



REVIEW

Application of gamification in work environment

Aplicación de la gamificación en el ambiente laboral

Esteban Rodríguez Torres¹  , Carlos Alberto Gómez Cano² , Verenice Sánchez Castillo³ 

¹Universidad de Ciego de Ávila Máximo Gómez Báez, Ciego de Ávila, Cuba.

²Corporación Unificada Nacional de Educación Superior - CUN. Florencia, Colombia.

³Universidad de la Amazonía. Florencia, Colombia.

Cite as: Rodríguez Torres E, Gómez Cano CA, Sánchez Castillo V. Application of gamification in work environment. Gamification and Augmented Reality. 2024; 2:24. <https://doi.org/10.56294/gr202424>

Submitted: 17-10-2023

Revised: 05-01-2024

Accepted: 26-02-2024

Published: 27-02-2024

Editor: Adrián Alejandro Vitón-Castillo 

ABSTRACT

Introduction: preliminary findings clearly suggest that games and gamified systems have motivational potential for workplaces. The use of gamified systems in work environments could be a positive and innovative solution to address contemporary problems in organizations such as: high levels of stress, reduced social capital, reduced loyalty and rapid changes in workforce demographics. The objective was to characterize the application of gamification in the work context.

Method: a total of 23 articles in Spanish and English, from Science, Scielo and Dialnet, were reviewed; using as keywords: gamification, game, work environment, being more than 50 % of the last five years.

Result: it is considered a technology with a potentially high impact in industries such as retail, media, consumer goods and marketing, manufacturing. Gamification in intra-organizational environments can affect employee attitudes and behaviors, make workplaces more attractive, create opportunities for productive collaboration, improve customer service, build loyalty, and increase productivity.

Conclusions: gamification in the work environment uses game-like experiences to promote organizational and personal performance; It seems to be associated with improvements in motivation, productivity, performance, immediacy and remuneration according to true effort. However, its degree of applicability is still unclear.

Keywords: Gamification; Game; Work Environment.

RESUMEN

Introducción: hallazgos preliminares sugieren claramente que los juegos y los sistemas gamificados tienen potencial motivacional para los lugares de trabajo. El uso de sistemas gamificados en ambientes laborales podría ser una solución positiva e innovadora para abordar problemas contemporáneos en las organizaciones como: altos niveles de estrés, capital social reducido, lealtad reducida y cambios rápidos en la demografía de la fuerza laboral. El objetivo fue caracterizar la aplicación de la gamificación en el contexto laboral.

Método: se revisaron un total de 23 artículos en español e inglés, provenientes de Science, Scielo y Dialnet; utilizando como palabras clave: gamificación, juego, ambiente laboral, siendo más del 50 % de los últimos cinco años.

Resultado: Se considera una tecnología con un impacto potencialmente alto en industrias como el comercio minorista, los medios de comunicación, los bienes de consumo y marketing, manufactura. La gamificación en entornos intraorganizacionales puede afectar las actitudes y comportamientos de los empleados, hace los lugares de trabajo más atractivos, genera oportunidades para colaboración productiva, mejora el servicio al cliente, consolida la lealtad e incrementa la productividad.

Conclusiones: La gamificación en el entorno laboral utiliza experiencias similares al juego para favorecer desempeño organizacional y personal; la misma parece estar asociada a mejoras en cuanto a motivación,

productividad, desempeño, inmediatez y remuneración según verdadero esfuerzo. No obstante, su grado de aplicabilidad aún no está claro.

Palabras clave: Gamificación; Juego; Ambiente Laboral.

INTRODUCTION

Gamification (GM) fosters user experiences through game elements that motivate users to achieve personal goals. GM concepts and techniques are now primarily used to engage and motivate their “players” to behave in a particular way. They have developed a history of successful implementation in the pedagogical context through “serious games”.⁽¹⁾

It is an intentional process in which activities, systems, services, products and organizational structures are transformed in such a way that positive experiences and skills can be achieved as a result of a game.⁽²⁾

GM has been studied in different contexts such as healthcare, education, e-commerce, marketing, and work environments.⁽¹⁾ It is considered a technology with potentially high impact in retail, media, consumer goods and healthcare industries.⁽³⁾

Although detractors argue that GM is simply a gimmick or fad, preliminary findings strongly suggest that gamified games and systems have motivational potential for workplaces.⁽⁴⁾ Workplace GM is described as an approach that aims to make work-related tasks more enjoyable and generate access to information about job performance.⁽²⁾

When it comes to engaging employees, games have a unique power that few other media have. The fact that games can motivate people is a critical component of this model.⁽⁵⁾

Adding game elements to a work context can increase the enjoyment of work-related tasks.

Related tasks. Tasks become more playful, creating pleasure and enjoyment.⁽²⁾ Gamified systems should be aligned with the organization’s existing tasks and objectives. They should have elements that expand the knowledge, skills and abilities of the participants but avoid too high a learning curve that can lead to demotivation.⁽⁴⁾

Using gamified systems in the workplace could be a positive and innovative solution to contemporary organizational problems. These problems include high levels of stress, reduced social capital, reduced loyalty, and rapid changes in workforce demographics.⁽⁶⁾

In light of the above, the present research was conducted to characterize the application of GM in the workplace context.

METHOD

A bibliographic study of original articles and reviews was carried out, for which studies in Spanish and English were considered related to GM in the work environment, using as keywords gamification, game, and work environment from databases such as science, dialnet, and scielo.

In this way, 23 articles were selected, of which more than 50 % are from the last five years. The information of interest was extracted, and the present research was developed after its analysis and arrangement.

DEVELOPMENT

Gamified workplaces can be defined as organizations that use gamification to transform some of their work processes.

GM will transform some of their work processes into a game-like experience for employees by applying selected game design and interaction principles. The long-term goal of a gamified workplace is to increase well-being at the organizational and personal levels.⁽⁶⁾

Using GM as a technology to simulate game characteristics generates the potential to motivate “gamers.” Motivation exists when a person is energized or moved to perform a task or behave in a particular way. Motivation can vary in its level, intensity, or orientation.⁽⁴⁾

Enjoyment at work is defined as a dimension of the flow of experience at work and is influenced by work conditions and experiences.⁽²⁾

Intrinsic motivation occurs when a task is inherently interesting or enjoyable, whereas extrinsic motivation occurs when performing the task to achieve a desirable outcome. Extrinsic motivators, by their nature, are effective only until the desired outcome has been achieved. On the other hand, an intrinsic motivator, such as the inherent interest in an activity, will continue to motivate a worker to work hard indefinitely.⁽⁴⁾

Engaging intrinsic motivation benefits the work environment because these motivators are more stable over time and require less managerial intervention. In contrast, extrinsic motivators require closer scrutiny from management as the affective, motivational content increases over time. This distinction between extrinsic and

intrinsic motivation characterizes the distinction between work and play.⁽⁴⁾

Motivational capacity, a critical outcome of GM implementations, provides information about employees' needs, satisfaction and behaviour.⁽⁷⁾ Thus, the very existence of motivation can result in improved job performance as employees demonstrate greater dedication to achieving their goals and obtaining the rewards associated with gamified activities and objectives.⁽⁸⁾

While it is recognized that the primary purpose of games is entertainment, the basis of any game involves working within a set of rules to achieve a goal; this involves engagement, learning and problem-solving. Consequently, there is much in common between playing a game and performing a work-related task. Perhaps the only difference is that the former is often considered "fun," while the latter is often considered "work," implying that the two are mutually exclusive.⁽⁴⁾

Incentivizing through GM drives employees toward goal achievement and encourages sustained effort, improving overall productivity and organizational performance. In addition, the experiential facets of GM pave the way for more immersive and meaningful work experiences, considering individual preferences and diverse emotional and cognitive outcomes.⁽⁹⁾

While the psychological benefits of GM are broadly valid, the authors believe that assuming that these benefits categorically manifest themselves in the workplace is controversial, especially knowing that there are still no international guidelines or guidelines for using this technology.

Wafa Hammedia,⁽¹⁰⁾ points out that GM should be adopted with care if it can improve work, satisfaction, commitment and job performance. It is advisable to consider the consent of employees to participate in gamified experiences, as it can be counterproductive. Workers may feel stressed about succeeding or not in the challenge proposed through the gamified activity, which may affect their well-being and reduce their overall performance.

Any activity carried out by imposition rather than spontaneously risks being less productive, effective and interesting, knowing that motivation is a complex emotion that governs human interaction.

Despite the increase in theoretical interest around GM, literature support for applying the motivational properties that underpin an individual's desire to play to the work context is somewhat scarce.⁽⁴⁾ In this regard, although GM has been extensively analyzed in the educational context, it is unclear whether the results can be directly translated to employee training and education in the workplace.⁽¹¹⁾

Workplace activities can be made more attractive by introducing elements of fun. A fun environment could be achieved by focusing on a balance between collaboration and competition-oriented activities. Such programs can result in improved morale, productivity, and health behaviours with the long-term result of a healthier partnership between employers and employees. This partnership can result in both individual and organizational benefits.⁽⁶⁾

From an organizational or management perspective, it is posited that GM increases worker productivity. In addition to organizations introducing GM, individual workers use it to manage their daily work.⁽¹²⁾

There are many games applicable to the workplace. Games can be used for recruitment and training purposes, lead generation, recruitment and public relations, selection, training, continuous professional development and skills enhancement of the workforce, planning, performance and review processes.⁽⁶⁾

There are several applications available in the market that seem to be a possible solution for workers to cope with today's intensified work demands by providing them with a platform where they can set goals, structure their progress, focus and concentrate on the job, and get feedback and rewards for their efforts.⁽¹²⁾

The combination of human-computer interaction and GM can majorly impact engagement, loyalty and productivity at work.⁽⁶⁾

Impact on the work environment

GM is generally used where long-term commitment and perseverance are required to achieve desired goals. When motivating employees, the basic thing to consider is to identify the desired behaviour and focus on strengthening that behaviour using appropriate GM methods. It is important to reward exactly what is desired; GM should not be used if this is not possible.⁽¹³⁾

Identify which area of the company you intend to impact. Try to focus on one area at a time and focus efforts. Determine which employee behaviours to modify, reinforce or eliminate. Keep in mind the objectives when reorienting processes. Seek the greatest possible user loyalty to the game so that they remain with it until the planned process is fulfilled. Fun activities that encourage permanence and motivation. The sales area is one of the preferred areas for developing GM strategies.⁽¹⁴⁾

Another important factor is that the elements that make up the GM context should be as related as possible to the work environment and equally interesting for all participants (regardless of gender, age, etc.). In addition, the use of GM should be voluntary whenever possible. For it to have the desired effect, it is also important that its application does not result solely from a desire to increase productivity or control employees.⁽¹³⁾

In the case of education, the authors promote the personalized character that GM must have to be effective,

and they consider that its application at work should be similar. Each individual receives different experiences and perceptions of daily tasks. This would make working GM a more appropriate, acceptable and popular strategy.

Florin Opreșcu,⁽⁶⁾ believes that gamified systems could transform work-related processes on multiple levels, including developing a research-oriented culture. Gamified workplaces could enable researchers, managers, and employees to collaborate to understand better the changes needed in their work.

GM can improve the affective experience of workers by stimulating the hedonic system.⁽¹²⁾ Hypothesized benefits include more attractive workplaces and additional opportunities for productive collaboration, increased motivation, and personalization of the workplace for greater personal control.⁽⁶⁾

GM in intraorganizational settings can affect employee attitudes and behaviours. Effective pathways promote employee enjoyment, and informational pathways increase performance information's visibility, comparability, and immediacy.⁽¹¹⁾

Gerdenitsh,⁽¹²⁾ states that, in particular, workers who use GM for specific tasks will enjoy themselves during the task and have greater job-related enjoyment in general. Employees who are more productive when completing a gamified task will also experience greater work productivity when using GM for many tasks.

GM allows organizations to reward their developers for every aspect of their activities, every task completed, and every unit test written. GM mechanics represent a way to reward team members and make work more fun.⁽¹⁵⁾

The authors see GM as an advantage for evaluating and rewarding work with a high percentage of certainty about the effort and time spent. The advantages of monitoring and computing are among its major benefits. To deny computerization is to deny current technological development itself.

From a theoretical point of view, GM increases the visibility, comparability and immediacy of performance information, providing users with feedback on their performance. Visibility can be conveyed, for example, through badges earned or point counts. Users receive clear feedback on how they are doing, indicating what needs to be improved. Performance information also enables comparability both with oneself and with others. Immediacy means that users get real-time or more timely access to performance information.⁽¹²⁾

The authors describe points, badges, leaderboards, levels, progress bars, avatars, and missions as design elements to foster engagement in the organizational context.⁽¹²⁾

GM can be used to leverage employee motivation through a series of achievements, badges, a hall of fame, and leaderboards (leaderboard and hall of fame are terms that show how employees rank in comparison to others based on certain criteria that can be points, a ranking, or several badges acquired), which stimulate enjoyment and challenges in day-to-day work with the ultimate goal of increasing employee satisfaction and engagement.⁽¹⁶⁾

Achievement-based rewards could also help build employee relationships and greater loyalty to the company if employees perceive gamified systems and programs as wellness-oriented benefits.⁽⁶⁾

Although the literature recommends methods such as the above when applying work GM, the authors disagree on its application, as variables such as anxiety and stress caused by competitive activities and generational inclusion due to the high computerization of gamified processes should be assessed.

Uddin et al. considers that gamified systems can increase productivity, stimulate positive rivalry and cultivate a sense of achievement, resulting in higher job satisfaction and overall performance. In addition, this methodology can provide a meaningful structure for evaluating and improving performance, which is essential to achieving continuous progress.

Just as games encourage users to progress through various levels, gamified work processes can encourage users to progress through increasingly difficult tasks.⁽⁶⁾ Games could improve employee engagement, resulting in employees exceeding job requirements, becoming organizational citizens, and increasing job satisfaction.⁽¹⁷⁾ This would happen under ideal conditions of gamified environments.

GM, which promotes cooperation, may be more effective than that which emphasizes competition. Some may experience GM intending to motivate one-on-one competition as unattractive and demotivating, presenting the subsequent risk of reduced performance and participation. When competition is emphasized, localized, team-based competitions that unite players against a common opponent are likely more effective, as working within a team generates healthy competition and social connection among the workgroup.⁽⁴⁾

The available literature on the subject needs to be more sufficient to state with absolute certainty the effects of GM on productivity, motivation, and work performance; however, to deny its impact on them outright would be a mistake. The evaluation of its influence with studies of methodological strength would help to even out opinions in the international community.

Elements of game mechanics and dynamics can satisfy employee needs: the need to work with other people, the need to communicate with other people, the need for competence and evaluation of the individual for the individual's merits and achievements; feedback, self-realization, the need to grow as a personality, the need to feel that work is interesting and useful to society, and the need to meet complex objectives and achieve

them.⁽¹⁷⁾

GM is not effective per se, but the specific elements of the game design influence the player's psychological state.

The game influences the psychological state and motivation of the user. The effects of GM in organizations ultimately depend on whether employees are motivated to use it and whether it enhances their positive attitudes toward their work. If workers experience more satisfaction and engagement in their work as a result of GM, this will also be more likely to benefit organizations.⁽¹⁶⁾

Cornelia Gerdenitsch,⁽¹²⁾ in her study on the effect of GM on enjoyment and productivity, applied an online survey to 114 employees, finding that the Participants used work GM to organize and self-monitor effectively.

Hosseini Changiz,⁽¹⁸⁾ in her study on the effects of GM on job performance, found that it increased work quality in task performance and subsequent deliverables over time. In addition, GM positively impacted punctuality.

Rivers,⁽¹⁷⁾ after empirically investigating advertising agencies, found that organizations that used games in their activities enjoyed significantly higher employee engagement and positive consequences: lower turnover and greater organizational citizenship.

GM also offers opportunities to engage employees in the Fourth Industrial Revolution (Industry 4.0). It aims to attract people to explore sustainable manufacturing concepts and promote sustainably produced products. As Industry 4.0 seeks to develop more sustainable processes, there is interest in spreading the idea of sustainability through GM in Industry 4.0.⁽⁹⁾

Typical objectives achieved through GM in the workplace include improving customer service, strengthening brand loyalty, and improving the performance of students, employees, and partners.⁽¹⁶⁾

GM can bring new ways to improve job performance, work attitude, social relationships, and onboarding and training processes. Such a resource is too promising to be ignored by companies.⁽¹⁹⁾ Hence, its application to the work environment has recently gained popularity.

Some applications

GM in software development has several advantages due to factors such as reward mechanisms. Thus, unpleasant tasks for the development team, such as writing unit tests and easy maintenance, are stimulated with rewards and joy obtained with GM.⁽¹⁵⁾

The application of GM in software engineering activities not only improves the team's motivation and commitment to its activities but also improves product quality and project performance results.⁽¹⁵⁾ Activities with a high percentage of computerization, if not total computerization, will always benefit from this technology due to their aetiology.

Korn and Schmidt,⁽²⁰⁾ describe that GM has yet to be extended to industrial production as surprising. Many processes in this area generate physical outputs, which are measured and transferred to business intelligence systems. Therefore, game elements such as progress visualization, scores, and leaderboards could be implemented with little effort, and their use seems natural.

The same authors argue that implementing GM in production must meet specific requirements. Unlike games or computer-based office work, the user's default target in production work is not the software but the physical product and various machines and tools. This creates a dilemma: GM elements can distract the user from the main focus of work. For this reason, the visualization of the GM should be simple, avoiding, for example, moving elements.⁽²⁰⁾

In the authors' opinion, the extension of GM in industrial processes is seen as its main disadvantage in the high cost of technological facilities to be applied to the industry, the qualification needs of the personnel, and its risks.

GM in project management is usually aimed at motivating the team to perform tasks more efficiently. One of the most important motivators for project team members is the belief that what they are doing is necessary and the feeling of progress in achieving subsequent objectives.⁽¹³⁾

Research indicates that game-based workshops develop an environment relevant to GM at the forefront of corporate strategy, entrepreneurship and innovation management.⁽⁹⁾

Jessica Ulmer,⁽²¹⁾ proposes GM in the area of manufacturing having as objectives: increasing motivation and satisfaction, supporting work-integrated learning by adopting the workplace at the level of individual knowledge, enabling skill-based task assignment, increasing employee flexibility by using customized attendance systems, increasing efficiency by providing the right amount of supporting information.

Konstantina Georgiou,⁽²²⁾ suggests the use of GM environments for employee selection, arguing that traditional methods make the data inferential, being influenced by the situation, personal stress, etc., while using gamified environments could divert the applicants' attention from the fact that they are being evaluated, thus showing their true behaviours. As a result, falsification bias and social desirability are reduced.

To achieve similar positive effects, several companies (e.g., Cisco, Deloitte, and IKEA) have also included GM in their human resources (HR) processes, including recruitment, training, and human resource management

systems.⁽¹⁶⁾

Although GM of business processes beyond marketing is still a relatively new development, there are areas of more intensive use: the service industry, especially call centres, human resources and recruiting, and finally, the industrial production area.⁽²³⁾

GM can be a catalyst for incremental and radical changes in business models and strategies. Adopting gamified techniques, such as the cost-effective design of badges for participation in social networks, demonstrates how even seemingly simple gamified incentives can profoundly impact digital marketing outcomes.⁽⁹⁾

In contrast

Despite the growing hype and excitement around GM principles for organizations and consumers, studies have identified several problems associated with their effects. For example, players interacting with a gamified system that constitutes a single, isolated task generally experience little or no increase in intrinsic motivation and only marginal performance improvement. In addition, several of the cases described, especially in the intra-organizational context, found that the benefits of GM were often short-lived, except for a small number of competitively inclined employees.⁽⁴⁾

One problem is that imposing “play” on employees runs counter to the spontaneity and self-determination that underpin play, as management decides what game dynamics employees will perceive as fun and introduces them, usually without employee consent. Participating in a game for extrinsic reasons, such as job retention or wage security, is less likely to result in productivity gains than outcomes derived from intrinsic motivation.⁽⁴⁾

More valid studies in the literature that characterize workers’ opinions and positions on gamified experiences at work need to be conducted to clarify their true impact without fear of speculation.

Apart from the obvious ethical implications of their misuse, there are structural and even philosophical issues. Concern has recently arisen that replacing intrinsic rewards with explicit ones may reduce work motivation in the long run. It is argued that GM may trivialize serious issues, reinforce the wrong mindset, and taint motivation.⁽²⁰⁾

Recent studies suggest that differences in the perceived legitimacy of games and employee perceptions of the role of GM itself play a role in determining the effectiveness of gamified systems.⁽⁴⁾

The main limitations of the present study are its bibliographic nature, that only bibliographies in 2 languages were assessed, and that all the necessary bibliography was used without discarding studies based on their methodological validity.

CONCLUSIONS

Gamification in the work environment uses game-like experiences to promote organizational and personal performance; it is associated with improvements in motivation, productivity, performance, immediacy and remuneration according to real effort. However, its degree of applicability is still unclear.

REFERENCES

1. Wolf T, Weiger WH, Hammerschmidt M. Experiences that matter? The motivational experiences and business outcomes of gamified services. *Journal of Business Research* 2020;106:353-64. <https://doi.org/10.1016/j.jbusres.2018.12.058>.

2. Cornellá P, Estebanell M, Brusi D. Gamificación y aprendizaje basado en juegos. Consideraciones generales y algunos ejemplos para la Enseñanza de la Geología. *Enseñanza de Las Ciencias de La Tierra* 2020;28:5-19.

3. Wunderlich NV, Gustafsson A, Hamari J, Parvinen P, Haff A. The great game of business: Advancing knowledge on gamification in business contexts. *Journal of Business Research* 2020;106:273-6. <https://doi.org/10.1016/j.jbusres.2019.10.062>.

4. Perryer C, Celestine NA, Scott-Ladd B, Leighton C. Enhancing workplace motivation through gamification: Transferrable lessons from pedagogy. *The International Journal of Management Education* 2016;14:327-35. <https://doi.org/10.1016/j.ijme.2016.07.001>.

5. Hamza I, Khodor S, Tóvölgyi S. The Effect of Gamification on Employee Behavior: The Mediating Effects of Culture and Engagement. *Journal of Asian Finance Economics and Business* 2022;9:213-0224. <https://doi.org/10.13106/jafeb.2022.vol9.no5.0213>.

6. Oprescu F, Jones C, Katsikitis M. I PLAY AT WORK—ten principles for transforming work processes through gamification. *Frontiers in Psychology* 2014;5.

7. Kumar Singh H, Verma S. Gamification at Workplace: Theories, constructs and conceptual framework. vol. 24, AIS Electronic Library; 2020.
8. Uddin A, Das D. The Power of Gamification in Employee Performance Management. *Open Journal of Business and Management* 2023;11:3452-70. <https://doi.org/10.4236/ojbm.2023.116188>.
9. Sharma W, Lim WM, Kumar S, Verma A, Kumra R. Game on! A state-of-the-art overview of doing business with gamification. *Technological Forecasting and Social Change* 2024;198:122988. <https://doi.org/10.1016/j.techfore.2023.122988>.
10. Hammedi W, Leclercq T, Poncin I, Alkire (Née Nasr) L. Uncovering the dark side of gamification at work: Impacts on engagement and well-being. *Journal of Business Research* 2021;122:256-69. <https://doi.org/10.1016/j.jbusres.2020.08.032>.
11. Bitrián P, Buil I, Catalán S, Hatfield S. The use of gamification strategies to enhance employees' attitudes towards e-training systems. *The International Journal of Management Education* 2023;21:100892. <https://doi.org/10.1016/j.ijme.2023.100892>.
12. Gerdenitsch C, Sellitsch D, Besser M, Burger S, Stegmann C, Tscheligi M, et al. Work gamification: Effects on enjoyment, productivity and the role of leadership. *Electronic Commerce Research and Applications* 2020;43:100994. <https://doi.org/10.1016/j.elerap.2020.100994>.
13. Muszyńska K. Gamification of communication and documentation processes in project teams. *Procedia Computer Science* 2020;176:3645-53. <https://doi.org/10.1016/j.procs.2020.09.022>.
14. Riquelme Benítez CR. Gamificación empresarial como herramienta dinámica de motivación y logro de objetivo. *Revista Científica En Ciencias Sociales* 2023;5:87-91.
15. Porto D de P, Jesus GM de, Ferrari FC, Fabbri SCPF. Initiatives and challenges of using gamification in software engineering: A Systematic Mapping. *Journal of Systems and Software* 2021;173:110870. <https://doi.org/10.1016/j.jss.2020.110870>.
16. Silic M, Marzi G, Caputo A, Bal PM. The effects of a gamified human resource management system on job satisfaction and engagement. *Human Resource Management Journal* 2020;30:260-77. <https://doi.org/10.1111/1748-8583.12272>.
17. Girdauskiene L, Ausrine Ciplyte E, Navickas V. Gamification as an innovative instrument for employee engagement. *Marketing and Management of Innovations* 2022:10-7.
18. Hosseini C, Humlung O, Fagerstrøm A, Haddara M. An experimental study on the effects of gamification on task performance. *Procedia Computer Science* 2022;196:999-1006. <https://doi.org/10.1016/j.procs.2021.12.102>.
19. Almeida Gil B. How gamification influences employees to be more productive: a meta-analysis. Master's degree in Information Management. Universidade Nova de Lisboa, 2023.
20. Korn O, Schmidt A. Gamification of Business Processes: Re-designing Work in Production and Service Industry. *Procedia Manufacturing* 2015;3:3424-31. <https://doi.org/10.1016/j.promfg.2015.07.616>.
21. Ulmer J, Braun S, Cheng C-T, Doweiy S, Wollert J. Usage of digital twins for gamification applications in manufacturing. *Procedia CIRP* 2022;107:675-80. <https://doi.org/10.1016/j.procir.2022.05.044>.
22. Georgiou K, Gouras A, Nikolaou I. Gamification in employee selection: The development of a gamified assessment. *International Journal of Selection and Assessment* 2019;27:91-103. <https://doi.org/10.1111/ijjsa.12240>.
23. Caserman P, Baumgartner KA, Göbel S, Korn O. A best practice for gamification in large companies: An extensive study focusing inter-generational acceptance. *Multimedia Tools and Applications* 2023. <https://doi.org/10.1007/s11042-023-16877-7>.

FINANCING

The authors did not receive funding for the development of this research.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

AUTHORSHIP CONTRIBUTION

Conceptualization: Esteban Rodríguez Torres, Carlos Alberto Gómez Cano, Verenice Sánchez Castillo.

Data curation: Esteban Rodríguez Torres, Carlos Alberto Gómez Cano, Verenice Sánchez Castillo.

Formal analysis: Esteban Rodríguez Torres, Carlos Alberto Gómez Cano, Verenice Sánchez Castillo.

Acquisition of funds: Esteban Rodríguez Torres, Carlos Alberto Gómez Cano, Verenice Sánchez Castillo.

Research: Esteban Rodríguez Torres, Carlos Alberto Gómez Cano, Verenice Sánchez Castillo.

Methodology: Esteban Rodríguez Torres, Carlos Alberto Gómez Cano, Verenice Sánchez Castillo.

Project administration: Esteban Rodríguez Torres, Carlos Alberto Gómez Cano, Verenice Sánchez Castillo.

Resources: Esteban Rodríguez Torres, Carlos Alberto Gómez Cano, Verenice Sánchez Castillo.

Software: Esteban Rodríguez Torres, Carlos Alberto Gómez Cano, Verenice Sánchez Castillo.

Supervision: Esteban Rodríguez Torres, Carlos Alberto Gómez Cano, Verenice Sánchez Castillo.

Validation: Esteban Rodríguez Torres, Carlos Alberto Gómez Cano, Verenice Sánchez Castillo.

Visualization: Esteban Rodríguez Torres, Carlos Alberto Gómez Cano, Verenice Sánchez Castillo.

Drafting - original draft: Esteban Rodríguez Torres, Carlos Alberto Gómez Cano, Verenice Sánchez Castillo.

Writing - proofreading and editing: Esteban Rodríguez Torres, Carlos Alberto Gómez Cano, Verenice Sánchez Castillo.