Teaching soft skills in higher education through serious games: validation of the *Compete!* gamification

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Abstract

Soft skills, essential for employability and professional success, are often underemphasised in traditional higher education curricula. This study assesses the effectiveness of *Compete!*, a serious game developed under the Erasmus+ program, in enhancing students' awareness of key soft skills, including creative problem-solving, effective communication, stress management, and teamwork. The game simulates professional scenarios requiring strategic decision-making, providing real-time feedback, and fostering reflective learning. A pilot test conducted with 63 business students at Universidad Internacional de La Rioja during the 2023–2024 academic year employed pre- and post-game surveys to assess changes in perceptions of soft skills. Results revealed statistically significant improvements across 13 of 18 competencies, with notable increases in confidence and the perceived importance of teamwork and stress management. Findings highlight the potential of serious games as innovative tools for integrating soft skills into higher education, underscoring their role in preparing students for the complex challenges of the workplace. The study calls for broader institutional adoption and curriculum integration of gamified approaches to enhance employability.

Keywords: Serious games, Soft skills, Game design, Employability, Compete+, Erasmus+, Higher education

Introduction

Soft skills have become crucial indicators of employability, surpassing academic and technical expertise as a criterion for career success (Schwab & Zahidi, 2020). Stress management, problem-solving, effective communication, and teamwork are now considered essential traits for students to ensure desirable employment after completing their education and to thrive in complex professional environments (Succi & Canovi, 2020).

However, integrating these skills into higher education classrooms poses different challenges (Tang, 2019). Many higher education institutions struggle to do so effectively, as traditional teaching methods tend to focus on hard skills or technical knowledge. Various approaches have been proposed to address this issue, including the use of serious games, which have demonstrated potential for enhancing student learning.

Serious games, defined as games with a primary purpose beyond entertainment, offer unique opportunities for experiential learning (Laamarti et al., 2014). By simulating real-world scenarios, serious games allow students to practice decision-making, collaboration, and adaptability in a risk-free environment, thereby fostering the development of soft skills (Castillo-Parra et al., 2022). Research has shown that gamified learning environments can enhance motivation, improve knowledge retention, and create a more immersive learning experience compared to traditional methods (Subhash & Cudney, 2018). Moreover, the interactivity and feedback mechanisms embedded in serious games help learners understand the consequences of their decisions, encouraging reflective learning and personal growth (Rebah, 2019).

Moreover, gamified strategies have been shown to contribute to the development of transversal competencies (Latorre-Cosculluela et al., 2025). Students from Generation Z (Centennials) and Generation Alpha have considerable experience interacting with advanced technology, making gamified learning particularly appealing to them (Khaldi et al., 2023). Furthermore, it provides students with a learning methodology that extends beyond theoretical knowledge, fostering professional competence in future professionals by enhancing motivation, reflective analysis, cognitive methods, information search and management, and skills related to the use of gamification tools (Folomieieva et al., 2024).

The impact of gamification on skill development

Regarding the impact of serious games, studies such as those by Facchino et al. (2025) identify key educational areas that strengthen psychological traits and attitudes, including empathy and prejudice reduction, foster the acquisition of theoretical knowledge, such as biopsychology, and develop professional skills. These positive impacts are particularly evident in games that incorporate feedback and modelling, which significantly enhance learning and training in psychology. Thus, the integration of learning strategies using active and collaborative methodologies through gamification significantly enhances cognitive skills in the university context (Orozco Castro, 2025), including problem-solving.

Gamification and the importance of its design

Previous research has shown that serious games have great potential for developing future learning skills, and their effectiveness is closely tied to their design. Many of them have approaches that foster skills such as problem-solving, collaboration, and teamwork, highlighting the importance of clear objectives and interactivity in their design (Gurbuz & Celik, 2022). Furthermore, other research (Tan & Chong, 2023) highlights the importance of clearly defining learning objectives. To achieve this, specific, measurable, and aligned learning objectives are key factors for effective and meaningful gamification design.

Gamification and motivational methodologies

Regarding the methodology used in serious games, research on the opportunity they offer to experience a trial-and-error process, along with the presence of motivating challenges, has shed light on aspects directly related to increased enjoyment during learning (Sandí-Delgado et al., 2022). These elements not only foster student engagement and

commitment but also provide a solid foundation for designing effective competency-based training strategies within higher education institutions. Other research, such as that by Klock and Dick (2021), highlights the effectiveness of motivation in gamification, achieved through the use of points, badges, and leaderboards, as well as the role of the player (Seaborn & Fels, 2015), which are the most common methods. Regarding gamified roles, research in the business field (Abuladze, 2023) has shown how when players are assigned the roles of "decision maker" and "team leader", they improve their soft skills related to resilience, teamwork and decision-making, resulting in these methodologies being successful.

Gamification with scenarios

The use of scenarios in games, through which the player must progress, as seen in research such as that by Perna (2021), highlights the importance of incorporating them into gamification, as they provide a real demonstration of skill mastery, not limited to temporary progress. Furthermore, the study conducted by Altomari et al. (2023) demonstrated the effectiveness of a serious game structured according to labour market needs. It was developed by incorporating interactive scenarios simulating real-life work situations to place the player at the centre. This allowed the player to practice and evaluate their skills in a controlled and branched environment. In this sense, defining the scenarios is crucial, as the objective to be achieved in each of them must be accomplished through specific tutorials aimed at discovering and understanding the mechanics, which are separate from the scenarios intended for learning objectives.

Gamification in university education for workplace integration

Based on the research mentioned above, serious games can be more effective than traditional methods, particularly in enhancing motivation, engagement, and knowledge retention. However, their successful integration into the curriculum requires careful design and instructor guidance to ensure that the educational objectives are met and that students can fully benefit from the immersive learning experience they offer (Vlachopoulos & Makri, 2017; Schrader, 2022).

Considering the educational advantages of gamification as a methodology, *Compete!* was created within the framework of a European Erasmus+ project.

Compete! is a serious game designed to improve higher education students' awareness of the critical role that soft skills play in professional settings in order to address the growing need for soft skill development in higher education. Developed under the Erasmus+ program, this game encourages students to apply and evaluate soft skills while discussing their impact across different scenarios. The players are placed in a simulated professional setting where they must solve complex challenges. The project uses gamification and a participatory methodology to engage students actively. One of the key features of the game's design is the continuous feedback provided to students on their choices and progress, helping them understand the consequences of their decisions and their connection to soft skills. Through this constant feedback, the game aims to foster a deeper understanding of how these skills impact outcomes in professional scenarios. There are no specific requirements needed to play the game, as a simple web browser allows access through the *Compete!* Project's website.

Research gaps and study objectives

In this context of education and gamification, there is a need for research. Despite the recognised importance of collaborative learning strategies and the use of gamification methodology for improving transversal skills, there is little evidence analysing the effects of these strategies on actual learning (Latorre-Cosculluela et al., 2025).

Furthermore, research has limited consideration of cultural and contextual factors. Soft skills can vary culturally, and gamification is often applied without adapting the methodology to diverse sociocultural contexts (Pillai & Srinivansan, 2018). The difficulty in defining soft skills and the variability in their assessment across different sectors and contexts are often highlighted (Robles, 2012). This represents a significant challenge, particularly in measuring soft skills in education and employment internationally (Nedelkoska & Quitini, 2018).This study aims to validate the effectiveness of *Compete!* as a tool to raise awareness about the importance of soft skills among higher education students. Specifically, it examines the impact of the game on students' perceptions of four key soft skills: creative problem-solving, communication, stress management, and teamwork. To achieve this objective, the research seeks to address the following questions: Does the game contribute to the perception of key soft skills? How has the game influenced students' understanding of the importance of interpersonal skills for their entry into the workforce? Does the game encourage reflection and self-awareness regarding interpersonal decision-making skills, and if so, in what ways? Additionally, how does the game shape students' perception of key soft skills, and how has it impacted their appreciation of the relevance of interpersonal skills for professional success?

By analysing the results of pre- and post-game surveys, this research contributes to the growing body of literature on serious games as a means of promoting soft skill development in higher education. This study presents the results of the pilot test of the game for its validation as a tool to help enhance students 'awareness of the importance of soft skills. The test was administered to students of the Business Faculty at Universidad Internacional de La Rioja during the 2023–2024 academic year. In the academic discipline of Economics, the use of gamified learning models has a well-documented history, demonstrating their effectiveness in online education (Rusmaini et al., 2020). Consequently, this analysis of the implementation of *Compete!* gamification as a tool offers valuable insights for its application in other fields of knowledge within higher education institutions (Balbaa & Abdurashidova, 2023), along with the necessary evaluation for its enhancement.

This article aims to present a novel approach to analyzing the real impact of student learning through gamification and its specific effect on effective learning. It seeks to advance its measurement and understanding. It also aims to provide a critical analysis and a methodological proposal for incorporating the cultural dimension into the application of gamification in the context of higher education. This approach will enable the recognition of cultural variations in soft skills and the adaptation of gamified strategies to diverse sociocultural contexts, thereby enhancing their relevance and effectiveness. Ultimately, this article will propose solutions to address the challenges posed by the variable definition and assessment of soft skills across different sectors and contexts. It will aim to advance the development of tools and criteria that enable more valid and reliable measurement of these skills in educational and professional settings worldwide.

Methodology

Research design

This research used a quantitative methodological approach, consisting of a comparative analysis using pre- and post-game surveys to evaluate the effectiveness of *Compete!* as a tool for strengthening students' knowledge of key interpersonal skills. Students completed both surveys before and after participating in the *Compete!* game.

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The pilot consisted of a pretest and post-test survey used to evaluate the effectiveness of *Compete!* as a tool to enhance students' awareness of key soft skills. Students completed both surveys before and after engaging with the *Compete!* game.

Pretest Survey. Before the gameplay session, participants completed an 18-item survey consisting of one multiple-choice question, two ordinal scale questions and 15 Likert scale questions. The survey measured their prior knowledge of soft skills and which ones they consider most useful in a new job position. The eight questions were distributed among the soft skills: "Creative problem solving", "Effective communication," Stress management, and "Teamwork.

Study group

The *Compete!* pilot for this study was conducted with students from the Faculty of Business Administration at the International University of La Rioja during the 2023–2024 academic year. The initial sample included 243 third- and fourth-year students, who were voluntarily invited to participate by their professors. However, due to a lack of availability and schedule conflicts, the total number of participating students was 63. Since this is a convenience sample based on voluntary self-registration, the results reflect only the characteristics and opinions of those who chose to participate. Furthermore, of the 63 participants recruited for the study, all completed both the pretest and posttest. Therefore, there was no data loss between measurements, allowing for a complete and comparative analysis of the results without the need to apply missing data handling techniques. The average values were calculated from the total sample, ensuring the validity and representativeness of the results obtained.

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within higher education institutions (Balbaa & Abdurashidova, 2023), along with the necessary evaluation for its improvement. This research contributes to the growing body of literature on serious games as a means to promote the development of soft skills in higher education.

Data analysis

Data from the pretest and post-test were analysed to calculate means and standard deviations. Second, the difference between each variable in the post-test and the pretest was calculated to determine how much the mean had changed. A positive value indicates an increase in the mean, while a negative value reflects a decrease.

A paired t-test was used to evaluate the significance of these differences, with p values of less than 0.05, 0.01, and 0.002 indicating the varying degrees of statistical significance. The differences between the means of the two populations (pretest and post-test). A p value of less than 0.05, 0.01, or 0.002 indicates a statistically significant difference between the two means.

Finally, an additional column was added with stars indicating the level of significance. A p value below 0.05 is marked with one star (*), below 0.01 with two stars (**), and below 0.002 with three stars (***). The number of stars reflects the level of significance of the difference in means: the more stars, the more significant the difference. Variables without stars indicate that no significant difference was found between the pretest and post-test means.

Research tool

The research tool used in the investigation is a survey, as it is the most effective way to collect data in a structured manner, based on quantifiable information about players' opinions and perceptions regarding *Compete!* The questionnaire used in the pre- and post-intervention phases is the same, as its content, format, and objectives are fully applicable to both assessment periods. Therefore, no adaptations or modifications were necessary, as it allows for a direct and valid comparison of the results obtained before and after the intervention.

The same questions were presented in both the pretest and post-test surveys. The question set can be found in Table 1.

The online version of the survey in Spanish can be found at the following addresses:

Pretest *https://docs.google.com/forms/d/1vBuvW7DyTpce8hA41teFhzS7ADkwOx_9h9rqb_vmHHQ/viewform?edit_requested=true*
Post-test: *https://docs.google.com/forms/d/1iiupq4bOjKxKFrPoGbep9TvymVo16EyYXTwLqO-fwck/viewform?edit_requested=true*

Procedure

The game session was held online, and no specific requirements are required to play, as a simple web browser allows access through the *Compete!* website. Players connected via Zoom to receive instructions, with an explanation given by a teacher and supported by a PowerPoint presentation. The total session lasted 90 min. The session was divided into two key presentations. The first presentation introduced

Table 1 *Compete!* Survey questions and competency mapping

Question	Competency	Question
1	Soft skill knowledge	When you start a new job, what do you think you will find most difficult? Indicate the options that you think may be difficult for you
2	Soft skill knowledge	Do you feel capable of facing challenges that go beyond what you have studied in class?
3	Soft skill knowledge	Have you ever heard of soft skills?
4	Problem solving	How important is it to express a problem clearly and explicitly before solving it?
5	Problem solving	How important is it to consider different approaches to a problem, valuing the multiple factors that contribute to its understanding?
6	Problem solving	How important is it to encourage creativity and innovation by considering different points of view in complex problem-solving situations?
7	Effective communication	How important do you consider listening skills to be?
8	Effective communication	How important is expressing oneself verbally?
9	Effective communication	How important is expressing oneself in writing?
10	Effective communication	How important is it to understand the needs of others?
11	Stress management	How important is it to manage time according to the priorities to be addressed and to establish a relationship between these priorities and professional technical resources?
12	Stress management	How important is it to help co-workers and perform one's duties during peak work periods?
13	Stress management	How important is it to have a rich personal life outside of work?
14	Stress management	How important is it to take care of the work team during stressful periods?
15	Teamwork	How important is it to work as a team in order to be effective within an organisation
16	Teamwork	How important is it to take into account the opinions of all members of a work team?
17	Teamwork	How important is trust among all members of a team?
18	Teamwork	How important is information communication among a work team for the achievement of common goals?

the context and goals of the session, focusing on the importance of soft skills for employability. The second presentation provided detailed instructions on the game's structure, the scenarios students would encounter, and how their performance would be evaluated based on soft skill competencies. The students were given a web link to access *Compete!* game, which they played via a web browser.

Post-test survey. After completing the game, participants filled out the same 18-item study to measure any changes in their perceptions of the soft skills.

Compete! Design

To facilitate the effective acquisition of these soft skills through *Compete!*, the game needed to be an enjoyable and useful experience for players. To this end, a study was initially conducted to identify which skills should be included in the game design. A structured narrative was subsequently developed to maximise the educational impact within the game environment. Finally, assessment methods based on specific metrics were implemented to measure the acquisition and development of these soft skills through gameplay.

The *Compete!* narrative structure

The narrative employs gamification, focusing on the acquisition of soft skills. The story revolves around the theme of sustainability, where the decisions made by players generate both social and economic impacts. Throughout the game, the player takes on the role of project manager on the fictional island of Allpa Kawsay, inspired by Ecuadorian territories. In this position, the player must advise the local government and contribute to the sustainable development of the regional economy, striking a balance between economic interests and the well-being of residents.

This structure begins with two introductory tasks that explain how players should interact with the gamified experience, utilizing buttons and icons to make decisions, advance, and solve challenges (Fig. 1). The initial tasks are designed to familiarize the player with the game's dynamics.

Second, the game consists of 10 scenarios that present challenges to overcome, each set in a distinct setting where a social or environmental issue is posed. Each player advances through these scenarios. These scenarios are as follows:

1. The International Investor: The player must consider whether tourist developments on the beach are desirable.
2. Better Fish to Fry: Fish stocks are depleting in local waters.
3. High Voltage: The island is experiencing power shortages. A suitable power source must be chosen.
4. Deep Water: The island's water supplies have been contaminated by the local mining industry.
5. Garbage: Improper waste management contributes to rising pollution levels.
6. Naturally, a Disaster: The player must help resolve a crisis caused by a natural disaster.
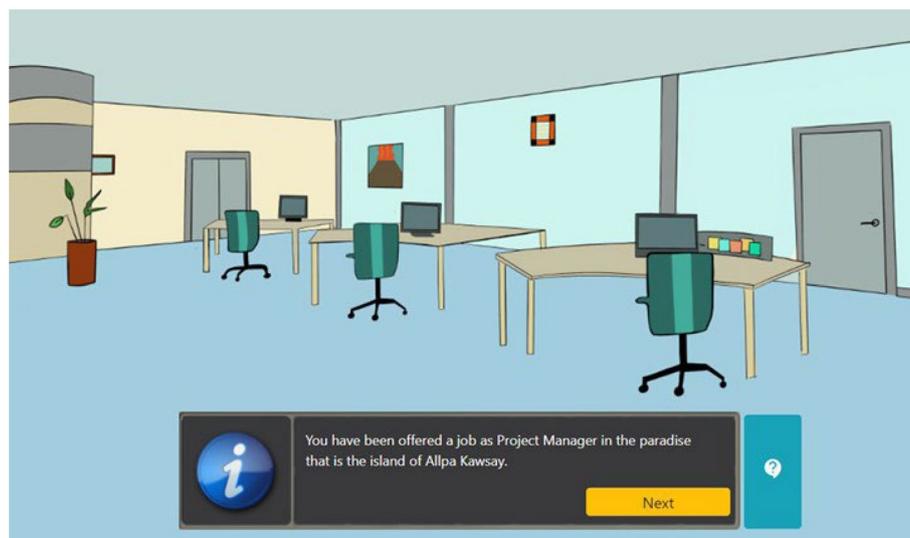7. Poachers: An international mafia is smuggling local wildlife.

Fig. 1 *Compete!* Interface. Source: Gamification *Compete!*

Fig. 2 Example of two options for solving a task. Source: Gamification *Compete!*
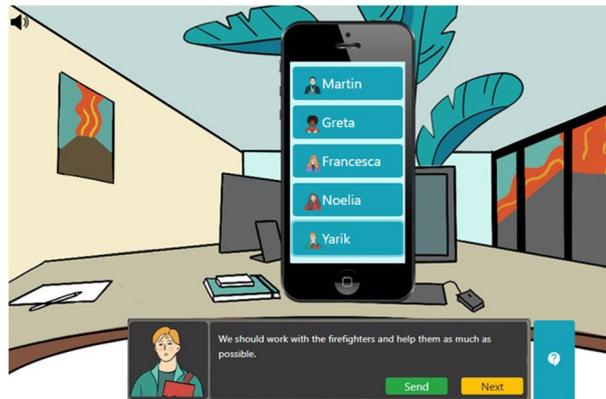

Fig. 3 Selecting a counselor to follow. Source: Gamification *Compete!*

8. Rising sea levels: Rising water levels are drowning the island.
9. Deforestation: Forests are being consumed by farms and timber production.
10. Slave trade: Residents are at risk of human trafficking and modern slavery abroad.

The structure of gamification

In each *Compete!* challenge, the player encounters an identical structure (Fig. 2), which corresponds to the presentation of the challenge's plot, along with a story that describes the context and the problem to be addressed. The player is then given a task to complete. To complete this task, the player must select one of the two possible options, as shown in Fig. 2. Each choice helps measure specific soft skills competencies.

To make this decision, the player must consult each of the councillors about the best course of action. The player decides which councillor to follow, as shown in Fig. 3, keeping in mind that the decisions will affect the Island's sustainability, happiness, or social impact.

Competency measurement

Interpersonal competencies are assessed independently of the social and economic impact derived from the participant's decisions. These competencies are analysed through three specific dimensions, each of which is assessed through a binary decision, coded as correct or incorrect (options a or b).

The social and economic impact, meanwhile, is quantified through two main indicators: island sustainability and island happiness. Sustainability represents the financial effect of the decisions made, while island happiness reflects the social impact associated with those decisions. Both indicators are interrelated and directly depend on the response provided in the competency assessment. A correct response enables the participant to access the optimal option in the decision-making phase. In contrast, an incorrect response restricts access to the alternative that would have generated the highest score. In this scenario, the game counselor justifies the impossibility of offering a recommendation.

Each competency is assessed three separate times using a four-star scale. Each assessment emphasises a particular aspect of the competency. Each competency is composed of two elements, each awarded one star, and a core element, awarded two stars. Star assignment depends on the correct selection when addressing a specific task within a challenge. Thus, the maximum score achievable per competency is four stars. The detailed distribution of stars by competency is presented in Table 2.

On the other hand, the analysis of decisions related to island development, with respect to their economic and social impact, is scored on a scale of 0 to 15 points. In each challenge, the player's choice based on the advice of the selected advisor will influence the number of sustainability and happiness points for the island. A combined metric is used that integrates two key dimensions: economic sustainability and happiness. This metric is represented by scores that reflect the impact of each choice on both aspects, according to the following levels:

Table 2 Challenge-based competency scoring matrix

Challenge/Competency	Creative problem-solving	Effective communication	Stress management	Team building
Puzzle 1			☆	
Puzzle 2	☆☆			
Challenge 1		☆		
Challenge 2				☆
Challenge 3	☆			
Challenge 4		☆☆		
Challenge 5	☆			
Challenge 6			☆☆	
Challenge 7				☆
Challenge 8				☆
Challenge 9			☆	
Challenge 10		☆		
Total stars	☆☆☆☆	☆☆☆☆	☆☆☆☆	☆☆☆☆

Source: own elaboration

1. 0 Sustainability, 0 Island Happiness (0S+0Ih): The decision contributes neither to the development of a sustainable economy nor to the improvement of local social well-being, demonstrating a neutral or nonexistent impact on both dimensions.

2. 1 Sustainability, 0 Island Happiness (1S+0Ih): The choice prioritises economic sustainability, promoting practices that ensure viable long-term economic development; however, it has no positive impact on the social well-being of the island community.

3. 0 Sustainability, 1 Island Happiness (0S+1Ih): The decision does not improve the local economy from a sustainable perspective, but it does generate a positive social impact, increasing the satisfaction and quality of life of the island's inhabitants.

4. 1 Sustainability, 1 Island Happiness (1S+1Ih): The adopted option is simultaneously sustainable in economic terms and beneficial for social well-being, creating a favourable balance between economic development and community happiness.

5. 1.5 Sustainability, 1.5 Island Happiness (1.5S+1.5Ih): This score reflects a choice that is not only sustainable and socially positive but also incorporates an additional level of creativity and innovation in its design, representing a competitive advantage and an exemplary model of holistic decision-making for island development.

This scoring scheme enables an integrated assessment of the multidimensional impact of decisions, facilitating the identification of strategies that optimise both economic sustainability and social well-being.

Since five councillors participate in each challenge, there are five possible choices assigned to each of them based on their sustainability and island happiness scores. This specific assignment determines the distribution of points across the different categories, as detailed in Table 3.

Each category combines two dimensions: economic sustainability (S) and island social happiness (Ih), with scores ranging from no impact to creative options with a strong positive influence. Thus, for each of the ten challenges, each councillor was assigned to a different category, ensuring a balanced and rotating distribution of responsibilities and scores.

Table 3 Advisors according to sustainability and social impact in each challenge

Challenge	0S+0Ih (no sustainable, no social impact)	1S+0Ih (sustainable, no social impact)	0S+1Ih (not sustainable, social impact)	1S+1Ih (sustainable & social impact)	1.5S+1.5Ih (creative & strong impact)
Challenge 1	Noelia	Francesca	Martin	Yarik	Greta
Challenge 2	Greta	Francesca	Martin	Yarik	Noelia
Challenge 3	Noelia	Greta	Yarik	Martin	Francesca
Challenge 4	Francesca	Greta	Martin	Yarik	Noelia
Challenge 5	Martin	Noelia	Greta	Francesca	Yarik
Challenge 6	Greta	Noelia	Francesca	Yarik	Martin
Challenge 7	Martin	Yarik	Greta	Noelia	Francesca
Challenge 8	Yarik	Martin	Francesca	Noelia	Greta
Challenge 9	Noelia	Yarik	Greta	Francesca	Martin
Challenge 10	Greta	Francesca	Martin	Noelia	Yarik

Source: own elaboration

Gamification evaluation

Compete! offers continuous evaluation, which is conducted at the end of each challenge and its scene. Players receive feedback on their choices (Fig. 4). They are given results related to the social and economic impact of their decisions, as well as a score based on the soft skills competency associated with the challenge. In the latter, gamification provides the player with feedback on whether the choice is correct, explaining the reasoning behind it. If the answer is incorrect, the player is offered more appropriate options. Players are also encouraged to discuss these results with others.

After completing all the scenarios, players access the Final Report section, where their total scores are presented and explained. These scores correspond to the cumulative sum of the partial evaluations obtained in each of the previous scenarios. The design of this section aims to emphasise the relevance of soft skills competencies and their critical behaviours, with the goal of incentivising players to continue developing these skills (see Fig. 5).

In addition, a scoring scale classifies each player's experience or skill level based on the numerical ranges obtained in each test. Each score interval corresponds to a category that reflects the level of proficiency achieved (Table 4):

Fig. 4 Score per challenge completed. Source: Gamification *Compete!*
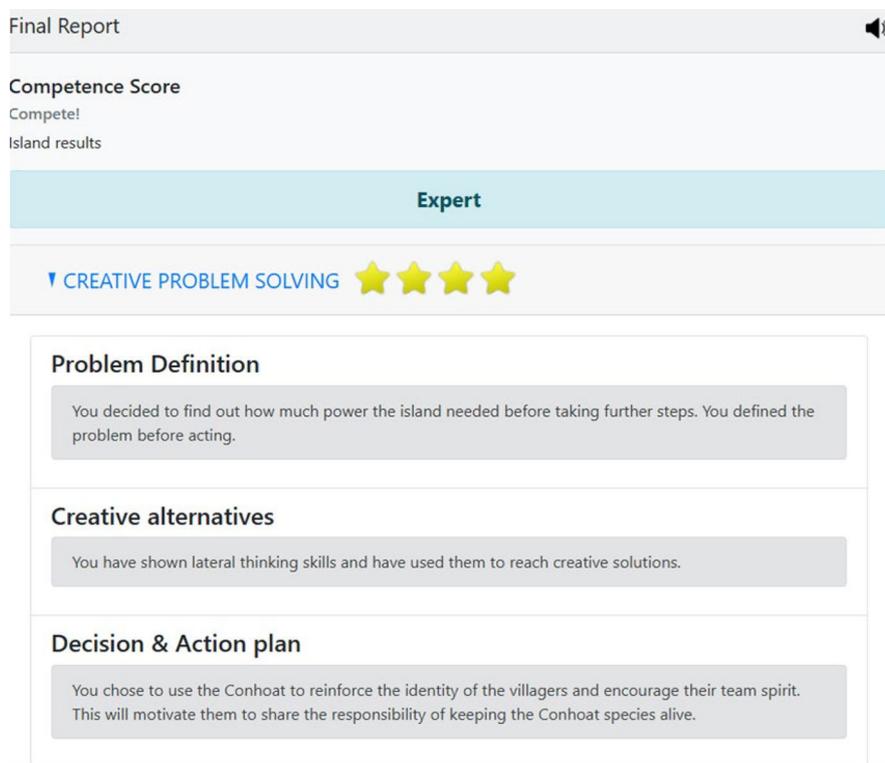
Fig. 5 Final report. Source: Gamification *Compete!*

Table 4 Scores and categories

Score	Category	Definition
25–30	Expert	Advanced mastery and excellence in knowledge and skills. Able to perform with maximum effectiveness
19–24	Professional	Solid professional level, with well-developed skills and proven competence in practical contexts
13–18	High potential	Considerable knowledge and skills base, with capacity for growth toward higher levels
7–12	Beginner	Initial level, in the process of acquiring basic knowledge and skills, requiring further training
0–6	Misfit	Insufficient score, indicating a lack of preparation or suitability for the evaluated area

Source: own elaboration

Results

The application of *Compete!* has led to revealing results in distinct aspects of its evaluation. Results show both increases and decreases in mean scores for different competencies, along with the level of statistical significance for these changes, as indicated by their *p* value s. Results can be found summarised in Table 5.

General knowledge of soft skills

The pilot test indicated significant changes in students' perception and understanding of key soft skills after playing *Compete!*. There was a marked decrease in students' self-assessed knowledge of soft skills, with a significant reduction in mean score from 1.67

Table 4 Survey results, average values, standard deviation, variation, and *p* values

	Variable	n PRE	n POST	Average PRE	Average POST	std PRE	std POST	Variation	*p* Value	*p**
3	CONOCOMP	63	63	1.67	1.1	0.48	0.3	−0.57	0	***
4	IMPTRABEQUIP	63	63	4.62	4.84	0.58	0.48	0.22	0.02101	*
5	IMPOCONFI	63	62	4.67	4.92	0.48	0.27	0.25	0.00042	***
6	CAPESCUCHA	63	63	4.83	4.89	0.42	0.36	0.06	0.3682	
7	EXVERBAL	63	63	4.63	4.78	0.58	0.52	0.15	0.14736	
8	ADMTIEMPO	63	63	4.73	4.87	0.45	0.34	0.14	0.04495	*
9	EXPROBLEM	63	63	4.81	4.89	0.43	0.32	0.08	0.24398	
10	EXESCRITA	63	63	4.38	4.68	0.73	0.64	0.3	0.01512	*
11	ENFRETOS	63	63	4.16	4.6	0.68	0.64	0.44	0.00023	***
12	CREATINNOVA	63	62	4.68	4.85	0.5	0.4	0.17	0.03562	*
13	IMPOCUIDEQUIP	63	63	4.76	4.9	0.47	0.3	0.14	0.04226	*
14	NECTRAB	63	63	1.94	2	0.78	0.44	0.06	0.57499	
15	METYFACT	63	63	4.57	4.83	0.56	0.46	0.26	0.00625	**
16	IMPOCOMUINFO	63	63	4.76	4.92	0.47	0.27	0.16	0.02148	*
17	NECDEMAS	62	63	4.74	4.92	0.48	0.27	0.18	0.01179	*
18	IMPOAYUDA	63	63	4.4	4.75	0.73	0.47	0.35	0.00191	***
16	IMPOPINION	62	62	4.5	4.81	0.62	0.47	0.31	0.00251	**

to 1.10, with a significant negative change of -0.57 ($p < 0.001*$). This suggests that after playing *Compete!*, students became aware of the scope and complexity of soft skills, realizing that they knew less than they previously thought. This newfound awareness underscores *Compete!*'s potential as a tool to raise awareness about soft skills and encourage further development in this area.

Conversely, Question 2, which measured students' confidence in facing challenges beyond their classroom knowledge, saw a significant increase in confidence. The mean score increased from 4.16 to 4.60, with a significant difference of 0.44 ($p = 0.0002**$). This suggests that exposure to realistic and challenging scenarios in *Compete!* positively impacts students' self-perceived abilities.

The rise in self-perception of their abilities could be a reflection of the knowledge gained regarding the scope of soft skills and the degree to which they possess them. It could also show a recognition of the importance of developing personal confidence for employment. This boost in confidence can lead to a more proactive attitude towards taking on challenges and learning from new experiences.

Creative problem-solving

These findings suggest that the game helped students better recognize the importance of using diverse approaches in problem-solving and fostered creativity in complex scenarios. Questions 5 and 6, regarding different methods of problem-solving and the importance of creativity to solve problems, both show a statistical increase in their scores. In question 5, the mean score increased from 4.57 to 4.83, indicating a significant positive change of 0.26 ($p = 0.006*$). Similarly, in question 6, the mean score increased from 4.68 to 4.85, with a significant change of 0.17 ($p = 0.036*$).

Effective communication

Although some aspects of effective communication, such as listening and verbal expression, showed smaller changes and no significant p values, the results still highlight an overall improvement in written communication skills and a greater understanding of others' needs.

Question 9 regarding the importance of written communication showed an increase in its mean score from 4.38 to 4.68, with a statistically significant change of 0.30 ($p = 0.01512$). Question 10 regarding the importance of understanding the needs of others showed an increase from 4.74 to 4.92, showing a significant improvement of 0.18 ($p = 0.01179$), emphasizing a greater appreciation for empathy in communication.

Stress management

These results suggest that the game reinforced the importance of assisting colleagues during times of high workload and improved students' time-management skills. All questions showed statistically significant changes, especially in question 12 regarding the importance of helping people in your team. Here, the mean score increased from 4.40 to 4.75, with a highly significant positive change of 0.35 ($p = 0.002**$).

Question 11, relative to managing time and priorities, showed a mean score increased from 4.73 to 4.87, with a significant change of 0.14 ($p = 0.04495$), suggesting that students became more aware of the importance of prioritizing tasks effectively.

Teamwork

These results highlight the positive impact of the intervention on trust and collaboration within teams. The findings indicate that students now place greater value on teamwork and the consideration of diverse perspectives. In this regard, in question 16, the mean score increased from 4.67 to 4.92, with a highly significant change of 0.25 ($p = 0.00042^{**}$).

The rise in the perceived importance of trust among team members suggests a growing recognition of its critical role in effective team performance. Covered in question 17, in this item, the mean score increased from 4.67 to 4.92, with a highly significant change of 0.25 ($p = 0.00042^{**}$).

Strengthening this trust may foster a more collaborative and productive work environment. Additionally, the increased awareness of the importance of supporting colleagues, especially during periods of high workload, underscores the value of fostering a culture of mutual help and collaboration. This, in turn, can enhance team cohesion and overall group effectiveness.

Importance of interpersonal skills

Several interpersonal competencies demonstrated statistically significant improvements after gameplay. Students demonstrated an increased awareness of the importance of teamwork (Q4), effective written communication (Q10), and stress management through providing assistance to colleagues during peak workloads (Q12). Specifically, teamwork saw scores increase from 4.62 to 4.84 ($p < 0.05$), communication from 4.38 to 4.68 ($p < 0.05$), and helping colleagues during stressful times from 4.40 to 4.75 ($p < 0.01$). These changes underscore the game's effectiveness in emphasizing critical interpersonal skills necessary for successful workforce integration.

Decision-making skills

The data indicated that the gameplay significantly promoted reflection and self-awareness among students concerning their decision-making skills. Improvements in recognizing the importance of trust among team members (Q17, from 4.67 to 4.92, $p < 0.001$) and appreciating diverse team opinions (Q16, from 4.67 to 4.92, $p < 0.001$) suggest that students developed greater awareness of the relational dimensions crucial for effective decision-making.

Discussion

The results of this study indicate that *Compete!* effectively increased students' awareness of soft skills, particularly emphasizing teamwork, stress management, and written communication. These findings align with existing literature, reinforcing the pedagogical potential of gamification in higher education (Castillo-Parra et al., 2022; Subhash & Cudney, 2018).Thus, the Compete! The pilot has also demonstrated that gamified learning is an effective tool, as it appeals to students who have experience interacting with technology (Khaldi et al., 2023). This methodology leverages students' technological expertise to enhance motivation, reflective analysis, and the development of professional skills (Folomieieva et al., 2024).In comparing these results with previous research, this study aligns with Altomari et al. (2023) and Perna (2021), who recognized the capacity of gamification to enhance cognitive and practical skills. Furthermore, the results

obtained coincide with those of Orozco (2025), which demonstrate how the integration of learning strategies using active and collaborative methodologies, through gamification, significantly improves cognitive skills, such as problem solving, in the university context. However, the current study uniquely highlights changes in student perceptions and awareness, suggesting significant metacognitive skills, reflecting on their thinking process, understanding their cognitive strengths and weaknesses, which allows them to regulate their learning strategies more effectively, effects similar to findings by Rebah (2019).

Compete!'s significant impact on students' reflection about their abilities emphasizes its utility as a preliminary step towards actual behavioral change in soft skill competencies. The decrease in perceived general knowledge post-gameplay suggests increased recognition of skill complexity, highlighting *Compete!*'s role in fostering critical self-awareness. In this sense, it is worth highlighting the importance of the motivation achieved in Compete! players through its methodology, coinciding with the results obtained in other research, such as that of Klock and Dick (2021), which highlight the effectiveness of motivation in gamification, achieved through the use of points, badges and leaderboards, as well as the role of the player (Seaborn & Fels, 2015), all of which are included in the design of Compete! Regarding the approach and design employed in Compete!, the research findings support the results obtained in previous studies, such as that of Gurbuz and Celik (2022), which demonstrate that the effectiveness of serious games is closely linked to their design. This relationship between design and effectiveness highlights the importance of how the structural and functional characteristics of the game can significantly influence pedagogical outcomes. In this sense, the design of Compete! incorporates fundamental elements that promote the development of key skills, such as problem-solving, collaboration, and teamwork, which aligns with the approaches suggested by Gurbuz and Celik (2022).

Regarding the importance of interpersonal skills, the results obtained coincide with the research by Sandí-Delgado et al. (2022), which indicates that the methodology used in serious games not only facilitates a trial-and-error process through motivating challenges, but also provides a solid basis for designing competency-based training strategies in higher education institutions.

Whit respect decision-making, the results obtained have demonstrated the effectiveness of gamified roles, which aligns with Abuladze's (2023) research, which shows how the assigned roles of "decision-maker" and "team leader" improve soft skills such as resilience, teamwork, and decision-making. Furthermore, the use of scenarios within *Compete!* significantly favors the development of this skill. In this context, players had the opportunity to progress through different scenarios, allowing them to practice and evaluate their decision-making skills in a controlled environment. This structure, supported by specific tutorials, not only guided players toward the objectives to be achieved in each scenario but also promoted continuous improvement through feedback and analysis of the decisions made. The results obtained in *Compete!* coincide with those of previous research by Altomari et al. (2023) and Perna (2021), who also highlight the effectiveness of this approach in strengthening decision-making. The discussion of the research findings suggests that serious games, such as Compete!, should be more widely integrated into higher education curricula as tools to raise awareness and foster reflection. Given

the appeal of gamification to digital generations, educators should strategically leverage these methodologies to promote student engagement and develop interpersonal skills, which would contribute to improving their future employability. The integration of gamifications such as Compete! into the university curriculum can be successful, provided that a carefully planned design and instructor guidance ensure that objectives are met and allow students to make the most of the immersive learning experience they offer. These results are consistent with previous research findings by Vlachopoulos and Makri (2017) and Schrader (2022).

Conclusions

The objective of this study is to validate the effectiveness of the gamification tool *Compete!* as a means of raising awareness about the importance of soft skills among higher education students.

In addressing the first research question, whether gamification contributes to the perception of key soft skills, the findings indicate that *Compete!* has significantly enhanced students' awareness of these skills during its pilot session. This includes skills such as creative problem-solving, effective communication, stress management, and teamwork. These results align with the perspectives of various authors (Latorre-Cosculluela et al., 2025; Subhash & Cudney, 2018), who argue that gamification fosters the creation of collaborative and creative learning environments that promote the development and acquisition of transversal skills. The second research question seeks to examine the impact of gamification on students, specifically regarding the importance of interpersonal competencies for their transition into the professional world. The analysis of data collected through pre- and post-questionnaires demonstrates a measurable positive impact, with improvements observed in students' perceptions of 13 out of the 18 competencies assessed. This highlights the game's value as an educational tool for fostering awareness and emphasizing the significance of these essential skills in professional contexts. These findings align with existing research, which underscores that competency-based learning, alongside work-based and experiential learning, must be effectively integrated into the education system to equip students for the challenges of the future (Huston & Ceballos, 2024).

Compete! was not designed to directly develop competencies, but rather to educate students about their significance. The game can introduce students to what soft skills are, explain which soft skills are particularly relevant for university graduates entering the workforce, demonstrate their importance for achieving professional efficacy and motivate students to actively seek out opportunities to further develop these skills throughout their university studies.

The third research question aims to examine whether the game enhances students' ability to reflect and develop self-awareness in relation to interpersonal decision-making skills. The analysis of the collected data reveals that students made in-game decisions based on their understanding of these competencies. This result aligns with the findings of previous studies (Rebah, 2019).

The results indicate that gamification, as a methodology for fostering awareness of soft skills among university students, has a positive impact. It supports both their academic and social development while effectively preparing them for professional

integration into the workplace. These findings are consistent with the perspectives of other researchers (Castillo-Parra et al., 2022; Folomieieva et al., 2024; Schwab & Zahidi, 2020).

Students made decisions within the game based on their understanding of these competencies. One of the most valuable contributions of *Compete!* is its ability to foster reflection and self-awareness regarding soft skills. By engaging students in challenging scenarios that simulate real-life professional contexts, the game encourages them to recognize their own strengths and areas for improvement. Moreover, the structured feedback provided at the end of each scenario helps students understand the consequences of their decisions, deepening their comprehension of how these competencies influence outcomes in the workplace.

Additionally, the study suggests the need for institutions to create an *action plan* to further support the development of these competencies. This could involve providing students with more structured opportunities for experiential learning, mentorship programs, or workshops designed to develop specific soft skills. In doing so, universities can enhance the long-term employability of their graduates by ensuring that they are not only knowledgeable in their academic fields but also well-equipped with the soft skills that are highly valued in today's job market.

Compete!, as a tool, could be used by higher education institutions to help increase awareness of soft skills among their students. Its integration in the curriculum could help address the challenges of preparing students for the demands of the modern workplace by motivating them to recognize and develop essential soft skills. This idea aligns with the existing literature (Balbaa & Abdurashidova, 2023), which highlights the value of designing strategic gamification elements; training university professors to incorporate gamification into curricula; creating gamified activities with engaging tasks to spark students' curiosity for learning; evaluating gamification methodologies in education; and identifying effective strategies and suitable knowledge areas for their implementation.

Finally, it is important to note that a significant limitation of this study is its small sample size, which may limit the generalizability of the results to the broader population. The small sample size limits representativeness, which may affect the external validity and robustness of the conclusions. Furthermore, a small sample size reduces statistical power, making it difficult to identify significant differences or relationships and increasing the likelihood of Type II errors. Therefore, we suggest that future research use larger and more heterogeneous samples to validate and expand the findings presented. Another limitation of this research is that the sample used was composed solely of Economics students, as this was a pilot study. This restricts the generalizability of the results to other university programs. To expand the scope and external validity of the study, it would be necessary to replicate the research with students from other academic programs, which would allow for a broader and more representative view of the university population as a whole.

Supplementary Information

Additional file 1 (DOCX 21 kb)

Declarations

Competing interests
The authors declare no conflict of interest.

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