InterGames

VIDEO GAMES AS AN INTERDISCIPLINARY PEDAGOGICAL TOOL

Evaluating the Impact of the InterGames project on European Secondary Education

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UDC

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InterGames

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1. INTRODUCTION

In recent decades, secondary education has undergone significant transformations, driven by technological advances and the need to **develop twenty-first century competencies** in students. The integration of digital resources and innovative pedagogical strategies has become a central axis to promote active, critical and collaborative learning.

In today's society, the educational landscape has evolved from a traditional pedagogical model, characterized by the one-way transmission of knowledge, to a student-centered approach. This change implies a constant need to update and develop new skills for both students and teachers.

In this regard, the **Key Competence Scale for Lifelong Learning (SKCLLL),** developed by **Şahin et al. (2010),** highlights the importance of competences such as communication, digital competence, autonomous learning and cultural expression, in line with the **Council of the European Union Recommendation (2018) on key competences for lifelong learning.** For its part, the **European Digital Competence Framework (DigComp)** (Ferrari, 2013; Carretero et al., 2017) has served as a reference for the **development of digital competence** in students, which requires new skills from teachers (Gómez-Sánchez et al., 2024; Ghomi & Redecker, 2019).

Technology stands as a component of great relevance for teachers, particularly in the context after the Covid-19 pandemic (Merino-Cajaraville et al., 2023; Faura-Martínez et al., 2022; Abu-Talib et al., 2021; Pozo et al., 2021). Video games, as a significant part of the population's leisure time, are present in the lives of students (Martín del Pozo, 2015; Olson, 2010).

In this context, the **InterGames** project explores the use of video games as educational tools to promote the **development of cognitive, social and emotional skills**, as well as the acquisition of **interdisciplinary competences essential for the 21st century**. This work is based on the hypothesis that **video games can be used as a tool for conflict resolution and the sustainability of peace**, due to five features that characterize them: their condition as a cultural

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phenomenon, their interactivity, their ability to simulate real processes, their potential to generate meaningful experiences and their usefulness in placing players in the shoes of others.

1.1 EDUCATIONAL CONTEXT AND COMPETENCIES OF THE TWENTY-FIRST CENTURY

Contemporary education faces complex challenges arising from rapid technological, social and cultural changes. Traditionally, learning was conceived as a unidirectional process, in which the teacher transmitted knowledge and the students received information passively. However, there has currently been a shift towards a student-centered approach, which implies a constant need for updating and developing new skills.

The **InterGames** project places the student at the center of the educational process, promoting **active, autonomous learning based on problem solving and meaningful experiences**. This approach aligns with the **competencies of the 21st century**, which constitute a central objective of the project.

As mentioned above, the SKCLLL (Şahin et al., 2010) and DigComp (Ferrari, 2013; Carretero et al., 2017) constitute key frameworks for understanding the competencies that students must develop, especially in the digital field and autonomous learning. With this, the basis of the skills for the twenty-first century that can be seen in Infographic 1, which has Fullan and Scott's (2014) Model 6C as a frame of reference.

InterGames seeks to integrate these competencies into educational practice through **innovative pedagogical sequences with the use of video games**, which allow **simulating complex environments, encouraging decision-making and promoting critical thinking** in students.

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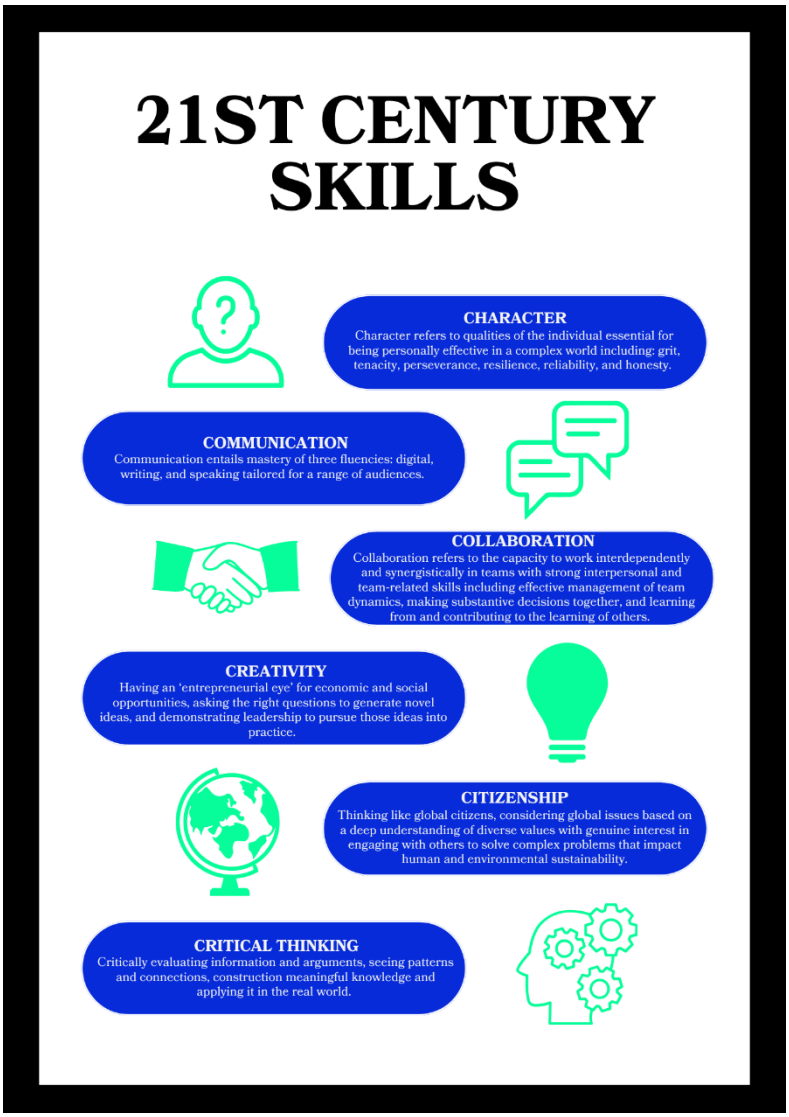

Infographic 1. Skills for the 21st century. Frame of reference - Model 6C. Own elaboration based on Fullan and Scott (2014)

1.2 VIDEO GAMES AS AN EDUCATIONAL RESOURCE

Video games have established themselves as a **motivating and effective educational resource for secondary school students,** allowing the simulation of complex situations that require decision-making, reflection on the consequences and development of cognitive, social and emotional skills (Muriel & Crawford, 2018; Bogost, 2007).

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Their incorporation into the classroom responds, to a large extent, to the reality of students at this stage: young people familiar with the use of digital resources and with a growing need to actively participate in their own learning process. In this sense, **active student-centered methodologies, such as gamification and the use of digital tools, have a remarkable innovative potential,** moving away from the traditional model and favoring a more meaningful educational experience. **Video games that simulate reality allow you to discover new elements in a less abstract way, facilitating understanding and learning**. The most relevant thing is that adolescents approach these environments through cognitive efforts that they already know or are familiar to (Crescenzi-Lanna & Grané-Oró, 2016; Gramigna & González-Faraco, 2009).

In addition to their ability to represent complex situations, **video games are a consolidated cultural phenomenon,** which has an impact on broader social transformations. **One of its most distinctive features is interactivity,** which gives the player options and the ability to influence the narrative development and the results of the game. This point becomes especially significant in genres that address ethical dilemmas, social conflicts or strategic decisions. As Muriel and Crawford (2018) point out, **video games offer multiple forms of active participation,** which allows us to explore their meaning within play practices and in contemporary culture.

Likewise, video games **can be used for students to learn coping strategies in the face of everyday conflicts,** developing skills such as analysis, decision-making and empathy. Their status as a cultural phenomenon allows them to influence the construction of new forms of social interaction. **Interactivity**, in this context, **becomes a pedagogical tool that enhances student involvement,** especially in the aforementioned genres, where each decision has a direct impact on the narrative and the game experience.

Bogost (2007) argues that, although **video games** do not replicate reality exactly, they **are capable of simulating physical and cultural processes** – real or imaginary – which opens up a wide field of theoretical and practical possibilities. Interpreting them as experiences allows us to

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analyze their material, symbolic, political and social dimensions, and favors empathy by placing the player in the shoes of others, facilitating the understanding of diverse perspectives.

Despite their potential, **it is essential to assess the pedagogical impact of video games so that they can be effectively incorporated as a teaching resource**. It is necessary to establish a balance between its playful and educational elements, so that they become useful tools for conflict resolution, thanks to their ability to simulate complex and dynamic environments, which reproduce characteristics of the real world.

Video game-based learning promotes active and collaborative experimentation, in which students interact with the environment, explore, solve problems, and receive constant feedback. Pineda-Martínez et al. (2023) highlight the educational potential of games such as *PeaceMaker*, which simulates the Israeli–Palestinian conflict and promotes critical thinking. In the same vein, ***Liyla and the Shadows of War*** addresses the same context from a more narrative and emotional perspective, which makes it particularly relevant to our project.

Along these lines, González et al. (2013) highlight that **video games offer opportunities to practice decision-making in realistic scenarios**, without losing experimental control, **and promote the sense of belonging to groups**, which influences the way in which individuals perceive and address conflicts. Olson (2010) stresses the importance of learning in interaction with the peer group, where common interests and shared motivation generate dynamics of affiliation and competition, which favor the development of skills such as mediation and leadership.

In addition, it is relevant to consider the different player profiles, which can be oriented towards individual experience or social interaction. Among the former are the *seeker* (exploration and discovery), the *survivor* (sensations of fear and escape), the *daredevil* (risk and play on the limit), the *mastermind* (strategy and puzzle solving) and the *achiever* (goal fulfillment). In the field of interaction, the *conqueror* (overcoming difficult opponents) and the *socializer* stand out, a profile

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especially suitable for the development of teamwork skills, as it focuses on collaboration with other players (Nacke et al., 2011).

Multiplayer video games are conducive environments for young people to explore and negotiate social norms, as well as to identify the limits of acceptable behavior, such as when strategic creativity borders on unfair advantage (Barnett & Coulson, 2010; Chen, 2005; Küchlich, 2008; Olson, 2010). **The combination of cooperation and competition**, integrated into its design, **stimulates interpersonal dynamics, which strengthen involvement in the playful activity**. A clear example is MMORPGs, which present collective challenges whose resolution requires teamwork, thus providing opportunities to **develop key competencies of the twenty-first century** (Steinkuehler, 2008). This type of game **promotes authentic interaction between participants**, comparable to that which occurs in collaborative learning contexts or in work environments mediated by technology: users organize themselves into groups, exchange information through text and voice, observe the actions of their peers and perfect their skills, which enhances both cooperation and the development of individual skills (Felicia, 2020).

Video games favor collaborative learning by requiring players to join forces to achieve common goals, which contributes to the development of key competencies for today's citizens (Martín del Pozo, 2015; Lago et al., 2015). This dynamic foster autonomy in the organization of learning, the exchange of ideas and constant feedback, elements that promote deep learning in the neurological, cognitive and social fields (Barkley et al., 2007).

In cooperative experiences, individual achievement depends on collective performance, which implies shared responsibility and the need to support each other. This involvement **is essential to cultivate interpersonal skills such as teamwork**, which require practical and contextualized approaches, far from traditional methods. In this sense, **educational video games, by integrating tasks within interactive narratives, facilitate learning by discovery** (Holohan, 2019).

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Another outstanding advantage is the possibility of **learning through experience in virtual environments and through interaction with complex digital entities** (Pérez & Gómez, 2016; Martínez, 2019). Numerous studies have shown that these environments incorporate elements that stimulate cognitive development, by integrating principles of theories on motivation and learning (Etxeberría, 2001; Valderrama, 2012), which makes them valuable tools for application in formal educational contexts.

From a cognitive perspective, **they stimulate complex thinking, strategic planning, and self-regulation of learning**. In addition, they adapt to different cognitive styles and facilitate language acquisition in students with difficulties (Zimmerman, 1990). On a motivational level, it has been proven that they surpass traditional methods in terms of effectiveness, by enhancing curiosity, challenge and a sense of control (Malone & Lepper, 1987; Kulik, 1994; McFarlane et al., 2002; Jenkins, 2002). **They also help reduce verbalized errors, correct mistakes without emphasizing them, improve concentration and optimize study time**, which is especially beneficial for those who have attention difficulties or poor performance.

This approach, known as "edutainment" (Griffiths, 2002; Jarvin, 2015), combines entertainment and learning, capturing students' interest and stimulating their curiosity. Qian & Clark (2016) highlight that game-based learning promotes **twenty-first century competencies** such as critical thinking, creativity, and collaboration. Their research shows that the most common effects are seen in behaviors and attitudes (42%), followed by cognitive improvements (38%), with critical thinking being the most analyzed skill.

Virtual worlds and role-playing games offer immersive experiences that can strengthen the player's identity and improve their performance in real life. Twining (2010) argues that these experiences can be as significant as those that occur in a physical classroom. On the other hand, **entertainment video games use design resources** such as adaptive challenge, self-expression, immediate feedback or variable rewards **to maintain the motivation and active involvement of students** (Anderson, 2011; Gee, 2007; Squire, 2011).

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These interactive environments also facilitate the transfer of skills to other areas, such as education or careers. In addition, they have a positive influence on affective aspects such as motivation, commitment and autonomy, which are essential for collaborative work. The combination of cognitive and emotional abilities improves the effectiveness in solving tasks together. According to Acquah and Katz (2020), video games have a positive impact in 81% of cases on affective and psychological states, in 88% on skills such as critical thinking and problem-solving, and in 62% on participatory behaviors.

Returning to design elements, games that are limited to questionnaire formats or repetitive exercises tend not to capture the interest of students (Lester et al., 2014; Ruggiero & Watson, 2014; Squire, 2003). In contrast, **well-designed games can engage students in reflective thinking processes** (Johnson & Mayer, 2010), especially when they incorporate elements such as collaboration, role-playing, narrative, exploration, and complexity.

Various studies have shown its positive impact on academic performance, improving performance in areas such as algebra, reading comprehension, spelling and grammatical decoding. In addition, they strengthen attitudes towards learning, contribute to the development of self-concept and favor complex thinking, strategic planning and self-regulated learning. Its adaptability to different learning styles and its usefulness in teaching languages to students with difficulties reinforce its pedagogical value (McFarlane, Sparrowhawk & Heald, 2002; Din & Caleo, 2000; Lou, Abrami & d'Apollonia, 2001; Keller, 1992; Jenkins, 2002; Mandinach, 1987; Rieber, 1996; Zimmerman, 1990).

As a result, **video games have been promoted as a didactic resource for the development of intrapersonal skills, increased motivation, and improved academic performance**, especially in students who have grown up with technologies as an integral part of their lives (Merino-Cajaraville et al., 2023).

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1.3 THE PROMOTION OF CRITICAL THINKING THROUGH VIDEO GAMES

The most recent studies on the impact of video games on the young population have gone beyond the judgmental vision that has traditionally accompanied them, redirecting the gaze towards their potential as an educational tool. This industry, which is increasingly important, offers direct and indirect resources to promote critical thinking among students, as well as to strengthen their skills and attitudes in peacebuilding and in the active and reflective observation of conflict.

The rise of video games as significant instruments for the **development of critical thinking and decision-making skills** has been widely documented (Fernández Sánchez et al., 2023; Gómez, 2025; Hidalgo et al., 2025; Jiménez Palacios & Cuenca López, 2015). Research such as that by González et al. (2013) and Holohan (2019) highlights its **effectiveness in diverse educational contexts**, underlining its ability to stimulate deep reflection and critical analysis. Through interactive scenarios that simulate real problems, ethical dilemmas and strategic challenges, video games have proven to be effective in promoting active and responsible learning.

According to Espinosa (2021), **video games encourage critical thinking by presenting situations that require complex decisions**. Players must analyze and reflect on ethical dilemmas, moral conflicts, or political decisions, which aligns with the **Problem-Based Learning (PBL) approach**, which uses **simulated scenarios to improve decision-making and critical reflection**.

Role-playing games, in particular, **allow players to make decisions that affect the narrative development and outcome of the game**. This interaction involves not only problem-solving, but also confronting **ethical dilemmas**, which require a critical analysis of one's own actions. Razolin (2020), citing Gee (2003), argues that **video games are designed to encourage active and critical learning**, in contrast to traditional methods that often fail to motivate deep

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thinking. The challenges they present force players to plan and make strategic decisions, which contributes to the development of essential cognitive skills.

The **ability of video games to address ethical dilemmas** is another relevant dimension. Some titles present **situations in which players must choose between good and evil**, facing the consequences of their decisions. This dynamic **encourages reflection on ethical values and principles**, allowing informed and responsible decision-making to be practiced, especially useful in the teaching of ethics and morality.

Del Moral-Pérez and Rodríguez-González (2022) highlight how **war video games** can **stimulate critical thinking from various dimensions**. On the cognitive level, **they allow us to understand war from multiple perspectives** – historical, fictitious or contemporary – enriching the understanding of conflicts and their implications.

It is evident that an **exhibition oriented to critical thinking** through the use of playful narratives **does not hinder the enjoyment of the game** —the user's main motivation—, **and**, in addition, **enhances their reflective capacity to understand the mechanics of war, power and resistance from its infrastructure**, and not only as mechanisms that generate violence. Among the studies in this regard, those of Nick Dyer-Witheford, Amanda Cote, Soraya Murray, and in the Spanish sphere, Alberto Venegas Ramos and Antonio César Moreno Cantano, stand out. Titles such as the *Assassin's Creed* series have been designed with a clear didactic purpose in values and content, and their narratives have been successfully used in subjects related to citizenship education (Harris, 2022). However, games from this series were not selected for our project mainly because of their long duration and complex structure, which make them less suitable for short classroom-based learning sequences. Instead, we focused on shorter and more accessible titles that address similar civic and ethical themes, such as Quandary (ethical dilemmas and decision-making), Bury Me, My Love (migration and global citizenship), and Freedom Bridge (resilience and human rights), all of which offer meaningful opportunities for reflection and value-based learning within limited teaching time.

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In short, video games offer a **rich and dynamic platform for the development of critical thinking and decision-making skills**. Through simulations of real problems, ethical dilemmas, and strategic challenges, players practice problem-solving, reflect on their decisions, and face complex moral situations. These interactive environments not only provide a deep learning experience, but also foster greater ethical and social awareness, preparing students to face the challenges of their academic and everyday lives.

For these skills to be effectively transferred to the educational context, it is **essential** that the use of video games is accompanied by **teacher supervision**. Teachers must **guide critical reflection, question the stereotypes present in playful narratives and promote a critical reading of their mechanics** (Olson, 2010). This has been taken into significant account in our project, **InterGames**, and has been applied both in the creation and implementation of the pedagogical sequences.

1.4 SELECTION AND PEDAGOGICAL APPLICATION OF EDUCATIONAL VIDEO GAMES

For the **integration of video games in the classroom** to be effective and aligned with educational objectives, it is **essential to establish clear criteria for their selection and application**. Video games should promote critical thinking, cooperation, empathy, and conflict resolution. Titles that simulate negotiation, community-building, or sustainability scenarios, such as ***Quandary***, are especially valuable in this regard (Pineda-Martínez et al., 2023; Barab et al., 2009).

It is recommended to identify **video games that incorporate narrative and mechanical elements that encourage collaboration, negotiation, and understanding of different perspectives** (Squire, 2008; Felicia, 2020). In addition, it is essential to evaluate games in terms of their content and their correspondence with learning objectives, integrating them as part of the curriculum and not as isolated elements.

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Pedagogical implementation should include follow-up activities, such as discussions, analysis of decisions made during the game, and proposals to solve similar problems in the real world. These strategies allow learning to be experiential and meaningful, favoring critical reflection and knowledge transfer. If one of the educational objectives is considered to be the development of skills for conflict resolution, the use of video games as tools that facilitate discussion, reflection, and the application of these skills is proposed (Gee, 2003; Barab et al., 2009). In this framework, it **is essential to map conflict resolution and peace-sustaining competencies into the existing curriculum**.

In the context of **secondary education**, the use of video games as a teaching resource requires the **implementation of pedagogical strategies** that go beyond the transmission of knowledge. It is recommended to incorporate playful sessions that simulate conflict scenarios – real or fictitious – in which students must make complex decisions (Felicia, 2020; Gee, 2003). It is also proposed to encourage post-game reflection through activities such as learning diaries, group discussions, or case studies based on the decisions made during play (Barab et al., 2009).

The **role of the teacher** is **fundamental** in this process. It must act as a facilitator, guiding critical reflection and helping students to establish connections between the playful experience and the curricular content. Models such as "play-think-dialogue" (Pernía et al., 2011) promote learning environments based on discovery and exploration, where play is transformed into knowledge. Specifically, the "play-think-dialogue" model, proposed by Pernía et al. (2011), highlights the importance of guided reflection after the playful experience. For its application, it is recommended:

- Clearly define the purpose of the video game in the classroom, explaining the objectives before use.
- Design learning environments based on discovery and exploration.
- To transform playful action into critical reflection, overcoming participatory immersion to turn the video game into a transmitter of knowledge.
- Promote dialogue in small groups after the game experience.

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In **game-based learning,** *stealth assessment* has been proposed as an innovative approach that integrates evaluation into gameplay, allowing students to demonstrate competencies in a natural and continuous way (Kiili et al., 2015; Shute et al., 2016). However, this method requires specific game design and data tracking features that were beyond the temporal and technical scope of the **InterGames** project.

Despite this, the project remained highly valuable as it explored alternative forms of formative assessment within game-based environments. Through observation, guided reflection, and post-game discussions, teachers were able to evaluate key competencies such as collaboration, ethical reasoning, and decision-making. This demonstrates that meaningful assessment in game-based learning is possible even without embedded stealth mechanisms.

In conclusion, the evaluation using video games in the classroom should be governed by an approach focused on the achievement of objectives and competencies previously defined by the teacher. The video game offers the **possibility of continuous and formative assessment,** in which the how, what and when it is assessed differs from the traditional approach, allowing greater interaction and feedback between teachers and students.

It is imperative that teachers continuously monitor and evaluate the impact of video games on the learning process and on the development of students' skills. Constant feedback allows play activities to be adjusted so that they are better aligned with educational objectives (UNESCO, 2020; Pineda-Martínez et al., 2023). It is recommended to develop evaluation criteria that measure skills such as decision-making, emotion management, and mediation skills (Felicia, 2020), as well as to collect students' opinions on their experience with video games to adjust the pedagogical approach (Squire, 2008).

It **is also recommended that teachers receive specific training to integrate video games into the classroom** in a pedagogically meaningful way. This training should include the design of activities, the supervision of the game, the evaluation of competencies and critical reflection on the video game content. For video games to be effective in teaching conflict resolution skills, it

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is essential that teachers are trained to use them with sound pedagogical criteria (Pineda-Martínez et al., 2023; Felicia, 2020). As detailed in future sections, this has been taken into account in the **InterGames** project and training sessions have been conducted with teachers before implementation with pupils.

The authors conclude that the teacher's orientation towards dialogue is essential for students to reflect on the problems addressed and the strategies used to solve them. Video games can become powerful tools for interdisciplinary learning, conflict resolution and peacebuilding, provided they are applied with **reflective monitoring strategies and continuous assessment focused on the development of key competencies for the 21st century**. Game-based learning can be integrated into a variety of disciplines, such as **Environmental Sciences, Civic Education, Arts, History, and Economics**, allowing video games to act as multidisciplinary tools that not only teach conflict resolution, but also help students understand the interconnectedness between the sustainability of peace and other global issues (UNESCO, 2020; Gee, 2003).

The introduction of video games in the classroom entails, therefore, a necessary adaptation of resources, strategies and techniques, due to the gamification inherent in these elements. To facilitate its application, it is **essential to** establish **facilitation techniques and prior considerations that guide the teaching work towards a meaningful and transformative implementation**.

The effective implementation of video games in the classroom requires not only a careful selection of titles, but also pedagogical planning that contemplates the active role of the teacher as a facilitator of learning. Anetta's (2008) proposal includes several key considerations:

- **Synchronicity and safe environments**: Video games can facilitate interaction in virtual communities, offering safe spaces to carry out practices that, in real contexts, could be dangerous, such as in the case of scientific subjects.

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- **Social presence through avatars**: The ability to customize avatars fosters social presence and strengthens a sense of community. Students who individualize their avatars show greater satisfaction and closeness with their classmates and teachers.
- **Creation of video games by students**: This practice turns the teacher into an expert in content and pedagogy, aligning with the constructivist theory of *learning by doing*, which promotes active learning through creation.

Along these lines, the case study by Watson et al. (2011) in a History class provides specific techniques that can be extrapolated to other disciplines:

- **Organization in pairs**: Facilitates collaboration and ensures that all students are actively participating, preventing only the most experienced in video games from taking control.
- **Communication outside** the game: Allowing interaction between groups outside the game interface facilitates collective strategy and solves technical difficulties.
- **Teacher intervention during the game**: The teacher circulates around the classroom, makes strategic pauses to emphasize key concepts and relate the content of the game to the curriculum.
- **Achievement-based assessment**: Focuses on performance and achievement of educational objectives, keeping the focus on learning rather than entertainment.

It is worth mentioning that problem solving is one of the most effective methodological strategies for the development of educational processes, as it is based on research, interaction, functionality and connection with real life. Its objective is to place students in front of various alternatives, guiding them through strategies that lead to informed decision-making. In this process, **the role of the teacher is key: he or she must channel the students' concerns and transform them into viable formulations adapted to their level of development** (Koppenjan & Klijn, 2004).

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In the field of Social Sciences, Domínguez (1994) proposes a sequence of four phases to work with problem-solving strategies:

1. **Presentation and definition of the problem**: the conflict or situation to be analyzed is introduced.
2. **Provision of theoretical information**: the teacher provides the necessary foundations to understand the problem.
3. **Problem solving**: Interaction is encouraged through well-formulated questions that stimulate analysis and active participation.
4. **Reflection and evaluation of results**: the process is evaluated, contrasting the results with the previous ideas of the students.

All these practices show that the use of video games can promote collaborative work and critical thinking, fundamental skills for conflict resolution and the sustainability of peace.

In terms of assessment, as mentioned above, the use of video games in the classroom favors continuous and competency-based assessment, as they are designed to assess the player's actions intrinsically and constantly (Zea et al., 2015). This characteristic makes video games ideal tools for formative, adaptive and non-intrusive assessment. Some key principles for its application are:

- **Avoid the perception of evaluation**: it is essential that students do not feel that they are being evaluated, in order to maintain the motivation generated by the game.
- **Personalization of learning**: video games allow detailed information to be obtained about the student's progress, which facilitates the adaptation of the educational process.
- **Continuous feedback**: the player receives information about their evolution through game mechanics, such as points or levels, hiding the evaluative dimension without losing effectiveness.

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- **Transparent evaluation for the teacher**: while the player receives playful feedback, the teaching team has access to detailed reports that allow them to assess the development of competencies.

To structure this assessment, Zea et al. (2015) propose the use of game graphs with labeled nodes that define what, how, and where the following is evaluated:

- **Type A nodes**: educational tasks linked to specific competencies. They require a prior breakdown of objectives into concrete tasks.
- **Type B nodes**: conditioned by evaluation constraints. They guarantee that achievements are not obtained through non-educational means.
- **Type C nodes**: intended for the evaluation of distributed or deferred tasks, which require the integration of information in later phases of the game.

This approach allows for a richer, contextualized assessment focused on the development of key competencies, such as decision-making, emotional management, and mediation skills. In addition, it reinforces the idea that meaningful learning occurs when students actively participate in the resolution of real or simulated problems, in environments that favor critical reflection and knowledge transfer.

1.5 OBJECTIVES OF THE INTERGAMES PROJECT

The **general objective of InterGames** is **to enhance secondary school curricula and strengthen teachers' and students' capacities by introducing interdisciplinary approaches to education through conflict-themed video games**.

The project also pursued several specific objectives:

- Promote the role of the teacher as a facilitator of learning, guiding post-game reflection and establishing connections between video game experiences and curricular content. Models such as play–think–dialogue are presented as a basis for transforming playful action into meaningful knowledge.
- Define criteria for the selection of educational video games, considering their potential to foster cooperation, negotiation, critical thinking, and understanding of diverse perspectives.

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- Facilitate teacher training for the pedagogical use of video games by providing resources and strategies that enable their effective integration in the classroom and alignment with educational objectives.
- Create teacher preparation tools through an open-access online Virtual Learning Lab (VLL) containing theoretical modules, interactive multimedia resources, and micro-challenges for teacher training on interdisciplinarity in education.
- Integrate video games into secondary education as tools for developing 21st-century competencies such as critical thinking, collaboration, communication, empathy, and conflict resolution.
- Promote interdisciplinary learning through innovative pedagogical sequences that employ video games to address content from areas such as history, ethics, social sciences, the environment, and citizenship.
- Design learning experiences that combine motivation, reflection, and collaboration, enabling students to engage with complex, real-world situations. This includes the use of virtual environments that simulate conflicts, promote decision-making, and foster experiential learning.
- Generate evidence on the educational impact of video games and their effectiveness as pedagogical resources in diverse contexts through the implementation of these pedagogical sequences.

The **work packages (WPs)** that made it possible to achieve these objectives were:

- **WP2**: Develop a **Virtual Learning Lab (VLL)** with theoretical modules, interactive multimedia resources, and micro-challenges for teacher training on interdisciplinarity in education.
- **WP3**: Design **pedagogical sequences** for teachers addressing conflict and its socioeconomic and environmental implications through video games, enabling classroom adaptation.
- **WP4**: Test these sequences in **local pilot** programs and contribute to the limited literature on interdisciplinarity in secondary education through a scientific report analyzing the competencies students develop, the usability of video games as interdisciplinary tools, and the role of teachers in fostering 21st-century skills.
- **WP5**: **Communicate, disseminate, and publish project activities and results**. This package focused on maximizing visibility, fostering interest in interdisciplinary education, and ensuring the integration of the project's findings into global, European, and national practice through stakeholder participation and the development of policy recommendations.

Thanks to the achievement of these objectives, the **InterGames** project demonstrates how the use of video games in educational environments can transform the way students learn and develop interdisciplinary skills. By combining motivation, active experimentation, and guided

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reflection, these approaches foster critical thinking, collaboration, and problem-solving—preparing students to face the complex challenges of the 21st century and contributing to the formation of engaged and competent citizens across multiple areas of knowledge.

1.6 VIRTUAL LEARNING LAB (VLL) AND INTERDISCIPLINARY PEDAGOGICAL SEQUENCES WITH THE USE OF VIDEO GAMES

The **InterGames** project proposes the creation of an **open online Virtual Learning Lab (VLL)** for teachers, which includes **gamified micro-challenges,** and **interdisciplinary pedagogical sequences**. These sequences are designed for students to work on content from different areas through the use of video games, which allows them to explore complex phenomena from multiple perspectives – historical, social, environmental or ethical – and encourages critical thinking and the practical application of learning (Cuenca & Martín, 2010).

Video games, in this context, **become authentic laboratories of social experimentation**, where scenarios, conditions and situations that affect relevant human phenomena are reproduced. Research focused on its use in social science education has identified **five key thematic areas** for the development of resolution and decision-making strategies by students: **war and conflicts, urban planning and territorial management, democracy and citizenship, economy and trade, and the environment** (López & Cáceres, 2010).

When these experiences are accompanied by faculty-led reflection, students develop skills to analyze conflicts, understand different perspectives, and make informed decisions (Dyer-Witheford et al., 2017; Cantano & Ramos, 2020). Titles such as *Assassin's Creed* or *Ideological Games* exemplify how video games can support education in citizenship, history, or ethics, stimulating reflection on social and moral dilemmas (Harris, 2022).

Social content has become one of the most demanded areas in video games, especially those with a historical setting. However, educational video games that address social content continue

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to occupy a small market share compared to titles designed exclusively for recreational and commercial purposes.

Even so, video games allow an exhibition aimed at critical thinking without compromising the enjoyment of the game, enhancing the reflective capacity of students to understand the mechanics of power, conflict and resistance. In the framework of digital literacy, its usefulness is linked to a critical transculturality that, from the perspective of media education (Buckingham, 2005), promotes a critical vision of the biopolitical discourses of power. Far from encouraging passive participation that leads to the production of docile subjects and reproducers of neoliberal values (Rey, 2017), video games offer the potential to generate discursive rhizomes around the construction of the thinking and acting subject.

Peace, in this framework, is not conceived as static knowledge, but as an active exercise in critical thinking that explores its complexities and contradictions. Active observation of the conflict becomes an opportunity to reflect on the dialogical paths of peace, as Antonio César Moreno argues (Gómez-García & Cantano, 2021). Video games such as *PeaceMaker* allow you to experience the difficulties and compromises necessary to achieve peace, while other titles such as *Ideological Games* offer experiences that promote critical understanding of conflict and peacebuilding (Burak & Parker, 2017).

As evidence, the work of Siyahhan et al. (2017) shows how educational video games enable the development of citizenship skills and competencies by offering experiences that transcend the acquisition of traditional academic knowledge. Participating in an educational video game involves not only learning content, but also developing essential skills for coexistence, such as empathy, compassion, and cooperation.

The **VLL** proposed by **InterGames** allows teachers to acquire key competencies to implement teaching through video games. These competencies can be assessed through **gamified micro-challenges** designed specifically for this purpose. **Pedagogical sequences**, on the other hand, help establish the necessary methodological and didactic structure, as well as provide reflection

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sessions for a deeper learning experience and, in this way, provide a safe environment to experience the consequences of decisions, encourage learning from mistakes, negotiation and collaboration and contribute to the development of cognitive, social and emotional skills.

Integrating video games and game-based learning activities into curricula can be a powerful strategy to foster conflict resolution skills and promote peace sustainability (Pineda-Martínez et al., 2023; Squire, 2008; Barab et al., 2009; UNESCO, 2020).

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2. METHODOLOGY

The methodology of the **InterGames** project is based on a mixed and interdisciplinary approach, which combines the use of video games with active pedagogical practices in secondary education. The main objective is to evaluate how video games can foster the development of 21st century competencies – such as critical thinking, collaboration, conflict resolution and ethical reflection – by piloting pedagogical sequences designed for this purpose. This section describes the study design, the participants, the tools used, and the procedure followed to implement and evaluate the pedagogical sequences developed.

2.1 STUDY DESIGN

The **InterGames** project implements **interdisciplinary pedagogical sequences** in real classroom contexts. The **pedagogical sequences** were designed to **integrate video games in areas such as social sciences, ethics, history, and environmental studies**, promoting active and meaningful learning.

A mixed design was adopted:

- **Qualitative approach**: Direct observations of student interaction, semi-structured interviews with students and teachers, and learning analysis were carried out to assess collaboration, critical reflection and decision-making.

- **Quantitative approach**: Performance metrics were applied in video games, competency assessment questionnaires, and scales of motivation and perception of learning. This made it possible to objectively measure the impact of video games on the development of interdisciplinary skills.

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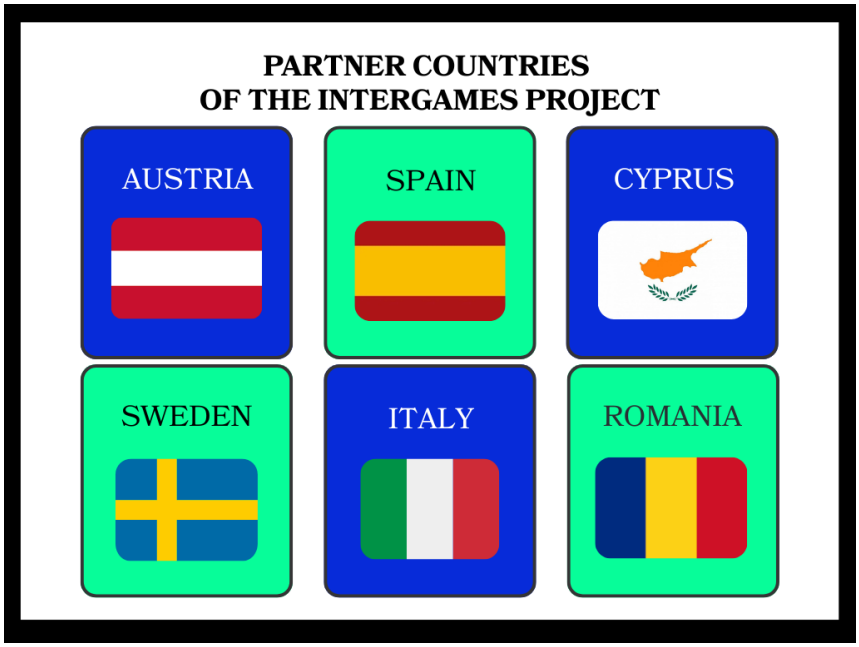
2.2 PARTICIPANTS

Secondary school students **from the project partner countries (see Infographic 2), with gender diversity, previous experience in video games and academic backgrounds, participated. Teachers received specific training** to integrate video games into the classroom, supervise the development of skills and encourage critical reflection.



Infographic 2. Partner countries of the InterGames project. Own production

Teachers acted as mediators of learning, guiding decision-making during play, promoting collaboration between students, and connecting playful content with curricular objectives.

2.3 TOOLS AND RESOURCES

The implementation of the **InterGames** project required a **careful selection of tools and resources,** which would allow video games to be integrated into the classroom in a pedagogically meaningful way. To this end, **didactic sequences were designed,** which combine the playful experience with analysis, reflection and evaluation activities, **aligned with the curricular objectives and competencies of the 21st century**.

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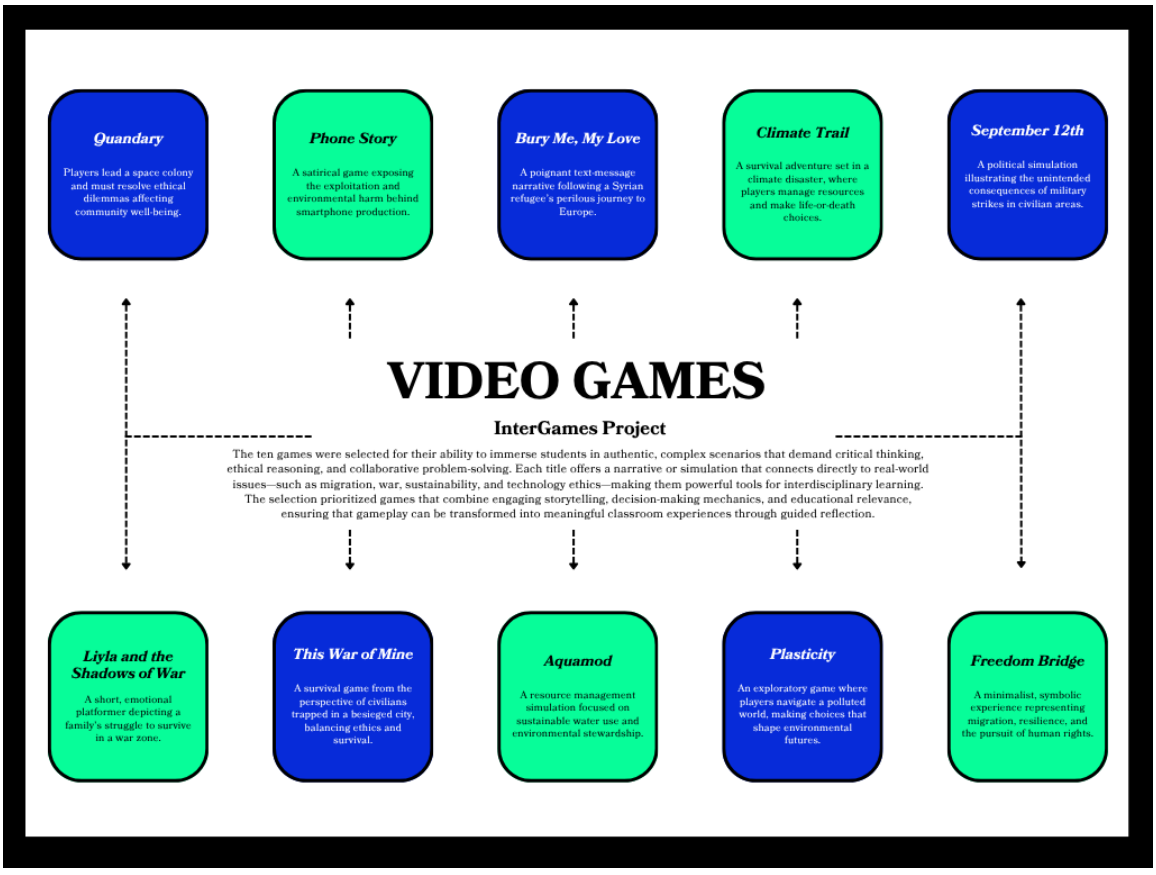
The selected video games not only offer interactive environments and complex narratives, but also allow them to simulate ethical dilemmas, social conflicts and environmental problems, favoring the development of cognitive, socio-emotional and collaborative skills. Along with these digital resources, data collection instruments and continuous evaluation strategies were used to ensure a rigorous measurement of the educational impact of the project.

Selected video games

Video games (which can be seen in the infographic below) were chosen for their ability to promote key competencies:



Infographic 3 Video games selected for the InterGames project with motivation and brief description of them. Own production

- ***Quandary***: Ethical dilemmas and decision-making.
- ***Phone Story***: Technological production and labor exploitation.

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- ***Bury me, my love***: Migration and the Syrian conflict.
- ***Climate Trail***: Environmental Issues and Sustainability.
- ***September 12th***: Security and political conflicts.
- ***Liyla and the Shadows of War***: War and Human Rights.
- ***This War of Mine***: Survival in Conflict Contexts.
- ***Aquamod***: Water resources management.
- ***Plasticity***: Pollution and sustainability.
- ***Freedom Bridge***: Migration, Resilience and Human Rights.

Pedagogical sequences

Each of the 10 games was analyzed in detail by three different colleagues. This analysis (**around 180 pages**) is part of the resources that accompany the pedagogical sequences. Each **pedagogical sequence** also **included**:

- **Preparation Phase: prior preparation with specific objectives and competencies**.
- **Game Phase: supervised play phases,** promoting social interaction and decision-making.
- **Reflection Phase: subsequent activities** such as debates, decision analysis and problem solving, to consolidate learning and promote metacognition.

Data collection instruments

For data collection, the following were used:

- **Skills** and motivation questionnaires.
- **Direct observations** by the teaching staff.
- **Analysis of performance in video games**.
- **Evaluation of learning outcomes,** to measure effectiveness without interrupting the gaming experience.

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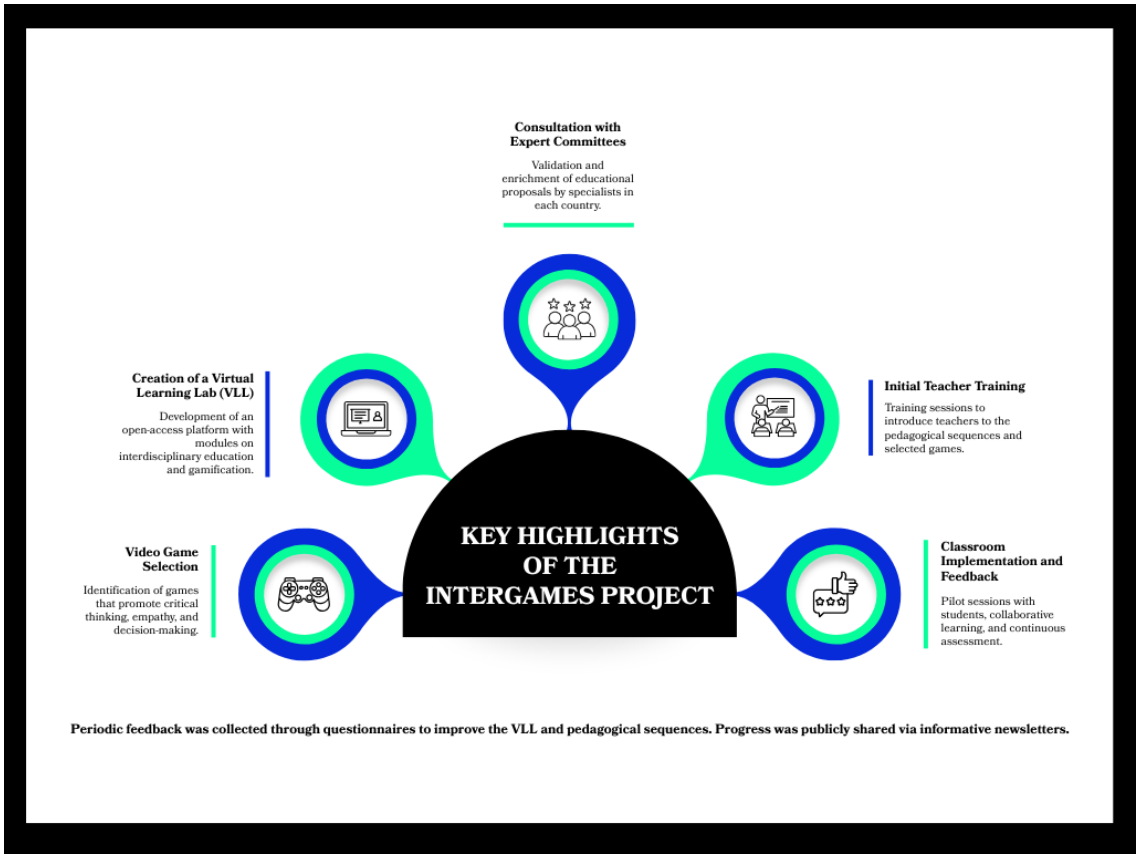
2.4 PROCEDURE

The methodological development of the **InterGames** project was structured in several **sequential stages,** aimed at guaranteeing the pedagogical quality and research validity of interdisciplinary learning experiences with video games.



Infographic 4. Key highlights of the InterGames project. Own production

As shown in Infographic 4, the following stand out from the stages of the project:

1. **Video game selection**: A comprehensive review of titles with educational potential was carried out, prioritizing those that allow the simulation of ethical dilemmas, social conflicts, environmental problems and decision-making situations. The proposed games were 34 in the categories "war" and "other conflicts" that three of the partners (with experience in GBL) pre-selected. The video games were selected for their ability to foster 21st century skills such as critical thinking, collaboration, empathy and conflict

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resolution. It was also taken into account, ensuring that all partners in all countries could use the produced material, that the game had been published and played in English; that it was free (as far as possible) and that it adjusted to the pedagogical structure of schools (for example, that it could be used in school sessions/classes of 50 to 100 minutes).

2. **Focus-groups**: As part of the **InterGames** project, several **focus-groups and interviews with secondary school teachers** were conducted between April and June 2024 across the participating countries. The overall aim of these sessions was **to analyze how interdisciplinarity is addressed within national curricula and to explore the potential for integrating video games as educational tools across different subject areas**.
   In total, teachers from **diverse disciplines**—including mathematics, languages, social sciences, history, civic education, environmental studies, economics, arts, and technology—took part, representing both **public and private schools**. This diversity provided a broad understanding of current practices, challenges, and opportunities related to interdisciplinary teaching in varied educational contexts.
   The methodologies used included **individual interviews and focus-groups**, adapted to the teachers' availability in each country. In some cases, such as **Cyprus** or **Sweden**, the discussions focused on identifying curricular gaps and potential areas for improvement in implementing interdisciplinary approaches. In others, such as **Romania**, **Italy**, or **Spain**, the sessions delved into teachers' concrete experiences, their perceptions of interdisciplinary work, and the difficulties they encounter when coordinating content across subjects. In **Austria**, the discussions revolved around nine key areas of analysis, addressing both structural and curricular barriers and teaching strategies already employed to promote cross-disciplinary connections.
   Overall, the **focus-groups** revealed a strong interest among teachers in pedagogical innovation and a shared recognition of the potential of video games as learning tools to foster critical thinking, collaboration, and the understanding of complex issues. However, participants also highlighted time constraints, curricular rigidity, and limited

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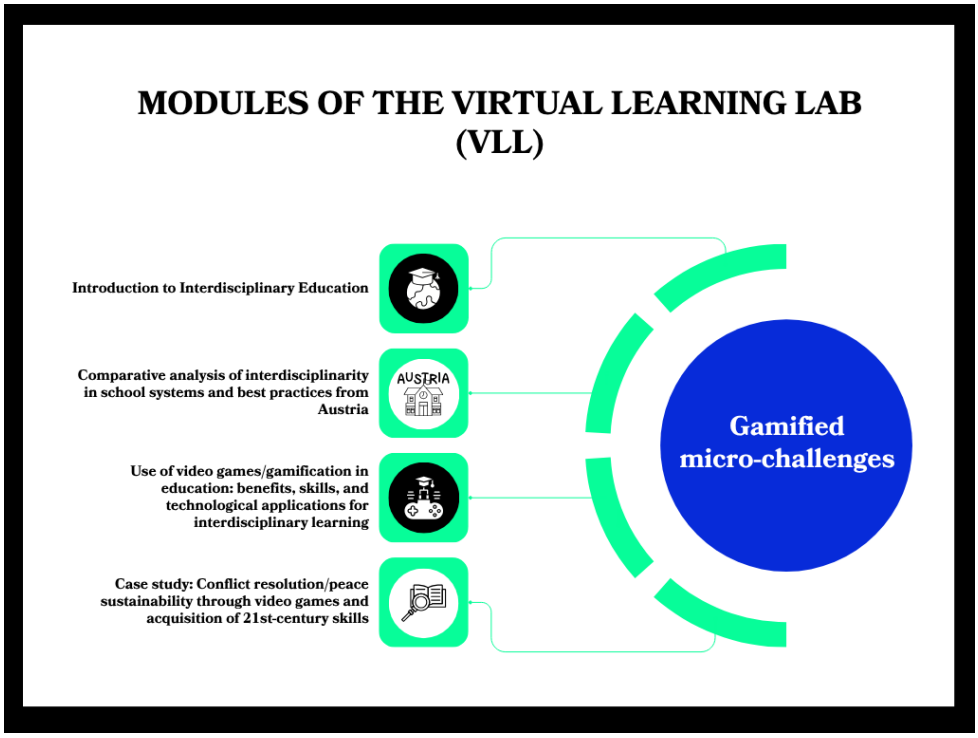
specific training, underscoring the need for institutional and professional development strategies that facilitate the effective implementation of interdisciplinary methodologies in secondary education.

3. **Creation of a Virtual Learning Lab (VLL)**: A virtual learning laboratory was designed as an open resource for teachers. This space offers 4 learning modules created with Genially. All of them have a gamified micro-challenge as an evaluation (as shown in Infographic 5).



Infographic 5. Modules of the Virtual Learning Lab (VLL). Own production

The **VLL** is available online for consultation and application in different educational contexts: https://intergames-project.com/?sfwd-courses=intergames-vll-y-microdesafios&lang=es. The skills acquired are measured through **gamified micro-challenges**.

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4. **Consultation with the Impact and Advisory Board (IAB) and Pedagogical Sequences**: Each country has **specific experts,** who were selected with the main work to improve the quality of the project results. After having the games selected and with the first version of the **VLL,** the meetings started. The **VLL** was finalized in all languages when it was first presented to the **IAB**. This **first meeting** brought many valuable comments that the consortium incorporated into the final versions of the **VLL**. The process was intense and lasted several months trying to improve the quality of the resources as much as possible. The **second meeting** took place after the **pedagogical sequences** were finalized in the national languages. It is worth noting, therefore, that these meetings allowed to validate the pedagogical proposals, enrich the VLL and the sequences with specialized contributions and guarantee their relevance in the different educational contexts.

5. **Pilotings with teachers**: In **all partner countries,** initial training sessions were held with teachers. For example, in the case of **Austria,** two 4-hour sessions with more than 30 teachers. In this phase, the aim was to motivate and train as many teachers as possible to implement some of the **pedagogical sequences** and/or test the **VLL**. To do this, the functioning of the selected **video games,** the objectives of the **pedagogical sequences** and the monitoring and evaluation strategies were explained. This stage was key to ensuring a coherent and reflective implementation of the project.

6. **Local trainings with pupils**: In this phase**, students from different partner countries** participated in game sessions supervised by supervisors from each country, which facilitated interaction, promoted collaboration and guided critical reflection on the decisions made. The dynamics were organized in pairs and groups to promote collaborative learning. Supervisors recorded the students' progress and supported the final discussion.

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- **Reflection and consolidation of learning**: After the game sessions, students participated in debates, decision analysis and problem-solving activities related to video games, consolidating interdisciplinary, cognitive and socio-emotional competencies.

- **Continuous assessment**: game performance metrics, observation by teachers and supervisors, and feedback from the students themselves.

As part of the project's research approach, collaborative review and continuous improvement were carried out. Periodic questionnaires were applied to the partners and collaborators, and these instruments made it possible to collect suggestions and evaluations about the **Virtual Learning Lab (VLL)** and the **pedagogical sequences,** facilitating its progressive improvement and its preparation for the final piloting. Regular *newsletters* on progress were also published to present the results in a visual and brief way, in the margin of this article that explains the **InterGames** project in more depth.

It is also worth noting that translations were made into the languages of the partner countries, which resulted in the **production of materials in seven languages**.

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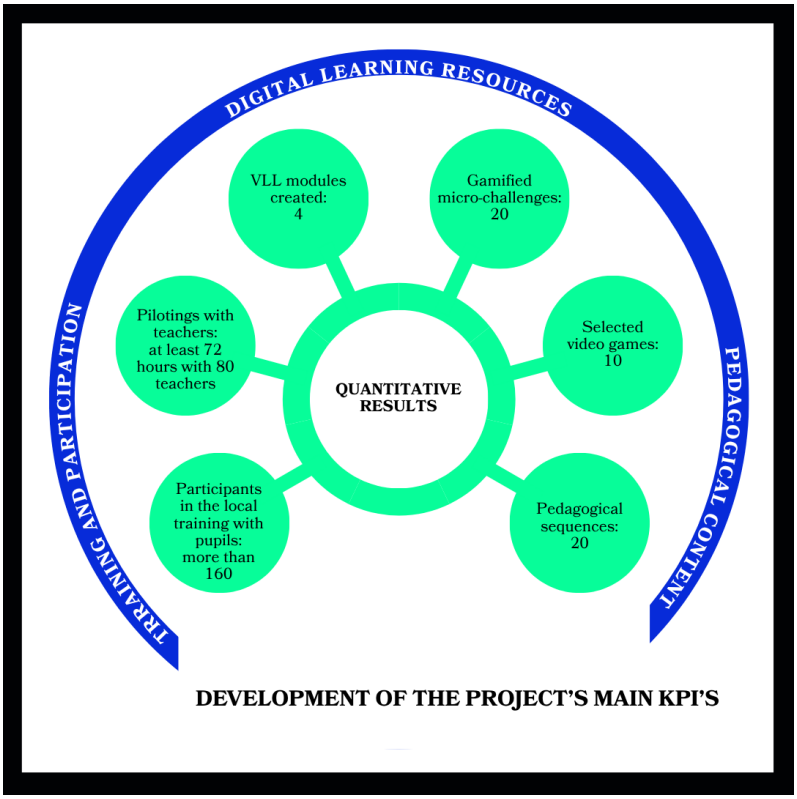
3. RESULTS AND DISCUSSION

The results presented below derive from the implementation of the **InterGames** project, focused on the **use of video games as a pedagogical tool to promote interdisciplinary learning and the development of 21st century competencies** in **secondary education**. The information has been collected through meetings with experts, training activities with teachers and pilots with students, as well as through internal and external evaluation processes. The data have been triangulated from questionnaires, observations, quality reports and usability analyses, allowing a comprehensive view of the educational impact of the project.

3.1 MAIN QUANTITATIVE RESULTS

Within the **InterGames** project, the satisfactory achievement of the main objectives set and, with it, the correct achievement of the **KPIs**, can be considered positive key quantitative results. Among them, those that can be seen in the following infographic stand out:



Infographic 6. Quantitative results: development of the project's main KPI's. Own production

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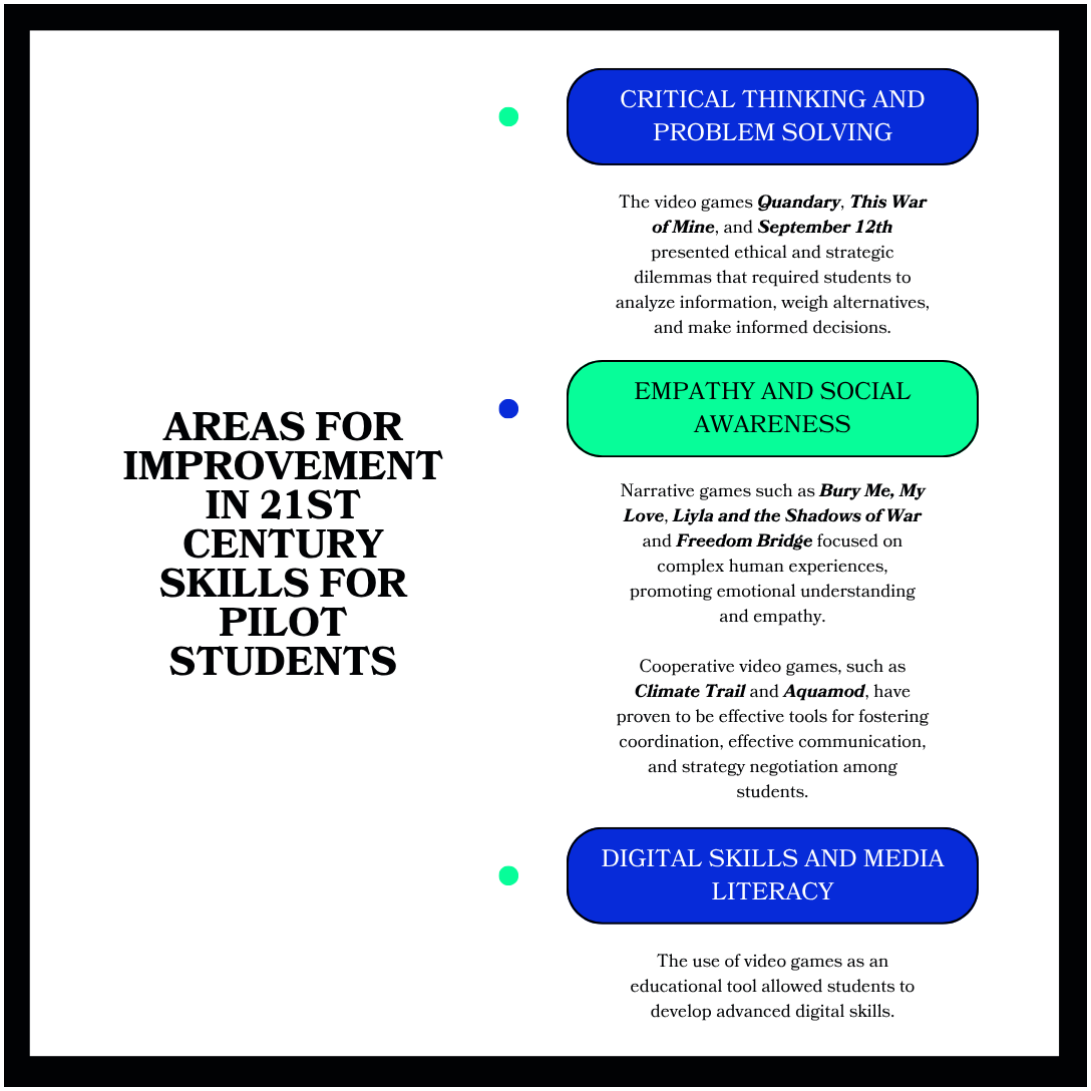
3.2 TWENTY-FIRST CENTURY SKILLS DEVELOPMENT

Within the framework of the **InterGames** project, the students participating in the classroom pilots showed **remarkable improvements in multiple key competencies of the 21st century,** as a result of the application of **pedagogical sequences based on video games**. These competencies are grouped into three major areas for improvement, which can be seen in Infographic 7.



Infographic 7. Three key areas that have improved in students of the pilot program in terms of 21st Century Skills. Own production

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In relation to these three areas (critical thinking and problem solving; empathy and social awareness; and digital skills and media literacy) we can delve into the specific experiences of the different video games.

Critical thinking and problem solving

In ***Quandary***, players had to manage resources and resolve conflicts in the space colony of Kerovnia, considering the consequences of their decisions on the community.

This War of Mine explored survival in a warlike environment, assessing risks and prioritizing ethical decisions under pressure.

September 12th placed students in crisis scenarios that combined history, politics and morality, stimulating critical reflection and contextualized decision-making.

These experiences favored the development of complex cognitive skills, such as strategic planning, anticipation of consequences, and ethical argumentation. In the pilots carried out in Austria, Italy and Romania, more than 75% of the students said they had improved their analytical and decision-making skills.

Empathy and social awareness

Bury Me, My Love chronicles the journey of a Syrian refugee through text messages, showing the personal dilemmas and difficulties of migration.

Liyla and the Shadows of War simulates the life of a family caught up in an armed conflict, emphasizing moral decisions and their consequences.

Freedom Bridge, through geometric figures and symbolic narrative, allows us to explore the emotional experience of displacement and resilience.

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These experiences encouraged students to reflect on human rights, social justice, and the sustainability of peace. In Sweden and Italy, it was observed that games facilitated empathy and content retention more than traditional classes.

For their part, through the experiences with ***Climate Trail*** and ***Aquamod*** that allowed work in groups, the students learned to:

- Distribute roles and responsibilities within the group.
- Analyze information together to solve complex problems.
- Make shared decisions that impact the collective outcome.

It is important to bear in mind that an essential component in group dynamics is cohesion, understood as the degree of affinity between the members of the group. It has a positive impact on multiple aspects of collective functioning, such as motivation, morale, conformity to rules, coordination of efforts, cooperation, productivity, effectiveness in achieving objectives, synergy, frequency of positive interactions and satisfaction with the group.

Therefore, these dynamics strengthened group cohesion and the ability to work collaboratively, especially in simulation and challenge-solving environments. The teachers highlighted the value of these activities to promote cooperation and shared decision-making, fundamental elements in the development of social competencies.

Digital skills and media literacy

Advanced digital skills, which enabled the use of each of the video games as an educational tool, include:

- Navigate complex interactive interfaces.
- Interpretation of non-linear and symbolic narratives.
- Critical evaluation of information presented in virtual environments.

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The playful nature of the games created a safe environment to experiment and make mistakes without real consequences, encouraging exploration and autonomous learning. In Austria, 90.9% of students valued the digital experience positively, and in Romania, 86% considered that video games helped them to better understand the content covered.

3.3 COMPETENCIES DEVELOPED BY STUDENTS

The analysis of the pilots of the **InterGames** project also made it possible to identify a set of cognitive, social, emotional and motivational competencies, which the students acquired or reinforced during the activities. These competencies are aligned with the **objectives of the 21st century**, including, in addition to those mentioned above, creativity and motivation towards learning.

Cognitive competencies

- **Critical thinking and decision-making:** Evaluate complex dilemmas, anticipate consequences, and justify decisions.
- **Problem Solving and Strategic Planning:** Resource and Risk Management in ***Climate Trail*** and ***Aquamod***.
- **Interdisciplinary Understanding:** Integrate knowledge of social sciences, ethics, the environment, and citizenship to address complex problems.

Social and emotional competencies

- **Collaboration and communication:** Cooperative work fostered coordination, negotiation, and joint problem-solving.
- **Empathy and social perspective:** Narrative games such as ***Liyla and the Shadows of War*** and ***Bury Me, My Love*** favored sensitivity to other realities.
- **Leadership and flexibility:** Group challenges demanded adaptability and initiative in dynamic contexts.

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Motivational and creative competencies

- **Intrinsic motivation:** The interactive and narrative nature of the games increased engagement and persistence.
- **Creativity:** Students generated original solutions to ethical and social dilemmas, expressing them through debate, writing or visual design.
- **Reduction of evaluative anxiety:** Continuous feedback integrated into the games strengthened confidence and willingness to learn.

Digital and ethical skills

- **Technological literacy:** The use of various platforms improved digital fluency applicable in other educational and work contexts.
- **Information and media literacy:** Students critically analyzed messages, symbols, and biases in games such as ***Phone Story*** and ***September 12th***.
- **Ethical reflection:** The games promoted deliberation about justice, conflict, and sustainability through moral decision-making.

Comments on the transfer of competences

- The skills acquired in pilots are transferable to real situations, such as conflict resolution, cooperation in group projects and understanding social and environmental problems.
- The combination of digital interaction, narrative, motivation, and teacher-guided reflection allowed for the consolidation of learning in a meaningful and experiential way.

The **InterGames** project demonstrates that video games are not just a playful resource, but a **comprehensive educational tool** for the development of the **full range of 21st century competencies**: **critical thinking, creativity, collaboration, communication, digital and media literacy, initiative, leadership, flexibility and social skills**.

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These competencies prepare students to face the ethical, technological and social challenges of the contemporary world from an interdisciplinary perspective.

3.4 INTERDISCIPLINARY APPLICATION

The pilots of the **InterGames** project demonstrated, therefore, that video games can work to improve the performance of **skills in the 21st century**, integrating various areas of knowledge and promoting transversal competencies. The interdisciplinary application was evidenced both in the design of the **pedagogical sequences** and in their **implementation** in real school contexts.

Each video game provided specific learning according to its theme and mechanics, allowing it to be linked to different subjects:

Social Sciences, Ethics and Citizenship

Video games such as ***This War of Mine***, ***Liyla and the Shadows of War*** and ***September 12th*** allow us to work on contemporary history, the understanding of war conflicts and ethical reflection on human decisions in crisis contexts. ***Bury Me, My Love*** fosters empathy and understanding of migration and human rights, connecting with citizenship and ethics studies.

Environmental Science and Sustainability

Climate Trail, ***Plasticity***, and ***Aquamod*** offer scenarios where students manage natural resources and face issues related to climate change, pollution, and sustainability. These experiences allow you to apply knowledge of natural sciences, geography and environmental education in simulated contexts.

Civic education and citizenship skills

Narrative games with ethical dilemmas such as ***Quandary*** encourage critical thinking, negotiation and conflict resolution within a simulated community, developing citizenship competencies and cooperation skills. ***Freedom Bridge*** facilitates reflection on displacement,

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resilience and social justice through symbolic narrative, promoting social awareness and the critical interpretation of complex phenomena.

Mathematics and logical thinking

Quandary and ***Climate Trail*** incorporate elements of resource management and quantitative decision-making, favoring strategic planning and logical-mathematical reasoning in interdisciplinary contexts. In the pilots, the students applied calculation, estimation, and variable analysis skills in simulated environments.

Physics, chemistry and experimental sciences

Although not all games were designed specifically for these areas, some such as ***Aquamod*** and ***Plasticity*** allow you to address content related to water management, pollution and the impact of plastic waste, facilitating the connection with concepts of environmental physics, applied chemistry and sustainability.

Languages and languages

Most of the video games used are available in English, which allows them to work on reading comprehension, vocabulary and interpretation of texts in a foreign language. In some cases, such as ***Quandary***, the textual load is high, which requires teacher mediation or linguistic adaptation. This situation also opens up opportunities for language learning in meaningful contexts, especially in bilingual or multilingual schools.

Art education

The aesthetic and narrative dimension of video games allows their integration into subjects related to the arts. Games such as ***Freedom Bridge*** and ***Plasticity*** offer visual and symbolic experiences that encouraged reflection on visual language, composition, design and artistic expression. In addition, the critical interpretation of graphic elements and the creation of visual proposals inspired by the dilemmas posed are promoted.

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Transversal competences

After the systematic review carried out, it can be stated that the results obtained are in line with the studies of Acquah and Katz (2020), which highlight that video games promote skills such as critical and creative thinking, collaboration, communication and problem-solving. Consequently, they contribute significantly to the development of teamwork skills, essential for the comprehensive training of students and their preparation for diverse social and professional contexts.

In our project, all the games have contributed to the development of skills such as:

- Critical thinking
- Troubleshooting
- Teamwork
- Communication
- Creativity
- Empathy
- Digital Literacy

Interaction in multiplayer and cooperative environments reinforces collaboration and negotiation between students, connecting academic learning with social skills applicable to various contexts.

Effective curriculum integration

After the pilots, the teachers were motivated to integrate the games into the existing curricula, adapting activities and evaluations to link the virtual experience with theoretical content. The most used and best-valued strategies are:

- Discussion and critical analysis of decisions made in the game.
- Preparation of problem-solving proposals inspired by the dilemmas posed.

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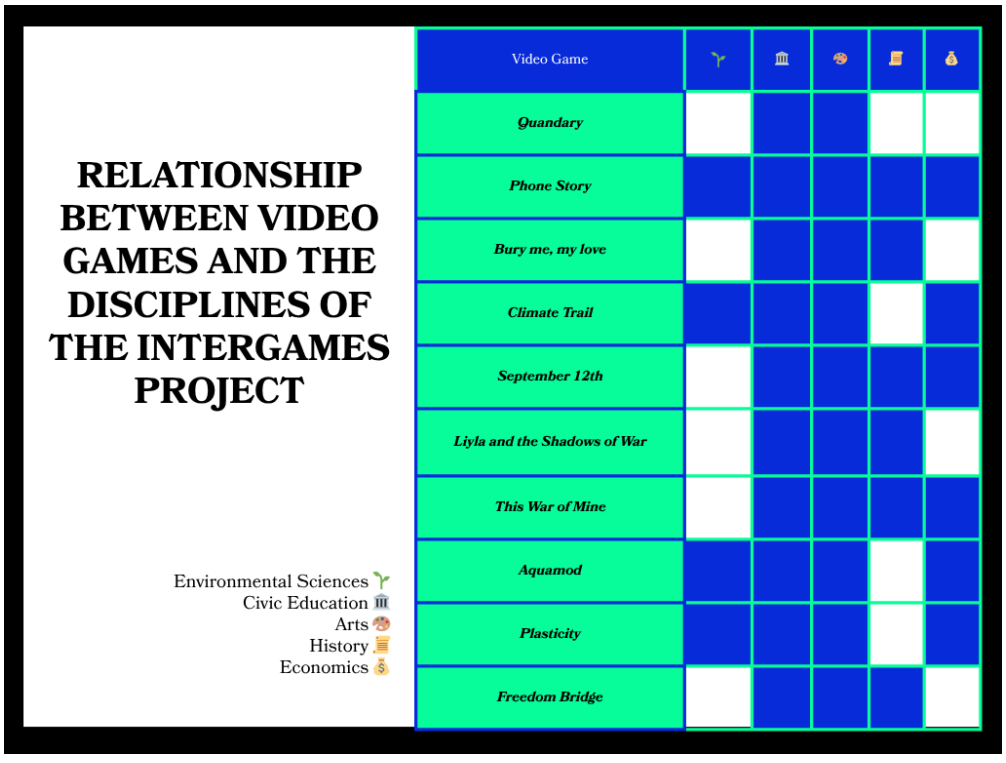
- Reflection on the social, ethical and environmental impacts of simulated decisions.

This curricular integration allowed a holistic approach to complex phenomena, favoring meaningful learning and the transfer of knowledge between disciplines.

3.5 LINKING TO INTERGAMES AREAS

The **implementation of video games** within the **InterGames** project made it possible to establish a clear connection between the **learning experiences** and the **thematic areas defined by the project**. Although the selection of video games and the preparation of the learning sequences was designed for this purpose, pilot tests with real students consolidate the hypothesis. The results of the pilots showed that the interactive dynamics of video games not only fostered the development of **transversal competencies,** but also strengthened the links with the curricular content of the areas of **Environmental Sciences, Civic Education, Arts, History and Economics** (see Infographics 8 and 9).



Infografía 8. Relationship between video games and the disciplines of the InterGames project. Own production

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Environmental Sciences

Video games such as *Climate Trail*, *Plasticity* and ***Aquamod*** were directly integrated with this area, promoting the understanding of current environmental issues such as climate change, water management, pollution and sustainability. Through simulation and eco-friendly decision-making, students developed a critical awareness of the human impact on the environment and the need to adopt sustainable practices.

Civic Education

Titles such as *Quandary* and ***Freedom Bridge*** served as resources for exploring ethical dilemmas, responsible decision-making, and citizen participation. These games favored the development of empathy, negotiation and critical thinking in the face of social problems, consolidating values of justice, cooperation and collective responsibility.

Arts

The aesthetic, narrative and visual dimension of video games such as *Freedom Bridge* and ***Plasticity*** offered opportunities to work on symbolic interpretation, artistic expression and the analysis of visual language. The derived activities include debates on design and composition, as well as the creation of visual proposals inspired by the themes covered.

History

Games such as *This War of Mine*, *Liyla and the Shadows of War*, and ***September 12th*** provide critical insight into contemporary conflicts, the wartime civilian experience, and the ethical consequences of violence. These interactive experiences facilitated the understanding of recent historical events and promoted reflection on peace, memory and human rights.

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Economics

Some video games incorporate elements of resource management, strategic planning, and decision-making with economic implications. In titles such as *Quandary* or ***Climate Trail***, students analyze how asset management, the balance between limited resources, and sustainable decisions affect both the environment and the community, thus linking simulation to basic economic principles.

As we have seen, the disciplines of the **InterGames** project adapt to the different selected games, creating a rich network of interdisciplinary connections that link civic education, environmental awareness, history, economics, and the arts through interactive learning (see Infographic 8). These video games become meaningful educational tools that promote reflection, empathy, and critical thinking while addressing relevant global issues.

The video game ***Quandary*** promotes civic education by placing students in moral dilemmas and ethical decision-making within a fictional community, encouraging reflection on values and social responsibility. Its visual and narrative design also allows work from the perspective of the arts, analyzing expression and interactive storytelling as tools to convey complex ideas. In turn, ***Phone Story*** critically addresses technological production and labor exploitation, connecting with civic education and economics by prompting reflection on global production chains. It also includes an environmental dimension by showing the ecological impact of electronic device manufacturing and stands out for its artistic component of social critique.

In ***Bury Me, My Love***, the interactive narrative focuses on migration and the Syrian conflict, making it useful for civic education—by fostering empathy and awareness of human rights—and for history, by providing context on contemporary conflicts. The use of simulated messages turns the game into an aesthetic and narrative experience relevant to the arts as well. Similarly, ***Climate Trail*** centers on climate change and the environmental consequences of human activity, directly linking with environmental sciences and civic education by encouraging reflection on civic responsibility and introducing notions of sustainable economics. Visually, it provides an artistic approach to representing the environmental crisis.

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September 12th invites reflection on political conflict and security, connecting with civic education and recent history, especially the post–September 11 context. Its minimalist and symbolic aesthetic allows for an artistic perspective, while its critique of the war economy also relates to economics. Likewise, ***Liyla and the Shadows of War*** portrays the emotional reality of war and the violation of human rights, making it particularly relevant to civic education and history. Its expressive and symbolic artistic style enables exploration through the arts, analyzing representations of violence, empathy, and civilian suffering.

This War of Mine shares this focus on war but highlights civilian survival in conflict contexts, offering a powerful moral and social experience. It connects with civic education through ethical decision-making and with history through its depiction of modern conflicts. Additionally, it introduces economic concepts such as resource scarcity and crisis management, making it relevant from an economic perspective as well. In another domain, ***Aquamod*** addresses water resource management, making it especially valuable for environmental sciences and the economics of natural resources. The game promotes civic cooperation and sustainability, thus reinforcing competencies in civic education and social commitment to the environment.

As for ***Plasticity***, its storyline focuses on plastic pollution and environmental sustainability, allowing it to be used in environmental sciences, civic education, and circular economy learning. Its futuristic and visually appealing artistic design also makes it an ideal resource for art-related and creative activities. Finally, ***Freedom Bridge*** depicts the journey and resilience of migrants, directly linking it to civic education and human rights. Its minimalist and symbolic design supports artistic analysis, while the historical context of modern migration connects naturally with the study of history.

Overall, the **link with the areas of InterGames**, as shown in Infographic 9, highlights how **video games consolidate themselves as versatile pedagogical tools**, capable of connecting disciplinary knowledge and fostering active, critical, and contextualized learning. This synthesis reinforces the interdisciplinary essence of the project and its potential to enrich teaching practices through the educational use of games.

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MAIN LINKS BETWEEN INTERGAMES AREAS, VIDEO GAMES AND KEY COMPETENCES

InterGames Area	Video Games Used	Key Competences Developed	Related Disciplines
Environmental Sciences	***Climate Trail, Aquamod, Plasticity***	Sustainability, systems thinking, critical decision-making	Natural Sciences, Geography, Environmental Education
Civic Education	***Quandary, Freedom Bridge***	Empathy, negotiation, ethical reflection, conflict resolution	Ethics, Citizenship Studies, Social Education
Arts	***Plasticity, Freedom Bridge***	Creativity, visual literacy, symbolic interpretation, artistic expression	Art Education, Visual Communication
History	***This War of Mine, Liyla and the Shadows of War, September 12th***	Historical understanding, ethical reflection, analysis of human conflict	History, Social Sciences, Citizenship Education
Economics	***Quandary, Climate Trail***	Resource management, sustainable decision-making, strategic planning	Economics, Mathematics, Environmental Studies

Infographic 9. Main links between InterGames areas, video games and key competences. Own production

3.6 CONCLUSIONS ON THE IMPACT OF INTERDISCIPLINARITY IN SECONDARY SCHOOL

The results of the **InterGames** project show that **video games**, when integrated into the classroom, are an effective tool for **developing 21st century skills and promoting content understanding in different curricular areas**. The interdisciplinary methodology applied in the pilots has generated a positive impact on both learning and student motivation.

Key competence development

Students improved cognitive skills such as critical thinking, problem-solving, and strategic planning when faced with complex dilemmas in simulated environments. In addition, social and emotional competencies were strengthened, including teamwork, communication, empathy and negotiation, especially in cooperative or multiplayer games.

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The narrative structure of video games made it possible to address ethical, social and environmental issues from an experiential perspective, favoring reflection and critical analysis. Interaction with digital environments also contributed to the development of technological skills and media literacy.

Promoting interdisciplinarity

The pilots showed that video games can articulate content from a variety of disciplines. This thematic diversity allows students to apply knowledge from different branches to solve complex problems, promoting a holistic understanding of the phenomena treated.

The connection between narrative, game mechanics and curricular objectives facilitated the integration of video games into the school curriculum, generating meaningful and contextualized learning experiences.

Active and experiential learning

The students were actively involved in decision-making, analyzing the consequences of their actions in simulated contexts. This participation reinforced the deep understanding of the contents and promoted the transfer of skills to real situations.

The playful nature of video games created a safe environment to experiment, make mistakes and learn, moving away from rote learning and favoring the autonomy of students.

Implications for educational practice

The integration of video games in interdisciplinary contexts favors the adoption of active and student-centered methodologies, such as problem-based, project-based learning and discussions. Video games can complement traditional content, providing a safe framework for experimentation, decision-making, and ethical reflection.

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The role of the teacher as a facilitator is key to guide reflection and promote the transfer of skills from play to formal learning and everyday life.

Overall, the implementation of the **piloting of the use of video games in the classroom** shows that this methodology **enhances the motivation, involvement and autonomy of students**, while **developing essential transversal skills for secondary education in the 21st century**. Video games, therefore, are not only a playful resource, but also a powerful vehicle for interdisciplinarity and the integral development of students.

3.7 USABILITY OF VIDEO GAMES IN EDUCATIONAL SETTINGS

The **usability** of video games in the **InterGames** project was evaluated from the perspective of students and teachers, considering factors such as **accessibility, clarity of the interface, motivation** and **ease of linking the game experience with curricular objectives**. The results show that, in general, **the video games used offered a positive educational experience**, although some limitations that require attention were identified.

Relationship of video games with the development of curricular objectives

We can affirm, as mentioned above, that there is a clear link between the different video games and the curricular objectives. In short:

- ***Climate Trail*** allowed students to learn how to manage resources and make environmental decisions while interacting with data related to sustainability and climate change.
- ***Aquamod*** presented challenges related to water management, reinforcing concepts from natural sciences and geography in a practical way.
- ***Plasticity*** offered an experience focused on pollution and sustainability, promoting decision-making based on multiple environmental variables.

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- ***This War of Mine*** provided a survival environment in a context of urban warfare, where players' decisions had direct consequences on the lives of the characters, stimulating critical analysis, empathy, and strategic planning.
- ***Freedom Bridge*** addressed the issue of division and the search for freedom in conflict contexts, encouraging reflection on human rights and the social consequences of oppression.
- ***Liyla and the Shadows of War*** provided an understanding of civilian experiences in war zones, developing empathy and critical thinking in the face of humanitarian crises.
- ***Bury Me, My Love*** simulated communication between a refugee and her partner via text messages, promoting understanding of forced migration and analysis of ethical and emotional dilemmas.
- ***Phone Story*** offered a critical look at the technology industry and its social, economic and environmental implications, encouraging ethical thinking and citizen responsibility around digital consumption.
- ***September 12th*** proposed a reflection on war and the use of force, inviting us to analyze the consequences of military actions and to value the importance of peace and diplomacy.

Intuition and accessibility

Most of the video games had clear interfaces and understandable mechanics that facilitated the immersion of the students. Games like ***Quandary***, ***Climate Trail***, and ***Aquamod*** offered built-in tutorials and immediate feedback, allowing students to quickly understand the goals and rules of the game. Teachers especially valued the ease of use of these games, highlighting their potential to introduce complex content in an accessible way.

Narrative and teaching mediation

Some games (***Freedom Bridge***, ***Liyla and the Shadows of War***, ***Bury Me, My Love***, ***Phone Story*** and ***September 12th***) used symbolic, emotional or minimalist narratives, which required active

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mediation by teachers to link the playful experience with the curricular content. This mediation was key to:

- Connect emotional experiences of play with social, ethical, and humanitarian studies.
- To promote empathy and understanding of real problems, such as migration, armed conflicts or global inequalities.

The teachers facilitated reflection through debates, group analyses and interpretation activities, guiding the students in the understanding of the visual elements, decisions and implicit messages present in the games.

Simulation of complex problems

Simulation games, such as ***Plasticity*** and ***This War of Mine***, proved to be effective tools for tackling complex problems. These experiences favored the holistic understanding of social and environmental phenomena, and were especially valued for their ability to generate deep discussions in the classroom.

Motivation and participation

All video games increased the motivation and active participation of the students. The playful nature of the games created a safe environment to experiment and make mistakes without real consequences, encouraging exploration and autonomous learning.

The diversity of genres and topics made it possible to address different interests and learning styles, from problem solving to ethical and social reflection.

In the pilots carried out in Cyprus, 95% of the students expressed interest in continuing to use video games as a learning tool.

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Feedback and evaluation

Most of the games incorporated immediate feedback mechanisms, which facilitated continuous assessment of learning. For example, ***Quandary*** and ***Climate Trail*** offered scores and outcomes based on student decisions, allowing teachers to identify strengths and areas for reinforcement. These elements within the game allowed students to receive feedback without feeling direct evaluative pressure, increasing engagement and motivation.

Usability limitations

Although the meetings and pilots of the **InterGames** project proved to be effective in the **development of 21st century competencies**, the experience allowed us to identify limitations and areas for improvement to optimize future implementations:

The main problem was the lack of translation or availability in the right language of some games, which made it difficult to understand the narratives and objectives. In some cases, such as ***Quandary***, textual load in English was perceived as an obstacle for students with lower language proficiency. This language barrier partially affected the immersion and critical interpretation of the dilemmas posed, requiring additional mediation from teachers.

Significant differences were also identified in the digital familiarity of the students, as well as technical limitations (connectivity, devices, access to *software*), which conditioned the experience in some schools. In addition, certain paid games had to be adapted using gameplay videos, which was functional but less motivating than the direct use of the *software*.

Other limitations found were:

- **VLL design and accessibility**: Surveys conducted on the beta version of the virtual lab pointed to areas for improvement in structure clarity, visual aesthetics, and relevance to the target group. It was recommended to improve navigation, simplify content and strengthen visual coherence: criteria that were taken into account and carried out.

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- **Time and pace of gameplay**: Certain games required a considerable time investment to explore all mechanics and narratives, which made it difficult to integrate them into educational sessions of limited duration. This limitation was solved in some cases through the use of specific chapters or *gameplays*.
- **Curricular adaptation**: Integrating video games in a coherent way with the contents of different subjects requires methodological adjustments and teaching coordination, which can increase the planning burden. The need to transform some activities into optional or reinforcement activities was also identified to facilitate their implementation.

In other words, although the results of **InterGames** show significant potential as an interdisciplinary educational tool, attention to linguistic, technological and methodological barriers is essential to **maximize the impact of video games on the acquisition of competencies and skills in the 21st** century. The following section makes recommendations, which will allow future implementations to be designed in a more inclusive, effective and sustainable way.

3.8 SUGGESTIONS FOR TEACHERS

As has been said since the introduction, the **use of video games** in interdisciplinary teaching areas requires **active mediation** by teachers to **maximize their educational impact and link the playful experience with twenty-first century competencies**. From the implementation of the **InterGames** project, the following strategies and recommendations stand out:

1. Proper selection of video games

- Choose games that are aligned with the educational objectives and competencies that are sought to be developed. For example:
    - ***Climate Trail*** and ***Aquamod*** for sustainability and resource management.
    - ***This War of Mine*** and ***Liyla and the Shadows of War*** for ethics, citizenship and understanding of conflict.

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- Consider the availability of the language and the ease of understanding the narrative, avoiding games with long texts in languages not mastered by the students, unless there is teacher mediation or the purpose of the game is to learn the language, taking into account, for example, the case of ***Quandary***, where it was identified that its textual load in English can limit the participation of students with less linguistic competence.
- Take into account the possible personal experiences of the students to warn in advance if there is potential conflict. In these cases, it is recommended to offer alternatives or modify the pedagogical sequence to ensure a safe and respectful environment.

2. Preparation and contextualization

- Ensure that schools have sufficient devices and connectivity to run games without interruptions, preventing external factors from affecting the learning experience. It is also recommended to select free or funded video games to facilitate adoption.
- Design activities that connect the content of video games with objectives in different subjects, promoting meaningful learning and the transfer of skills. Planning must contemplate the flexibility to adapt the sequences according to the school context.
- To train teachers in greater depth in the pedagogical use of video games, including mediation strategies, monitoring of competencies and curricular adaptation. Training should include the use of tools such as Genially and H5P, which were key in the development of the VLL, but focus on pedagogical sequences.
- Explain to students the purpose of the game and how it relates to the curricular content.
- Briefly introduce the historical, social, or environmental context of the game before starting the activity, to ensure that all students can follow the narrative and participate in meaningful ways.

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3. Mediation and guidance during the game

- Supervise the interaction of students with the game, resolving doubts and highlighting key elements that connect with the educational objectives.
- Encourage active reflection through open-ended questions and group discussions about the decisions made in the game and their consequences.
- Facilitate the interpretation of symbolic elements, especially in games such as ***Freedom Bridge***, where the narrative can be more abstract.

4. Post-game activities, feedback and evaluation

- Organize discussions, case analyses or comparative studies between decisions made in the game and real situations.
- Ask students to develop proposals or solutions inspired by the dilemmas presented in the game.
- Promote self-evaluation and reflection on the learning acquired, highlighting the transfer of skills to situations outside the classroom.
- Incorporate immediate feedback instruments, which allow evaluating the involvement, motivation and experience of students, adjusting pedagogical strategies as necessary. The surveys applied in the project showed that this type of monitoring is key to improving the quality of implementation.

5. Twenty-first century skills development

- Explicitly work on skills such as critical thinking, problem-solving, collaboration, and communication.
- Design activities that require teamwork and negotiation, taking advantage of the multiplayer or cooperative elements of video games. Joint collaboration stands as an essential component to overcome challenges, which is fundamental for the development of interpersonal and communicative skills, especially relevant for conflict resolution and peacebuilding (Squire, 2008; Felicia, 2020; Pineda-Martínez et al., 2023).

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It is recommended to encourage teamwork within multiplayer games, where students must collaborate to achieve common goals. Likewise, the use of games that encourage dialogue and negotiation among players to resolve conflicts peacefully is suggested (Gee, 2003; Barab et al., 2009).

- Integrate continuous assessment, using the feedback provided by the games themselves, and complementing it with observations from the teaching staff.

6. Adaptation and flexibility

- Adjust the difficulty and objectives of the game according to the needs of the group and the educational context.
- Adjust game times and segment activities to fit into class sessions without the need for autonomous work, allowing for guided reflection and continuous evaluation without generating saturation.
- Combine video games with other pedagogical strategies (projects, debates, physical simulations) to reinforce interdisciplinarity and understanding of the contents.

3.9. DISCUSSION

The synthesis presented in the results table (see Infographic 10) shows the positive impact of the **InterGames** project in different European educational contexts. In general terms, **the data confirm that the incorporation of video games as a pedagogical tool generates high levels of motivation and commitment among students,** with a particularly high valuation in countries such as Cyprus and Austria. This finding reinforces the initial hypothesis of the project: **learning mediated by playful experiences increases student engagement and facilitates content retention,** in line with what Gee (2003) and Qian & Clark (2016) pointed out.

The **increase in critical thinking** – particularly noticeable in Italy – **and** the **improvement of empathy in games focused on war and migration themes, support the potential of video games to promote cognitive and socio-emotional skills**. These results coincide with the studies by Del Moral-Pérez and Rodríguez-González (2022) and Holohan (2019), which highlight

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the capacity of the video game environment to stimulate ethical reflection and the understanding of complex realities. Likewise, **the strengthening of teamwork and digital literacy** observed in Austria and Cyprus **confirms the value of video games as instruments for the development of collaborative and technological skills,** fundamental in education in the **twenty-first century**.

The teachers' assessment was also largely positive, both in relation to the **Virtual Learning Lab (VLL)** and the **pedagogical sequences** designed. This fact highlights the **importance of teacher mediation in the implementation of innovative methodologies**, consolidating the role of teachers as facilitators of learning and promoters of critical reflection (Felicia, 2020).

However, **the challenges identified** —such as language limitations, the length of some sequences, or technical problems— **reveal the need to adjust integration strategies to different school contexts**. The lack of localized versions of some video games (e.g., *Quandary* or *Liyla and the Shadows of War*) underscores the **importance of linguistic and cultural accessibility** in the **selection of digital assets**.

Overall, the results show that the **interdisciplinary and gamified approach** of the **InterGames** project not only improves student motivation and performance, but also **strengthens transversal competences essential for contemporary citizenship**. The experience validates the potential of video games as pedagogical tools capable of transforming the traditional dynamics of teaching and learning, as long as their application is accompanied by teacher mediation, critical reflection and contextual adaptation.

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MAIN RESULTS

Aspect	Relevant Data
Student motivation	**Austria**: 90.9% enjoyed the experience. **Cyprus**: 100% enjoyed it; 95% want to use video games in the future. **Italy**: 65% enjoyed it; 76.9% achieved better retention than with traditional methods. **Romania**: 86% found the activity very interesting. **Sweden**: average rating above 4.2/5 for relevance and participation. **Spain**: students were highly motivated by the learning sequences.
Impact on competences	**Critical thinking**: +53.8% (**Italy**), strengthened in all countries. **Empathy**: highlighted in games about war and migration. **Teamwork and digital literacy**: mentioned in **Austria** and **Cyprus**.
Teacher evaluation	**VLL**: very high scores (9.5/10 in **Cyprus**). **Pedagogical sequences**: an approximate result of 8.8/10.
Identified challenges	**Language**: ***Quandary*** and ***Liyla and the Shadows of War*** have no local version. **Duration**: some sequences were long. **Technical limitations**: connectivity or devices.

Infographic 10. Main quantitative and qualitative results. Own production

4. CONCLUSION

The analysis of **interdisciplinary learning with video games** implemented within the framework of the **InterGames** project shows that these experiences constitute an **innovative and effective educational strategy** for the **development of 21st century competencies** in **secondary** school students. The laboratories strengthened cognitive, social, emotional, and motivational competencies, including critical thinking, problem-solving, collaboration, empathy, self-regulation, and motivation for learning. Video games acted not only as a motivating medium, but as an experiential learning tool that integrated knowledge and skills in a meaningful way, facilitating the understanding of complex concepts and their practical application.

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In addition, video games offered a safe and structured framework to address diverse issues in different areas, such as social sciences, ethics, the environment and citizenship, fostering interdisciplinary understanding and the transfer of skills to real contexts. The interaction with digital narratives and mechanics allowed students to explore complex situations, make decisions and reflect on their implications, contributing to the development of critical skills and the ability to analyze different points of view. The interactive and narrative nature of the games increased the intrinsic motivation, active participation and involvement of the students, while the playful elements and the proposed challenges favored curiosity, experimentation and willingness to learn, also reinforcing their emotional well-being and self-confidence.

Despite the positive results, some limitations were identified, such as the language barrier of certain games that lack translation, differences in digital familiarity among students, high technological requirements and the need to adapt content to different curricula. Overcoming these limitations through accessible game selection, teacher training, and careful planning is critical to ensuring the effectiveness and inclusiveness of future implementations. **InterGames'** experience suggests that **video games can become authentic interdisciplinary learning tools**, offering a safe space for the practice of **21st century skills**, ethical reflection and complex problem solving.

In conclusion, the results obtained show that video games are a powerful pedagogical resource, capable of promoting significant learning, collaboration, critical thinking and motivation in secondary school students. Its reflexive integration, accompanied by teacher mediation and the design of contextualized activities, allows educational environments to be transformed into dynamic and multidisciplinary laboratories, preparing students to face the challenges of the twenty-first century in an ethical, critical and collaborative way.

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