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Game-based exercise focused on emotional intelligence

Ejercicio lúdico gamificado enfocado en la inteligencia emocional

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RESUMEN

Este estudio explora la vitalidad ascendente de las habilidades socioemocionales, o 'soft skills', en ingeniería industrial dentro de la órbita de la Industria 4.0. Anclándose en la teoría de inteligencia emocional de Daniel Goleman y las exploraciones de Arik Carmeli, se subraya cómo la inteligencia emocional impulsa actitudes y conductas laborales óptimas. La investigación implementa una actividad lúdica destinada a fortalecer competencias emocionales y sociales, poniendo un énfasis particular en la autoconciencia, autogestión y destrezas sociales. Ejecutada en un entorno rigurosamente controlado y monitoreado, y apalancando métodos de aprendizaje experiencial, el estudio anticipa que los participantes mejoren en comunicación efectiva, resolución de conflictos, liderazgo de equipos y adaptación a contextos laborales dinámicos y complejos.

Palabras clave: aprendizaje emocional, gamificación, habilidades blandas, inteligencia emocional, resolución de conflictos.

Clasificación JEL: I21; J52.

ABSTRACT

This study explores the rising vitality of socio-emotional skills, or 'soft skills,' within industrial engineering in Industry 4.0. Anchoring in Daniel Goleman's emotional intelligence theory and Arik Carmeli's explorations, it underscores how emotional intelligence propels optimal work attitudes and behaviors. The research implements a playful activity aimed at strengthening emotional and social competencies, particularly emphasizing self-awareness, self-management, and social skills. Executed in a strictly controlled and monitored environment and leveraging experiential learning methods, the study anticipates participants will enhance their capabilities in effective communication, conflict resolution, team leadership, and adaptation to dynamic and complex work contexts.

Keywords: emotional learning, gamification, soft skills, emotional intelligence, conflict resolution.

JEL classification: I21; J52.

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INTRODUCTION

Emotional intelligence has become an increasingly critical aspect of the modern work environment (Coronado-Maldonado & Benítez-Márquez, 2023; Lee et al., 2023; Wang et al., 2023). The shift towards digitization and automation, characteristic of Industry 4.0, has reassessed the essential skills needed in the workplace (Kryukov et al., 2022). Technical skills, while still essential, are no longer sufficient. Industrial engineers, in particular, need a broader range of skills to successfully navigate increasingly complex and dynamic work environments (Maisiri et al., 2019).

Research has shown that emotional intelligence, which includes skills such as self-awareness (Li et al., 2022), self-management (Beydler, 2017), empathy (McNulty & Politis, 2023), and social skills (Cerit & Şimşek, 2021; Salavera et al., 2019), is correlated with positive work attitudes and behaviors (Carmeli, 2003). Engineers with high emotional intelligence are better able to lead teams (Sinyard et al., 2022), communicate effectively, resolve conflicts, and adapt to change (Rezvani & Khosravi, 2019). These skills are particularly crucial in industrial engineering, where professionals

often must work in multidisciplinary teams and face complex and unfamiliar challenges.

In addition, emotional intelligence is a critical factor for job satisfaction and commitment, contributing to talent retention and organizational performance (Lee et al., 2023). Professionals with high emotional intelligence tend to have better relationships with their colleagues, feel more satisfied with their work, and perform better in their tasks (Carmeli, 2003). However, emotional intelligence is often overlooked in engineering education (Encinas & Chauca, 2020). Technical skills are the primary focus, while emotional and social skills are secondary. This gap must be addressed to prepare engineers for the challenges of Industry 4.0 (Gajek et al., 2022).

Gamification, a process that incorporates elements of game design in non-game contexts to enhance user engagement and learning, has gained increasing attention in pedagogy and corporate training in the last decade (Feinauer et al., 2022; Murillo-Zamorano et al., 2023). This methodology is based on the idea that games can foster intrinsic motivation, engagement, and creativity, essential characteristics for learning and problem-solving (Deterding et al., 2011). In the context of engineering education, gamification can provide an engaging platform for technical and non-technical skill development (Behl et al., 2022). Games can simulate real-life situations and challenge students to apply learned concepts to solve complex problems. At the same time, the social interaction and competition inherent in games can promote collaboration, communication, and other soft skills (Landers, 2014).

In addition, gamification can be a powerful tool for emotional intelligence training (Cheng & Ebrahimi, 2023; Hassan et al., 2021). Games can provide a safe and controlled environment for individuals to explore and experience emotions. Players can be confronted with situations that challenge their self-management and social skills and, through reflection and feedback, can learn to better manage these situations in real life (Nacke & Deterding, 2017). Despite the potential benefits of gamification, its practical implementation requires careful consideration of several factors, including game design, learning goals, user motivation, and implementation context.

As an educational and training tool, gamification focuses on applying game design elements in non-game contexts to stimulate participation and enhance user experience. Critical gamification elements include points, badges, leaderboards, challenges, narratives, and player roles (Hamari et al., 2014). These elements make activities more engaging and fun and motivate participants to achieve goals and overcome challenges. Points are a way to provide immediate feedback to users and help them track their progress (Hamari et al., 2014). Badges, on the other hand, are symbols of achievement that recognize participants' efforts and skills. Leaderboards foster competition by allowing participants to compare their performance with that of others.

Challenges, often presented as missions or levels, can provide a clear structure and direction for activities. Participants can be motivated to overcome these challenges and achieve specific goals. Through stories or themes, narrative can provide context and make activities more meaningful and exciting. Finally, player roles allow participants to adopt different identities and responsibilities within the game. This can allow participants to explore different perspectives and develop diverse skills (Dichev & Dicheva, 2017).

The analysis of player types is critical to designing a practical gamification experience. Richard Bartle, a pioneer in game research, classified player types into four main categories: achievers, explorers, socializers, and killers (Bartle, 1996). Achievers are players who enjoy challenges and achieving specific goals. Explorers prefer to discover new aspects of the game, while socializers focus on interacting with other players. Assassins, on the other hand, enjoy influencing or dominating other players. However, it is essential to mention that this typology originated in online multiplayer games and may not directly apply to all gamification contexts. For example, significant differences in player types may be observed in the context of education or vocational training.

Marczewski (2015) adapted Bartle's typology for gamification, introducing the idea of philanthropic gamers who find satisfaction in helping others and disruptive gamers who seek to change or break the system. These types of gamers can be observed in the gamified activity proposed in this study, where participants assume different roles and face a series of challenges to develop their emotional intelligence. Identifying player types is essential for designing gamification experiences that are engaging and effective for a diverse audience. By understanding the motivations and behaviors of different types of players, designers can create gamification experiences that meet the needs and preferences of all participants.

In the era of Industry 4.0, the profile of professionals, particularly industrial engineers, is evolving towards a greater demand for emotional and social skills, also known as soft skills. These skills, often overshadowed by technical competencies, have proven crucial for success in today's work environment. Arik Carmeli's study, for example, highlights the positive correlation between emotional intelligence and positive work attitudes and

behaviors. However, despite growing evidence of their importance, these skills are often underestimated in the educational and professional context.

Given this gap, developing innovative and effective methods to cultivate and reinforce these skills is essential. The present research presents a playful activity to foster emotional intelligence and social skills in industrial engineering. Inspired by Daniel Goleman's emotional intelligence theory, the activity seeks to allow participants to practice and reflect on their self-awareness, self-management, social skills, and knowledge in a controlled and supervised environment (Flórez, 2021). Through this activity, participants can explore and recognize the importance of these skills, not only in their professional lives but also in their personal lives. The activity is designed to be engaging, interactive, and practical, providing a meaningful and memorable learning experience.

METHODS

Design Thinking is a people-oriented approach to problem-solving introduced by Murphy (2016). Its primary purpose is to understand human challenges and needs and create innovative and practical answers from them. This strategy consists of five essential stages: understanding, defining, ideation, prototyping, and evaluation. For this project, these stages have been adapted to suit particular needs, resulting in a customized process consisting of the following phases:

1. Choice of the topic: A study was carried out to identify the specific field in which it was desired to work to obtain the most beneficial results.
2. Context analysis: An investigation was carried out to determine the target group, i.e., those users who would benefit from the implementation of the recreational activity.
3. Precedent research: A detailed review of existing information about play activities that have been developed previously was conducted in order to establish a frame of reference and clarify any ambiguous aspects related to the topic.
4. Ideation of the ludic activity: A brainstorming session was developed to determine the topics to be addressed in the play activity, followed by an evaluation of each topic.
5. Development of the playful activity: At this stage, the selected topics were deepened, and the structure of the playful activity was established.
6. Validation of the recreational activity: Students were evaluated to gather feedback on the design and other aspects of the play activity.

RESULTS

Phase 1. Choice of topic

A rigorous evaluation of the potential areas for the implementation of the ludic activity was carried out, taking into account three criteria: (1) the challenges faced by advanced students in addressing specific topics in their professional subjects; (2) a total of four meetings with Industrial Engineering students from a University in Santander, Colombia, where the topics they would like to see included in the playful activity were identified; and (3) an analysis of the playful activities already available at the Educational Innovation Laboratory GALEA of the Industrial University of Santander, to detect the areas that required an additional playful activity. Based on these criteria, it was concluded that designing a play activity focused on emotional intelligence was essential.

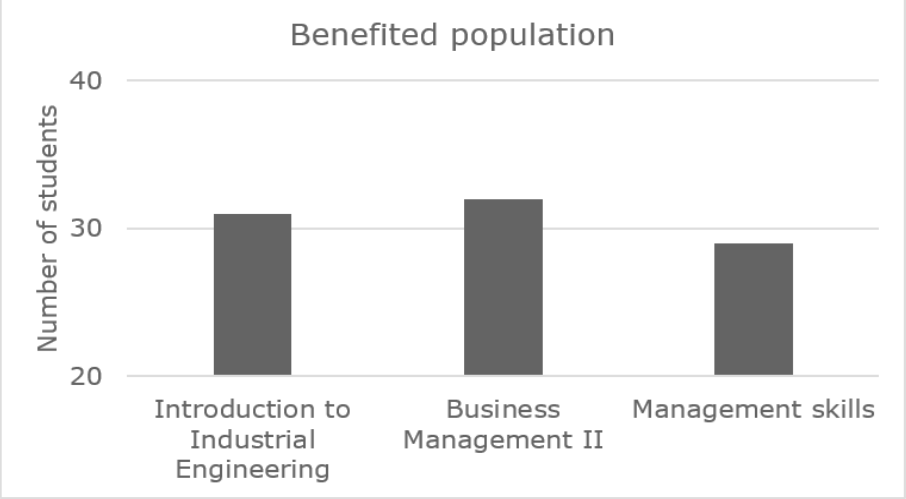
Phase 2. Context analysis

The target group for developing the ludic activity was specified in this phase. A detailed review of the School of Industrial and Business Studies (EEIE) curriculum was carried out to identify subjects that incorporate topics linked to emotional intelligence in their educational programs, such as Introduction to Industrial Engineering, Business Management II, and Managerial Skills. Figure 1 shows the average number of students enrolled in each subject. The final goal is to apply the ludic activity to 30 Industrial Engineering students.

Phase 3. Background research

A literature review of works associated with emotional intelligence and exploration within the collection of ludic activities and gamified exercises provided by the Educational Innovation Laboratory of the Universidad Industrial de Santander, GALEA, was carried out, where the absence of ludic activities in this field was demonstrated. However, previous research on playful activities linked to emotional intelligence was discovered, as shown in *table 1*.

Figure 1.
Student population



Source: own elaboration.

Table 1.
Background related to the study.

Activity or recreational	Description	Developer(s)	Institution
"I resolve my conflicts intelligently." (Bravo et al., 2021)	The objective of the playful activity is to sensitize students to the importance of harmonious coexistence and assertive conflict resolution, strengthening emotional intelligence and promoting peaceful attitudes in the classroom, the educational community, and the social environment. The activity structure includes listening, movement, and affective expression exercises, followed by interaction dynamics and group reflection on empathy. Through this route, we seek to create awareness and develop social skills, generating an environment conducive to peace and harmony.	Elvia Polimnia Bravo Terán, Martiniano Pacho Yucue, Filomena Angulo obando.	Los Libertadores University Foundation, Bogotá, D.C.
" Gamification of Electronic Negotation Training: Effects on Motivation, Behaviour and Learning". (Schmid & Schoop, 2022)	The research was conducted for five days, during which the participants carried out international negotiations in bilateral scenarios; the results of these negotiations were not studied, but the system used during the negotiations; the students of courses 1 and 2 were assigned to the gamification training group (g-training), and the students of courses 3 and 4 were assigned to the control group, where the training was conventional (c-training). In the end, a multiple-choice learning quiz was performed, and it was concluded that those in the gamification training showed positive results where motivation, improved engagement, and a better learning outcome were evidenced, as well as positive results in acquiring e-negotiation skills.	Andreas Schmid, Mareike Schoop.	University of Hohenheim, Stuttgart, Alemania.

Source: own elaboration.

Phase 4. Ideation of the recreational activity

Four meetings were held with three GALEA Lab students to organize a brainstorming session to gather suggestions for developing a play activity. The main objective was to detect topics of interest and appropriate tools for planning and executing the activity. The purpose of the brainstorming session was to establish an environment to suggest innovative and creative ideas to encourage exchange and cooperation to enhance imagination and divergent thinking.

All proposals made by team members were recorded on a digital board to facilitate the visualization of all options and prevent duplication. After gathering an adequate number of ideas, grouping and choosing based on the most relevant aspects, such as the activities and dynamics to be implemented, was initiated. This procedure was repeated in future virtual and face-to-face meetings, resulting in substantial progress that boosted the development of the new play activity.

Phase 5. Development of the recreational activity

At this point, the creation of the first model of the recreational activity began. The proposals were compiled in a single file that included a detailed explanation of the dynamics, a list of the materials required, a design for the appropriate layout of the spaces, time allotted for each phase of the activity, and a projection of the number of participants required. This file was a reference for planning and carrying out the recreational activity. The activity is designed to be carried out in a classroom, with an average duration of one hour and twenty minutes; this time may vary depending on the participants' responses to what was proposed during the activity.

Goals. The identification by the participants of the elements of emotional intelligence, such as self-knowledge, self-management, social skills, and knowledge, allows for the strengthening and development of these elements. In addition, generating awareness of the importance of these aspects both in the personal and professional spheres.

Criteria or rules

1. Once the groups have been formed, no member may make a change to another team.
2. The evaluation mechanism is quantified using points established by the station based on the performance in each proposed activity according to the criteria of the assistant in charge.
3. The team that fails to complete the activity in the estimated time will not obtain a point.
4. The team with the most points will be the winner.

Plan. First, the moderators will welcome the participants through a creative activation activity. Then, they will explain each round's methodology, rules, and objectives; at the end of the introduction, they will give way to creating teams and assigning roles and badges.

The first round is entitled "Making Nonsense". In this round, one team member will assume the role of Master Builder and guide the others, who will act as Operators, in assembling a model with Lego tiles. The Operators will use implements such as bandages, earplugs, and even being unable to speak to simulate the lack of their senses (sight, hearing, or speech). The team that finishes first will get a point. The prototypes to be built are Product 1 front view (Figure 2), Product 1 side view (Figure 3), Product 2 (Figure 4), and Product 3 (Figure 5).

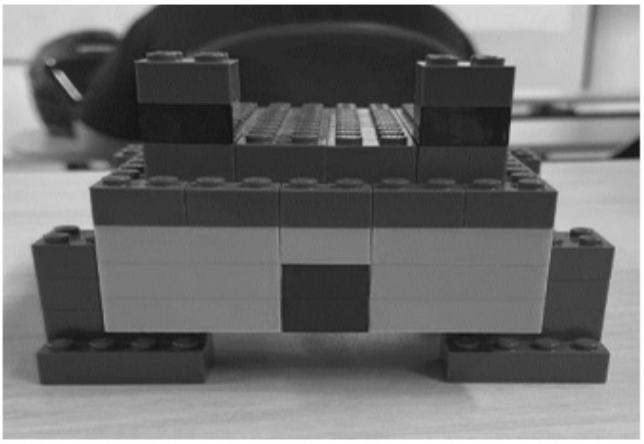
The second round will take place with the activity “Solve the case,” where one member of each team, who will be the narrator, will have to read six work cases that pose conflictive situations. The other members, whose role will be the worker, will have four minutes to respond to each case from a passive, aggressive, and assertive point of view. The team that responds best in the stipulated time will win a point.

Finally, the “ABCmotions” activity, which is the last round, will be developed. In this round, one member from each team will assume the role of representative and have the task of writing an emotion whose initial letter will be chosen randomly by the moderator. The objective is to be the first to write the word legibly and without errors and thus obtain a point for the group he or she represents. To conclude the activity, the moderators will choose the winner according to the number of points and then give feedback on the skills acquired or strengthened in each activity, emphasizing their usefulness and importance in both professional and personal life.

Input resources. For the correct development of the game, approximately 77 green 8-pin legos, 16 green 4-pin legos, 13 red 8-pin legos, two red 4-pin legos, four white 8-pin legos, two black 4-pin legos, four blue 4-pin legos,

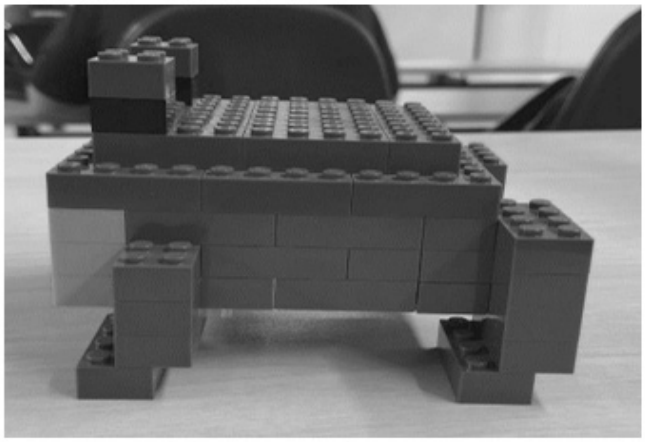
four blue 8-pin legos, eight blindfolds, Master Builder forms, ABCmotions forms (supplied by the authors), Solve the Case forms (supplied by the authors), a video Beam, 30 chairs and five tables.

Figure 2.
Prototype Product 1 front view



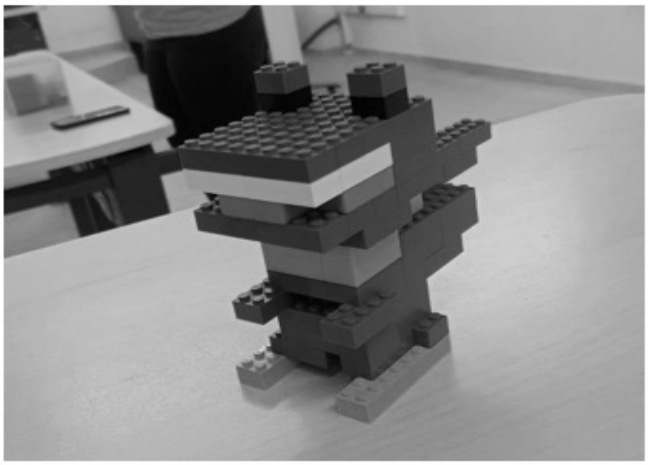
Source: own elaboration.

Figure 3.
Prototype Product 1 side view



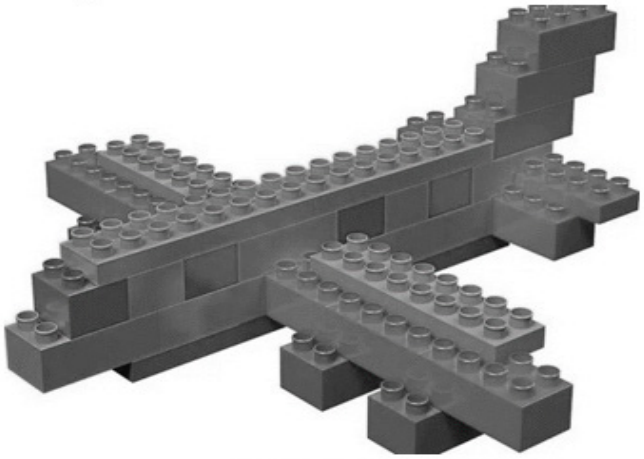
Source: own elaboration.

Figure 4.
Prototype Product 2



Source: own elaboration.

Figure 5.
Prototype Product 3



Source: own elaboration.

CONCLUSIONS

Gamification and game-based learning have proven practical tools to increase student motivation and engagement, thus improving learning outcomes. The design of a gamified activity focused on player types and emotional intelligence proved to be an innovative strategy to teach complex concepts in an engaging and participative way. This study provided a detailed overview of a play activity design process, from identifying a relevant topic to creating a prototype activity. It also highlighted the importance of careful selection and analysis of the target audience and the need for a thorough background review and effective ideation for the development of the play activity.

Implementing the designed activity in an honest group of engineering students was essential to validate its effectiveness and collect valuable feedback. This trial and error process is fundamental to improving and adapting the activity to the specific needs of the students and the educational context. However, it is essential to mention that this study represents a starting point and that the proposed play activity can and should be improved and adapted according to the specific needs and characteristics of the students and the educational context. The design of playful activities should be a constantly evolving process based on experimentation, feedback, and adaptation.

In future studies, it would be interesting to explore the impact of gamification on student learning and how the proposed gamified activity can be improved. In addition, it would be relevant to investigate how the lessons learned

in this study can be applied to other contexts and disciplines. Implementing evaluative and validation tests of the designed gamification activity is proposed to improve its initial version.

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