student involvement as players (Kiili et al., 2012). In this sense, the quality of the design directly affects the educational value of the game. Educational games should not be improvised or added superficially to a lesson, but developed in a way that facilitates the learning process. According to Plass and Kaplan (2016), this means encouraging students’ cognitive, behavioral, affective, and sociocultural involvement with the subject matter. This idea is important for educational contexts, as it suggests that a good game can support learning at different levels: by making students think, participate actively, feel engaged, and interact with others.

These foundations provide a clear basis for the design of educational games that combine structure, challenge, and decision-making processes, which are key elements in the proposal developed in this project.

3.4. Analysis of existing games related to creativity and critical thinking

3.4.1. Existing games that promote creativity and critical thinking

Some existing games are particularly effective in promoting creativity, especially those that offer open-ended environments and allow multiple possible solutions. One of the most widely studied examples is Minecraft, a sandbox[1] game in which players can build, design, and explore virtual worlds. Minecraft has been associated with increased engagement and the development of creativity, critical thinking, and problem-solving skills (Minecraft Education, 2023). Its open-ended environment encourages imagination and the generation of original solutions. Moreover, the open-ended nature of the game allows it to function as a learning space where knowledge is applied in meaningful ways. In fact, Minecraft “serves as a virtual classroom where educational concepts can be visualized and experienced directly through applied learning” (Minecraft Education, 2023). This means that students are not only creating freely, but also engaging with content in an active and experiential way, which supports deeper understanding and creativity.

Similarly, card-based games such as Dixit and Story Cubes can also promote creativity, although in a different way. Unlike Minecraft, which focuses on construction and exploration, these games stimulate verbal creativity, imagination, and the ability to generate original associations.

In Dixit, players are presented with illustrated cards containing ambiguous and highly interpretative images, which require them to create associations between visual stimuli and verbal clues. This dynamic encourages imaginative thinking, as players must generate original ideas that are both creative and understandable to others. According to Asisejuega (n.d.), Dixit promotes creativity, imagination, and idea association, while also improving communication and social interaction, as players must constantly explain and interpret different perspectives. This makes the game particularly valuable in educational contexts, as it not only fosters divergent thinking but also supports the development of expressive and communicative skills.

Story Cubes promote creativity through storytelling and spontaneous idea generation. By using random visual symbols as prompts, players must create original narratives, connect unrelated elements, and organise ideas in meaningful ways. This process encourages

[1] Sandbox: a type of game environment that provides players with a high degree of freedom to explore, create, and solve problems without following a fixed sequence of objectives.

flexibility, imagination, oral expression, and creative confidence, while also supporting learning through storytelling and helping students synthesise information and establish relationships between concepts (Sisternes Alacot, 2023).

These types of games highlight the importance of ambiguity, imagination, and personal interpretation, which are key elements in the development of creativity. However, despite their potential, they often lack structured challenges that require deeper reasoning. While they successfully promote idea generation, storytelling, and imaginative thinking, they may not always require students to justify their ideas, evaluate alternatives, or adapt their responses under clearly defined constraints.

In addition to games that mainly promote creativity, there are also many board and card games that are especially effective in developing critical thinking, particularly those based on strategy, deduction, and logical reasoning. These games require players to analyse situations, evaluate alternatives, and make decisions based on evidence, which are core components of critical thinking. Research on board games in educational contexts suggests that they can support cognitive and academic development, particularly in reasoning and problem-solving (Vita-Barrull et al., 2024). For example, Chess is widely recognised for promoting strategic thinking, as players must anticipate their opponent's moves, consider multiple possible outcomes, and plan sequences of actions in advance. This requires continuous evaluation of alternatives and decision-making based on predicted consequences, which directly strengthens analytical thinking and planning skills (Wow Me Design, n.d.).

Similarly, games such as Settlers of Catan involve resource management, negotiation, and strategic planning, requiring players to make decisions under changing conditions, balance short-term and long-term goals, and adapt their strategies depending on other players' actions (Bristol Tutors, n.d.). These processes support flexible thinking and the ability to evaluate complex situations. Deduction-based games such as Clue are particularly relevant for the development of critical thinking, as they require players to collect and interpret clues, eliminate possibilities, and reach conclusions based on incomplete information. This type of reasoning involves making inferences, identifying patterns, and justifying decisions, which are essential skills in critical thinking (Parenting Science, n.d.).

In a similar way, logic games such as Mastermind require players to test hypotheses, analyse feedback, and adjust their reasoning in order to reach the correct solution. Research has shown that repeated engagement with this type of game can reduce reasoning errors and improve logical thinking processes (Parenting Science, n.d.). Other games, such as Labyrinth, also develop critical thinking by requiring players to solve spatial and strategic

problems, anticipate obstacles, and adapt their decisions to changing game conditions (Bristol Tutors, n.d.).

Overall, these examples demonstrate that many existing games promote critical thinking by engaging learners in structured problem-solving processes that involve analysis, evaluation, and decision-making. However, despite their effectiveness, these games often focus on problem-based thinking and finding a correct or optimal solution, which may limit opportunities for creativity and the generation of multiple ideas.

Additional information about the inspirational references and analysed games, including visual examples and explanations of their influence on the proposal, can be found in Annex 1.

3.4.2. Limitations of existing games and justification of the proposal

The analysis of existing games shows that, although many of them promote creativity or critical thinking, few are able to integrate both skills in a balanced and structured way. On the one hand, open-ended games such as Minecraft, Dixit, or Story Cubes are particularly effective in fostering imagination, creativity, and problem-based thinking. However, these games often lack clear constraints or structured challenges that require students to analyse their ideas, justify their decisions, or adapt their responses based on specific conditions. As a result, while they promote creativity, they may not always encourage deeper reasoning or decision-making processes.

On the other hand, strategy and logic-based games such as Chess, Clue, or Mastermind are highly effective in promoting analytical and critical thinking, problem-solving, and decision-making. These games require players to evaluate alternatives, anticipate consequences, and identify the most appropriate solution. However, they are typically based on problem-based thinking, as they tend to focus on finding a correct or optimal answer. This can limit opportunities for imaginative thinking, flexibility, and the generation of multiple possible solutions, which are essential aspects of creativity.

In addition, many of these games are not specifically designed for educational contexts and are often used as complementary tools rather than structured learning resources. To address these limitations, the proposal developed in this project combines creativity and critical thinking through structured but flexible challenges that encourage students to generate, adapt, and evaluate ideas. Specifically designed for primary education, the game promotes both divergent and analytical thinking through active and meaningful learning experiences based on continuous adaptation and decision-making.

4. Methodology

This Final Degree Project follows a qualitative approach based on theoretical research and the design of an educational proposal. The methodology focuses on analysing existing knowledge about creativity, critical thinking, and educational games, and using this information as a basis for the development of the proposed game.

First, a literature review was conducted in order to identify relevant studies and theoretical contributions related to creativity, critical thinking, and game-based learning in primary education. Academic sources were selected using databases such as Google Scholar and ERIC. This process involved searching for articles, analysing previous research, and extracting key ideas and quotations to build the theoretical framework. The information gathered was organised into thematic categories in order to structure the different sections of the project and ensure coherence with the objectives of the study.

In addition, an analysis of existing games that promote creativity and critical thinking was carried out in order to identify their main characteristics, strengths, and limitations.

Based on this theoretical and analytical process, the proposed game was designed at a conceptual level. The design was informed by principles identified in the literature, especially the importance of combining creativity and critical thinking through structured challenges. The proposal was also inspired by games such as Dixit and Story Cubes, which encourage imagination and idea generation through open-ended prompts. However, the proposed game incorporates additional elements, such as Condition cards, in order to promote adaptation, reasoning, and decision-making.

The proposed game, titled *Solve it*, is designed as a learning resource to promote **creativity** and critical thinking through challenges with clear conditions. Its main idea is that creativity does not only come from complete freedom, but also from the need to respond to specific situations under structured conditions. At the same time, **critical thinking** is developed when children must analyse a situation, make decisions, and ensure that their solution is coherent and functional.

In each round, participants are presented with a situation (situation card) and a mandatory object (object card) that must be integrated into their solution. After proposing an idea, they must adapt it to an unexpected condition (condition card). This structure encourages creativity, as participants generate original solutions within constraints, and it also promotes critical thinking, as they must evaluate whether their idea truly respects all the given

requirements. The need to adapt their proposal when a new condition appears reinforces critical and flexible thinking and reasoning.

The educational purpose of the game is to move beyond artistic activities that focus mainly on copying models or producing a final product. Instead, the game emphasises the thinking process behind the solution.

The game is aimed at children aged 8 to 12, a stage in which autonomy, reasoning skills, and decision-making abilities are progressively developed. Short, time-limited rounds encourage active participation and maintained attention, while the structured format helps participants focus on analytic thinking rather than random imagination.

Different gameplay structures were also considered. One option was based on turn-taking, where each player individually drew cards and thought of a solution. Another option allowed all players to think simultaneously and rewarded the first participant who proposed an idea. After comparing both possibilities, the second option was selected because it created a more dynamic and engaging experience. The turn-based version was considered slower and less motivating, especially for younger children who could lose attention while waiting. The final structure therefore combines simultaneous thinking with a simple adaptation phase, making the game faster, more participatory, and easier to understand. Throughout the process, the game was progressively simplified in order to prioritise clarity, flexibility, and active participation.

Following the design phase, a small-scale implementation of the game was carried out in order to evaluate the functionality and educational potential of the proposal. The implementation took place in an extracurricular educational context with four children aged between 8 and 10 years old at Escola Turbula (Barcelona). The session lasted approximately one hour and began with a brief explanation of the rules and a short example round. The activity aimed to observe the clarity of the game mechanics, students' participation and engagement, and the extent to which the game promoted creativity, flexibility, and critical thinking.

The implementation followed a qualitative and exploratory approach based on direct observation supported by a simple observation grid focused on participation, engagement, creativity, flexibility, and interaction throughout the activity. Informal feedback was also collected through group discussion at the end of the session in order to identify strengths, difficulties, and possible improvements for future versions of the proposal. The information gathered during the implementation was later analysed in relation to the theoretical framework and the objectives of the project.

5. Contextualization

This project is framed within the context of primary education in Catalonia, following the current educational legislation established by Decret 175/2022, which regulates the primary education curriculum. Although some of the theoretical references used in this study have an international scope, the proposal is grounded in the Catalan educational system and its competency-based approach.

The project is specifically addressed to children in the middle and upper cycles of primary education (ages 8 to 12). At this stage, students are expected to progressively develop autonomy, decision-making skills, and the ability to justify their ideas within structured learning situations. The Catalan curriculum places particular emphasis on the development of competences rather than the mere acquisition of content, especially within the Arts Education area, where creativity, expression, and reflective processes play a central role.

However, both previous research and my own teaching internship experience suggest that artistic practices in primary classrooms often prioritise the production of final outcomes and the reproduction of teacher-directed models. This approach may limit students' opportunities to engage in open-ended creative processes and to develop critical thinking skills. As a result, there is a need for alternative pedagogical resources that promote more active, reflective, and process-based learning.

In response to this need, the proposed card game is designed as a flexible and adaptable resource that can be used within primary education contexts. While it can be implemented in the classroom and aligned with the Catalan curriculum, it is not limited to formal educational settings and can also be used in informal learning environments. Its design aims to support the development of creativity and critical thinking through structured challenges that encourage decision-making, adaptation, and idea generation.

Finally, this proposal is directly informed by my teaching internship experience in a public primary school located in the Raval neighborhood of Barcelona, where I mainly worked with middle and upper primary students. During this period, I observed that many artistic and creative activities were frequently based on predefined instructions, model reproduction, and highly guided processes, leaving limited space for experimentation, imagination, or open-ended responses. These observations reinforced the need to design learning experiences that move beyond imitation and promote active thinking processes. In this sense, the game seeks to provide a practical and engaging alternative that aligns with both theoretical principles and real educational needs.

6. Results

The implementation of the game was carried out with primary education students aged between 8 and 10 years old. The results were obtained through direct observation supported by a simple qualitative observation grid[2] focused on participation, creativity, engagement, flexibility, and critical thinking processes throughout the activity. The grid was used to register students' participation, interaction, idea generation, and adaptation processes during the different phases of the game. During the session, students participated actively and showed a high level of motivation and engagement. The implementation also allowed the observation of students' adaptation processes, interaction dynamics, and ability to generate and reformulate ideas according to the different conditions presented during the game.

The students quickly understood the basic dynamics of the game and were able to follow the sequence of the rounds without significant difficulties. The structure based on Situation cards, Object cards, and Condition cards was generally clear and functional for the target age group.

During the activity, students generated a wide variety of creative solutions in response to the situations presented. The use of object cards encouraged participants to think beyond obvious answers and integrate everyday objects into their proposals in original ways. In addition, the Condition cards required students to adapt and reformulate their initial ideas, promoting flexibility and deeper reflection during the game.

The adaptation phase was one of the most active parts of the implementation. After revealing a new condition, students frequently modified their original solutions to make them more inclusive, sustainable, safe, or accessible. In many cases, participants justified their decisions and explained why they had changed certain aspects of their ideas.

Another relevant result observed during the implementation was the spontaneous appearance of small debates among students when deciding whether a solution should be considered valid. Participants justified their opinions by discussing whether the proposed adaptations truly fulfilled the condition presented on the card. Moreover, these discussions were generally objective, as students focused on the logic and feasibility of the solutions rather than on gaining points or obtaining a competitive advantage.

The simultaneous participation structure also contributed to maintaining students' attention and involvement during the session. Most students remained focused on the game while

[2] Annex 2. Observation grid used during the implementation

waiting to participate, since they were continuously thinking about possible solutions and adaptations. Similarly, the “bounce” dynamic, in which another participant had to continue adapting the same idea if the original player could not do so successfully, also helped maintain attention and active involvement.

Another aspect that contributed positively to students’ engagement was the decision to assign different point values to the Object cards according to their level of difficulty. Objects considered more difficult or unusual provided more points, while simpler objects provided fewer points. This scoring system made the game more dynamic and interesting for the participants, as students showed greater motivation and interest when attempting to solve challenges involving higher-value cards.

From an observational perspective, the implementation showed that the game promoted imagination, oral expression, participation, and collaborative interaction between students. Several participants built upon ideas proposed by classmates or suggested alternative adaptations when a player could not successfully adapt the original idea.

The implementation also revealed differences between students regarding ease of imagination and idea generation. Some children were able to produce multiple ideas quickly and adapted their proposals easily when a new condition appeared. In contrast, other students showed more difficulty generating alternative solutions or modifying their original ideas, which sometimes resulted in lower participation in successful rounds or fewer points obtained during the game.

The implementation also confirmed that the simplified version of the game functioned more effectively than the initial design proposals. The elimination of the Rule cards reduced contradictions between cards and made the dynamics clearer and easier to follow. Similarly, the use of short and concrete situations helped students understand the challenges quickly and respond more confidently.

Overall, the implementation demonstrated that the game generated active participation, sustained motivation, creative responses, and continuous adaptation of ideas throughout the session.

The complete visual design of the game, including the cards created for the implementation, can be accessed through the following Canva link: https://canva.link/rvnvw329pc833wd

A detailed description of the game mechanics, materials, and examples of the different card types can be found in Annexes 3 and 4.

7. Discussion of the results

7.1. Discussion of the results

The results obtained during the implementation generally support the ideas presented in the theoretical framework regarding the educational value of creative and game-based learning experiences. The high level of participation, motivation, and engagement observed during the activity is consistent with Squire and Jenkins' (2003) perspective that educational games create active learning environments in which students experiment, solve problems, and interact meaningfully with knowledge. Similarly, the implementation confirmed Ziaee et al.'s (2024) argument that educational games can promote critical thinking, problem-solving, and the generation of innovative ideas when they are carefully designed and structured around meaningful challenges.

The adaptation phase generated by the Condition cards appeared to be especially relevant in promoting flexible thinking and critical reflection. Students were required not only to generate an original idea, but also to reconsider, modify, and justify it according to a new situation or requirement. This finding aligns with the perspective of Craft, Cremin, Hay, and Clack (2013), who argue that creative educational experiences should encourage students to reflect on their choices, justify decisions, and actively participate in the learning process instead of simply reproducing predefined models.

At the same time, the implementation also revealed some aspects that connect with more critical perspectives discussed in the literature. One of the most evident findings was that students showed different levels of ease and fluency when generating and adapting ideas. While some participants produced multiple ideas quickly and adapted them easily after the Condition cards appeared, others needed more time and demonstrated greater difficulty during the process. This observation can be related to Barbot, Besançon, and Lubart's (2015) perspective that creativity should not be understood as a single or uniform ability, but rather as a multidimensional competence influenced by cognitive, motivational, emotional, and contextual factors. In this sense, the results suggest that creative thinking develops differently in each child and that some students may require more support, time, or confidence to engage successfully in open-ended creative tasks.

These findings can also be connected to more critical perspectives regarding open-ended and minimally guided learning approaches. Kirschner, Sweller, and Clark (2006), in their analysis of discovery learning and minimally guided instruction, argue that excessively open tasks may generate "a heavy working memory load that is detrimental to learning," especially

when students are required to solve complex problems without sufficient guidance or structure. The authors defend that novice learners often need stronger instructional support because “minimally guided instruction is less effective and less efficient than instructional approaches that place a strong emphasis on guidance.” According to their perspective, students involved in highly exploratory activities may become “lost and frustrated,” and this confusion can even lead to misconceptions or superficial learning processes. Furthermore, the article highlights that “problem-solving search can function perfectly with no learning whatsoever,” suggesting that simply engaging students in problem-solving tasks does not automatically guarantee meaningful learning or critical reflection. Kirschner, Sweller, and Clark (2006) also explain that different students respond differently to instructional approaches, stating that “strong treatments benefited less able learners and weaker treatments benefited more able learners,” reinforcing the idea that some students may require more scaffolding, structure, and support than others during open-ended educational experiences. These perspectives are especially relevant in relation to the implementation of the proposed game, as some participants indeed required more time, support, and guidance to generate and adapt ideas during the activity. Similarly, during the design process, several mechanics and cards had to be simplified or eliminated because the initial version generated excessive complexity and contradictions between challenges. However, unlike the concerns raised by the authors regarding minimally guided approaches, the final implementation of the game appeared to maintain a balanced relationship between structure and freedom. The use of clear mechanics, concrete challenges, guided turns, and collaborative discussion provided enough structure to support students’ participation while still allowing flexibility, creativity, and critical thinking. In this sense, the results suggest that open-ended educational games can become effective pedagogical tools when creativity and problem-solving activities are combined with clear structures, accessible rules, and appropriate guidance adapted to students’ needs.

Furthermore, the design process of the game itself reflects some of the tensions highlighted in the literature regarding creativity and educational structure. During the development of the proposal, several mechanics and cards were modified or eliminated because the initial version became excessively complex and generated contradictions between challenges. This process is connected to Craft’s (2005) argument that creativity in education can be limited when activities become overly structured or constrained, reducing students’ freedom to explore ideas and think flexibly. The decision to simplify the mechanics by removing the Rule cards appeared to improve the clarity, rhythm, and accessibility of the game during the implementation.

In addition, some studies on gamification warn that certain game mechanics, such as points, competitions, leaderboards, and reward systems, may generate excessive competitiveness or shift students' attention towards winning rather than learning itself. Almeida et al. (2023), in their systematic mapping study on the negative effects of gamification in educational software, identified that badges, leaderboards, competitions, and points are frequently associated with motivational issues, worsened performance, and lack of understanding. However, these tendencies were not significantly observed during the implementation of this project. On the contrary, students generally discussed the validity of solutions in an objective and collaborative way, even when this did not personally benefit them in terms of points or competition. The bounce dynamic also contributed positively to maintaining attention and participation, as students remained mentally engaged throughout the activity in case the turn passed to them.

Another relevant aspect is that the implementation reinforced the importance of balancing structure and freedom within creative educational experiences. Although the game followed clear mechanics and limitations, students still had enough freedom to imagine, adapt, and justify different solutions. This balance appears to support the idea that creativity can be promoted more effectively when activities combine clear structures with opportunities for open-ended thinking, experimentation, and decision-making. Finally, the implementation suggests that educational games based on meaningful challenges, rapid adaptation, and collaborative discussion can become useful pedagogical tools for promoting creativity and critical thinking in primary education contexts.

7.2. Future improvements

Although the implementation produced generally positive results, some aspects observed during the activity suggest possible improvements for future versions of the proposal. One of the most noticeable findings was that students responded differently to the open-ended challenges presented during the game. While some participants generated and adapted ideas quickly and confidently, others required more time, guidance, and support throughout the activity.

For this reason, future versions of the game could incorporate differentiated levels of difficulty in order to make the activity more accessible and progressive for different learners. For example, the game could be organised into three levels of difficulty, each one including different types of Situation cards, Object cards, and Condition cards adapted to students' age, confidence, and creative abilities. The first level could include simpler and more guided challenges, while the following levels could progressively introduce more abstract situations,

complex conditions, and more demanding adaptation tasks. Students could progressively move from one level to another as they improve their creativity, flexibility, confidence, and problem-solving abilities throughout the game.

Similarly, future implementations could include more flexible adaptation times depending on students' needs and confidence levels. During the implementation, some participants appeared to need additional time to rethink and reformulate their ideas after the Condition cards were revealed. Allowing more flexible timing or progressive difficulty levels could therefore help reduce frustration and encourage participation among students who experience greater difficulty with spontaneous idea generation or adaptation tasks.

Another possible improvement would be the incorporation of additional scaffolding strategies to support students who require more guidance during the activity. Future versions of the proposal could include optional visual supports, simplified examples, cooperative formats, or guided prompts in order to facilitate participation and idea generation. In this sense, collaborative dynamics could be especially beneficial for students who feel less confident when responding individually to open-ended challenges, as interaction with peers may help stimulate imagination, discussion, and creative thinking.

Finally, the implementation reinforced the importance of balancing structure and freedom within creative educational experiences. Although the game encouraged open-ended thinking and imagination, the results suggest that some students benefit from clearer guidance and more structured support than others. Continuing to refine this balance between flexibility, accessibility, and guidance would therefore remain one of the main objectives for future versions of the proposal.

8. Conclusions

This Final Degree Project aimed to design and implement an educational card game to promote creativity and critical thinking in primary education through challenges, adaptation processes, and problem-solving situations. Both the theoretical framework and the implementation confirmed the educational value of game-based learning when connected to meaningful cognitive processes.

The results showed that the proposal encouraged students to generate original ideas, adapt their thinking to changing conditions, justify their decisions, and engage in reflective discussions. The activity promoted imagination, flexibility, reasoning, collaboration, and critical thinking, with the Condition cards playing a particularly important role in encouraging students to reconsider and reformulate their ideas.

The implementation also highlighted the motivational potential of educational games, as participants showed high levels of engagement and active participation throughout the activity. At the same time, the project reinforced the importance of balancing structure and freedom within creative learning experiences, providing enough guidance to support participation while maintaining opportunities for imagination and flexible thinking.

Overall, the proposal demonstrates the educational potential of combining creativity, play, and critical thinking in meaningful and adaptable learning environments, moving beyond activities based on simple reproduction or predefined answers.

The main objective of this Final Degree Project was to design an educational card game aimed at fostering creativity and critical thinking in primary education through challenges and rapid problem-solving situations. This objective was successfully achieved through the development, implementation, and evaluation of the card game proposal.

Regarding the specific objectives, the first objective, focused on analysing theoretical and empirical research related to creativity, critical thinking, and educational games, was achieved through the development of an extensive theoretical framework based on academic literature and previous studies. The analysis of these sources made it possible to establish a solid conceptual foundation for the proposal and to demonstrate the educational value of creativity, game-based learning, and critical thinking within primary education contexts.

The second objective, focused on analysing existing educational games that promote creativity and critical thinking, was also achieved. Different games such as Dixit, Story

Cubes, Minecraft, Chess, Catan, Clue, Mastermind, and Labyrinth were analysed in order to identify their main mechanics, strengths, and educational potential. This analysis helped determine which elements could inspire the proposal and which aspects differentiated the final game from existing references. In particular, the combination of adaptation phases, Condition cards, and rapid reformulation processes became one of the main distinctive characteristics of the game.

The third objective, focused on designing a card game structured around situations, objects, and unexpected conditions, was achieved through the creation of the different types of cards, the game mechanics, and active participation dynamics aimed at maintaining participants' attention throughout the activity. During the design process, several modifications and simplifications were introduced in order to improve the clarity, coherence, and playability of the proposal. The final version of the game successfully integrates creativity, flexibility, coherence, and decision-making under time pressure within a functional and adaptable structure.

Finally, the objective related to the implementation was also achieved through a small-scale exploratory implementation carried out with primary education students aged between 8 and 10 years old. This implementation made it possible to observe participants' participation, engagement, creativity, and critical thinking processes during the activity. The results obtained suggest that the game was understandable, dynamic, motivating, and effective in generating meaningful creative challenges and adaptation processes. In addition, the implementation provided valuable information that helped identify strengths, limitations, and possible future improvements for the proposal.

Overall, the different phases of the project, theoretical research, game analysis, the design process, implementation, and discussion of the results, contributed positively to the achievement of the objectives initially proposed in this Final Degree Project.

Although the results obtained during the implementation were generally positive, this Final Degree Project also presents several limitations that should be considered when interpreting the findings and evaluating the scope of the proposal.

One of the main limitations of the project is the small number of participants involved in the implementation. The game was tested with only four children aged between 8 and 10 years old, which means that the results cannot be generalised to broader educational contexts or larger groups of students. The game was tested during a single session lasting approximately one hour, which limited the possibility of observing the evolution of students' creative and critical thinking processes over time. A longer implementation carried out

across multiple sessions could provide more complete and representative information regarding the educational impact of the proposal and would allow the observation of whether students' creativity, flexibility, and critical thinking skills progressively develop and improve through repeated use of the game.

Furthermore, although a simple qualitative observation grid was used during the implementation, the data collection process remained mainly observational and qualitative. The project did not include more structured assessment instruments or quantitative measures that would allow creativity and critical thinking to be evaluated more objectively or systematically. As a result, the interpretation of the results was based primarily on direct observation.

Another limitation is related to the complexity of creativity. During the implementation, significant differences were observed in the generation of ideas, imaginative flexibility and the ability to adapt, among the students. Some participants were fast and confident to produce and adapt ideas, while others needed more time and help during the activity.

Finally, the game itself is still a proposal in development and could continue evolving through future implementations and modifications. Although several changes to the mechanics and cards were made throughout the design process, future implementations may reveal additional difficulties, limitations, or aspects that require further adaptation depending on the educational context or the characteristics of the participants.

With more time and resources, it would have been possible to carry out longer implementations with a larger number of participants and in different educational and social contexts. This would have allowed a deeper analysis of how the game functions and adapts in different environments such as primary classrooms, extracurricular activities, family contexts or leisure education spaces such as *esplais* or *caus*. Testing the game in different environments would also help analyse how group dynamics, participation, creativity, and motivation change depending on the educational setting and type of interaction between participants. In addition, further research and testing processes could have been conducted in order to redesign and refine the cards so that the instructions, situations, and conditions became even clearer, more understandable, and more coherent with one another. Likewise, with more time, it would also have been interesting to dedicate more attention to the artistic and visual design of the game, including the illustrations, aesthetic coherence, visual identity, and overall presentation of the cards and materials. Although the current version of the proposal is functional and visually understandable, future versions of the game could further develop the artistic dimension of the project in order to create a more attractive, and polished final product.

These aspects open possible future lines of continuity and improvement for the proposal.

Throughout the development of this Final Degree Project, several academic, professional, and personal competences have been developed and strengthened. The process of researching, designing, implementing, and analysing the proposal required the integration of theoretical knowledge, creativity, critical reflection, organisation, and pedagogical decision-making. One of the main competences developed during this project was the ability to connect theoretical research with practical educational application. The creation of the game required analysing academic literature and transforming these theoretical principles into a functional and meaningful educational resource adapted to primary education contexts. The project also contributed to the development of competences related to creativity, innovation, and problem-solving. Throughout the design process, several challenges emerged regarding the dynamics of the game, structure, clarity, and playability of the game. These difficulties required constant adaptation, reflection, and redesign in order to improve the proposal and make it more coherent, dynamic, and accessible for students.

As a future teacher, this project reinforced and consolidated many of the learnings developed throughout the degree, especially those related to gamification, active methodologies, and student-centred approaches. The experience of designing and implementing an educational game helped me better understand the importance of creating learning experiences in which students actively participate and construct knowledge through motivating activities.

Furthermore, this project increased my interest in continuing to explore gamification and game-based learning as educational tools in my future professional practice. In the future, I would like to continue creating materials and educational resources similar to this proposal, not only to promote creativity and critical thinking, but also to work on other skills and competences that I consider essential to develop during primary education. Since children represent a new generation that will shape the future of society, helping them develop abilities such as creativity, flexibility, critical thinking, communication, and problem-solving can contribute positively both to their personal development and to social progress more broadly.

Finally, this experience opened new possibilities for future professional and academic development. In the future, it would be interesting to continue researching creativity and critical thinking in educational contexts, further develop the game through new implementations and adaptations, and continue exploring the educational potential of games and creative methodologies within primary education.

9. References

9.1. Use of IA

For this Final Degree Project, I used ChatGPT (GPT-5.2, OpenAI) as a language support tool to improve spelling, grammar, and clarity of expression. It was also used to summarise information and assist in the creation of the game instructions.

The content and ideas are entirely my own. I used the following type of prompt: “Correct the grammar and language of my text without changing its meaning, at a B2-C1 level.”

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10. Annexes

Annex 1: Inspirational references and analysed games

1. Minecraft



Figure A1. Minecraft game. Source: Google Images.

Minecraft inspired the open-ended and creative nature of the proposal. The game demonstrates how players can solve problems creatively, experiment freely, and construct solutions using limited resources, imagination, and exploration.

2. Dixit



Figure A2. Dixit board game. Source: Google Images.

Dixit was one of the main inspirational references during the design process of the proposal. The game strongly influenced the imaginative and interpretative dimension of the project through its use of open-ended images and multiple possible meanings. One of the aspects that inspired the proposal the most was the idea that there is not a single correct answer, but

rather multiple possible interpretations and responses depending on each player's creativity and perspective.

This approach influenced the decision to create challenges that encourage imagination, storytelling, and original thinking instead of simple reproduction or memorisation. In addition, Dixit highlighted the importance of allowing players to justify and explain their ideas, something that is also present in the proposed game during the adaptation and discussion phases.

3. Story Cubes

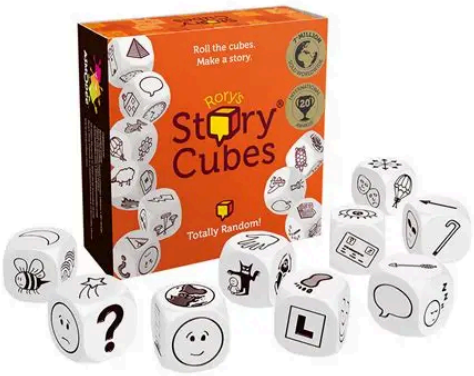

Figure A3. Story Cubes board game. Source: Google Images.

Story Cubes inspired the use of random prompts and spontaneous idea generation. The proposal adapts this concept through the combination of situations, objects, and conditions that require flexible thinking and adaptation.

4. Chess



Figure A4. Chess board game. Source: Google Images.

Chess inspired the importance of strategic thinking, anticipation, and decision-making processes. Although the proposed game is more imaginative and flexible, it also requires players to analyse situations carefully and adapt their responses strategically.

5. Settlers of Catan



Figure A6. Settlers of Catan board game. Source: Google Images.

Catan influenced the incorporation of strategy, resource management, negotiation, and adaptation to changing situations. The game highlighted the importance of balancing planning with flexibility during gameplay.

6. Clue



Figure A7. Clue board game. Source: Google Images.

Clue inspired reasoning and interpretation processes. The game reinforced the importance of analysing information carefully and constructing coherent conclusions from limited clues and evidence.

7. Mastermind



Figure A8. Mastermind board game. Source: Google Images.

Mastermind inspired deductive reasoning and the process of reformulating ideas according to new information and feedback, elements that are also present during the adaptation phases of the proposal.

8. Labyrinth



Figure A8. Labyrinth board game. Source: Google Images.

Labyrinth inspired adaptability and flexible thinking within constantly changing situations. The game highlighted the importance of modifying strategies and reacting dynamically to unexpected changes, which relates closely to the adaptation phase of the proposal.

Annex 2. Observation grid used during the implementation

Observed aspect	**Evidence observed during the implementation**
Participation of the students	All participants remained actively involved throughout the activity and participated voluntarily during the different rounds of the game. Students consistently contributed ideas, reacted to the proposals of their classmates, and remained engaged even when it was not directly their turn. No participant disengaged from the activity or showed a lack of interest during the session.
Engagement and motivation	Students showed high levels of motivation, enthusiasm, and interest from the beginning of the activity until the end of the session. Participants reacted positively to the challenges, laughed, celebrated creative solutions, and expressed excitement when new cards were revealed. The competitive and dynamic nature of the game appeared to increase students' motivation and willingness to participate actively.
Creativity and imagination	Participants generated original, varied, and sometimes unexpected ideas in response to the proposed situations and objects. Several students demonstrated the ability to reinterpret ordinary objects creatively and connect unrelated elements in coherent ways. In many cases, students proposed multiple possible solutions before selecting their final response, demonstrating divergent thinking and imaginative exploration.
Adaptation and flexibility	Most participants were able to reformulate and adapt their original ideas after the Condition cards were revealed. Students modified their responses according to the new restrictions and attempted to maintain coherence between the initial proposal and the adapted solution. Some participants adapted their ideas quickly and spontaneously, while others required more reflection time before finding an alternative response.
Critical thinking	Participants frequently evaluated whether solutions were coherent, realistic, and valid according to the conditions established during the round. Several spontaneous discussions and mini debates emerged naturally during the activity, especially when deciding whether a solution should be accepted or not. Students generally justified their opinions using logical arguments rather than focusing only on competition or personal benefit.

Attention and involvement	The “bounce” dynamic contributed significantly to maintaining students’ attention and continuous mental participation throughout the game. Since participants knew that the turn could pass to another player if the original participant could not adapt the solution, students remained attentive and mentally involved even when they were not actively speaking.
Functionality of the cards	The different types of cards functioned coherently during the implementation and successfully generated dynamic, adaptable, and creative challenges. The interaction between Situation cards, Object cards, and Condition cards encouraged students to think flexibly, reformulate ideas, and continuously adapt their responses. The point system linked to the Object cards also contributed positively to maintaining interest and engagement throughout the activity.
Difficulty differences between students	Important differences were observed between participants regarding imagination, speed of idea generation, flexibility, and adaptation capacity. Some students generated multiple ideas very quickly and adapted their responses easily after the Condition cards appeared, while others needed more time to think or showed greater difficulty reformulating their ideas. These differences appeared naturally throughout the implementation and highlighted the diversity of creative processes between students.
Clarity of the rules	Students understood the basic mechanics and structure of the game without major difficulties after the initial explanation and the short trial round. Once the first examples were completed, participants quickly understood the sequence of the rounds and the function of each type of card. Only occasional clarifications were needed during the implementation.
Group interaction	Participants listened attentively to each other’s ideas, reacted collaboratively, and generally respected different opinions and solutions throughout the activity. Students frequently commented on classmates’ responses, suggested alternative possibilities, and participated naturally in the discussions generated during the game. The activity promoted constant interaction and communication between participants.

Table 1. Observation grid used during the implementation. Source: Own elaboration.

Annex 3. Detailed description of the game

The game is organised around a structure that combines different types of cards and real-life challenges. Its design ensures that each round presents a meaningful problem that participants must solve creatively using specific objects and adapting their ideas to new conditions. The game was designed to be simple, dynamic, and easy to understand for children while still promoting creativity and critical thinking.

The game can be played individually or in small teams, depending on the number of participants. It is designed for approximately 3 to 6 players, although it can also be adapted for classroom contexts with larger groups. The flexible structure of the game allows it to be used both in educational settings and in informal contexts outside school. Depending on the pedagogical objectives, the activity can be organised through individual participation, cooperative group work, whole-class dynamics, or collective discussion. For example, in classroom contexts, students may negotiate and agree on shared solutions in small groups, encouraging communication and collaborative decision-making processes. This flexibility increases the practical applicability of the proposal and allows teachers to adapt the game to different educational situations and learning contexts without requiring complex preparation or materials.

The game materials include 24 Situation cards, 24 Object cards, and 24 Condition cards, as well as a one-minute timer or hourglass. Among the Condition cards, there are also four special “Player Choice” cards and two “No Condition” cards. The Object cards have different point values depending on their level of difficulty, as some include more complex or multiple objects that are harder to integrate creatively into the solution.

The game is structured around three main types of cards, each with a specific role within the round. Situation cards present concrete real-life challenges that require players to solve a problem through action and decision-making. Object cards introduce everyday objects that players must obligatorily include in their solution, encouraging them to reinterpret common materials in creative ways. After presenting an initial idea, players receive a Condition card that forces them to adapt their original solution according to a new requirement related to aspects such as sustainability, inclusivity, accessibility, safety, or cooperation.

The game also includes special cards to increase unpredictability and variety. The “Player Choice” card allows another participant to invent the condition for that round, while the “No Condition” card removes the adaptation phase and allows the original idea to remain unchanged.

Each round follows the same structure. First, a Situation card and an Object card are revealed, and players think of a possible solution. One participant presents an initial idea using the object shown on the card. Afterwards, a Condition card is revealed, and the participant has one minute to adapt the same idea according to the new restriction or requirement. If the adapted solution is coherent and functional, the player earns the points indicated on the Object card. If the player cannot adapt the idea, the round "bounces" to another participant, who must continue adapting the original solution. The game continues through different rounds until one player or team reaches 12 points and wins the game.

Annex 4. Examples of different types of cards



Figure A9. Examples of Situation cards. Source: Own elaboration.

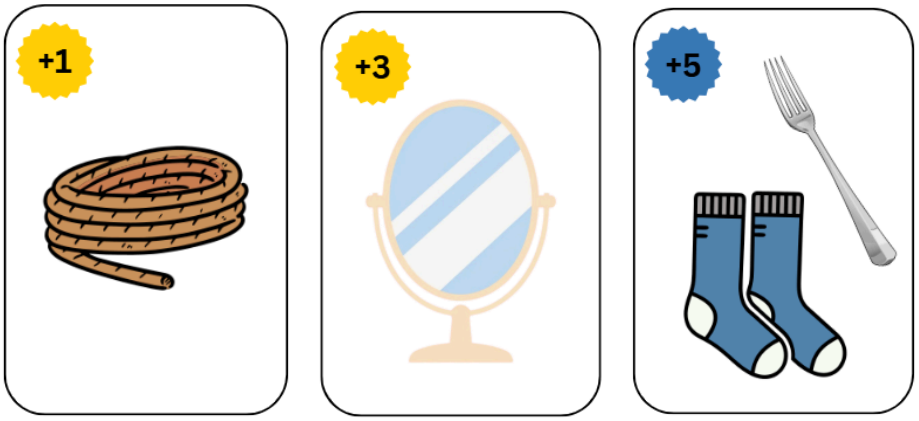

Figure A10. Examples of Object cards. Source: Own elaboration.

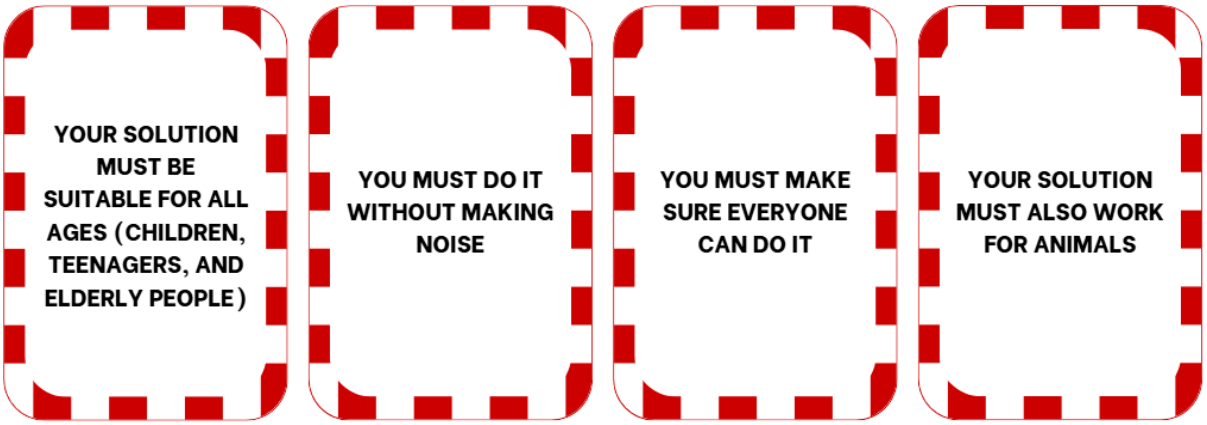

Figure A11. Examples of Condition cards. Source: Own elaboration.



Figure A12. Examples of Special cards. Source: Own elaboration.

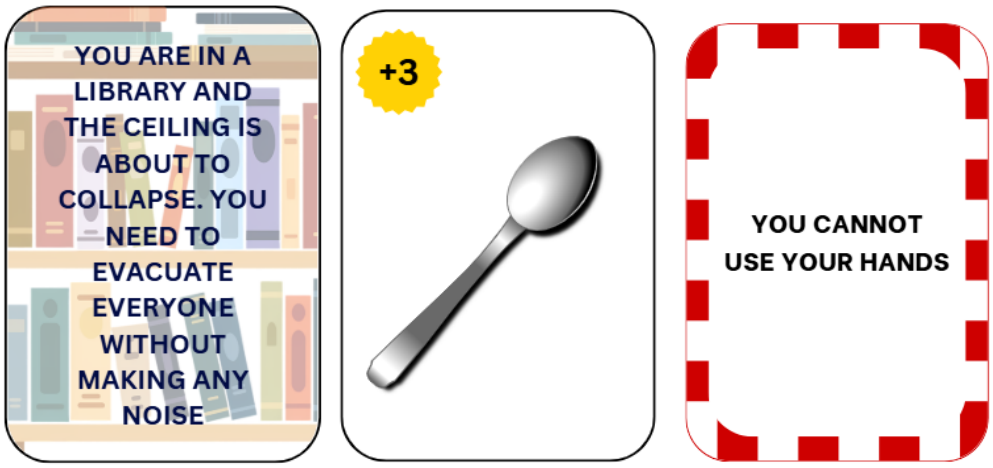

Figure A13. Example of a round. Source: Own elaboration.

In this example, the participant first draws a Situation card and an Object card. The Situation card presents the following challenge: “You are in a library and the ceiling is about to

collapse. You need to evacuate everyone without making any noise.” The Object card requires the participant to include a spoon in the solution.

At this stage, the participant thinks of an initial solution. For example, the player could propose using the spoon to tap lightly on shelves or surfaces in order to visually guide people towards the exit without speaking or creating loud sounds. Since no additional condition has appeared yet, the participant only needs to incorporate the object and solve the situation coherently.

After presenting the initial idea, the participant draws a Condition card. In this example, the condition states: “You cannot use your hands.” The participant must then adapt the original solution according to this new restriction. For example, the player could explain that the spoon would now be held using the mouth, arms, or clothing in order to continue guiding people silently without directly using the hands.

If the adapted solution is considered coherent and functional by the group, the participant completes the round and wins 3 points, corresponding to the value of the Object card.

During the design process, several changes and modifications were made in order to simplify the game and improve its clarity. Initially, the game included an additional type of card called Rule cards, which introduced restrictions such as “You cannot use electricity.” However, after testing different combinations and reflecting on the gameplay, it became clear that the game was becoming too complicated and sometimes contradictory. Some rounds demanded too many simultaneous conditions, which made the game confusing and difficult to follow for children. For this reason, the Rule cards were removed from the final version of the game.