Playful methodologies for evaluation in higher education: a systematic review

Metodologías lúdicas para la evaluación en educación superior: una revisión sistemática

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ABSTRACT

Traditional assessment methods often fail to comprehensively capture students' skills, prompting a shift toward more dynamic approaches. In this context, playful methodologies are gaining increasing prominence. This study aims to analyze the impact of these methodologies on university educational assessment. To this end, a systematic review was conducted following PRISMA guidelines. The search was performed in four databases (Scopus, Web of Science, PubMed, and Dialnet Plus), identifying experimental and quasi-experimental studies that applied playful methodologies in higher education assessments. The results highlighted game-based learning as the most used methodology, followed by escape rooms and gamification. These methodologies significantly improved student participation, motivation, and performance, providing more dynamic and comprehensive assessments of their competencies. The findings suggest that integrating playful methodologies into university assessments enhances educational outcomes by making the evaluation process more engaging and effective. This shift in assessment strategies allows for a deeper understanding of students' competencies, although further research is needed to optimize their implementation in different educational contexts.

RESUMEN

Los métodos de evaluación tradicionales a menudo no logran capturar de manera integral las habilidades del alumnado, lo que ha impulsado enfoques más dinámicos. En este contexto, las metodologías lúdicas están ganando cada vez más protagonismo. Este estudio tiene como objetivo analizar el impacto de estas metodologías en la evaluación educativa universitaria. Para ello, se llevó a cabo una revisión sistemática siguiendo las directrices PRISMA. La búsqueda se realizó en cuatro bases de datos (Scopus, Web of Science, Pubmed y Dialnet Plus), identificando estudios experimentales y cuasi-experimentales enfocados en la aplicación de metodologías lúdicas en las evaluaciones de educación superior. Los resultados destacaron el aprendizaje basado en juego como la metodología más utilizada, seguida de los escape rooms y la gamificación. Estas metodologías demostraron mejorar significativamente la participación, la motivación y el rendimiento estudiantil, proporcionando evaluaciones más dinámicas y completas de sus competencias. Los hallazgos sugieren que la integración de metodologías lúdicas en las evaluaciones universitarias potencia los resultados educativos al hacer el proceso de evaluación más atractivo y efectivo. Este cambio en las estrategias de evaluación permite una comprensión más profunda de las competencias del alumnado, aunque se requiere más investigación para optimizar su implementación en diferentes contextos educativos.

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1. INTRODUCTION

Educational assessment in universities is essential to ensure the quality of learning and the holistic development of students. It allows educators to measure academic progress, identify areas for improvement, and adjust pedagogical strategies to optimize student performance (Sambell, 2012). Assessment methods focusing exclusively on recognition or memorization exams have been criticized for lacking effectiveness and equity for all students (Sofyan et al., 2023). These approaches need to account for the diversity of skills and learning styles present among students, potentially leading to unfair and unrepresentative evaluations of students' capabilities(Tierney, 2022). Therefore, an approach is pursued to assess students' practical skills and competencies and their ability to solve problems and apply knowledge in real-world situations (Shraga-Roitman et al., 2023).

More open and formative assessment systems offer several benefits for students and educators. They allow students to demonstrate their understanding more comprehensively and accurately, focusing on critical thinking, problem-solving, and creativity rather than mere fact recall. This provides an opportunity to apply knowledge in practical and relevant ways, which can increase motivation and engagement in learning (Akbari et al., 2022). Searle and Poth (2021) add that more open assessment systems also provide educators with a complete view of students' progress and needs. By observing how students apply knowledge in real-world situations, educators can identify strengths and areas for improvement and adapt their teaching accordingly. This allows for more precise and personalized feedback and creates more meaningful and compelling learning experiences for all students.

Implementing playful methodologies such as escape rooms, gamification, game-based learning (GBL), or serious games as an assessment measure offers an innovative and effective solution for evaluating students' competencies in realistic situations and under time pressure (Santos-Villalba et al., 2020). This approach can provide an immersive and exciting learning experience beyond traditional recognition or memorization exams (Manzano-León et al., 2021).

Playful methodologies allow students to face challenges and problems that simulate real-world situations, enabling them to demonstrate their understanding and application of knowledge in authentic contexts. Puzzle-solving, teamwork, and quick decision-making are critical skills tested in this environment, reflecting the demands of the workplace and everyday life (Rodriguez-Ferrer et al., 2022). Additionally, these methodologies introduce the time factor, adding an element of tension and urgency, requiring students to think quickly and effectively while working towards a solution. This temporal pressure replicates stressful situations that students may encounter in professional scenarios, preparing them to manage time effectively and remain calm under pressure (Molina-Torres et al., 2021).

Furthermore, applying playful methodologies online is even more relevant in an increasingly digitalized society where remote work and digital tools are becoming more common and necessary in the professional field (Dinu et al., 2021). Students develop problem-solving and teamwork skills by adapting playful methodologies to the virtual environment and gain experience using digital technologies and online communication tools.

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Assessment within the e-learning environment has emerged as a crucial component to ensure the effectiveness and success of online learning (Al-Fraihat et al., 2020). Assessment becomes even more critical in a digital context, where face-to-face interaction is limited, and access to educational resources is predominantly virtual. Adapting traditional assessment methods to the online environment and developing new assessment strategies designed explicitly for e-learning are fundamental aspects to consider. E-learning assessment measures acquired knowledge and evaluates practical skills, digital competencies, and students' ability to apply learning in virtual and real-world environments (Lee & Lee, 2008).

Several studies indicate that gamification in higher education can significantly enhance student engagement, motivation, and academic performance, especially when applied thoughtfully and with well-designed game elements (Fitria, 2023). However, this study aims to provide new insights from the systematic review, allowing for more general and in-depth conclusions about applying playful methodologies as assessment tools in universities.

Specifically, this research aims to deepen the recent literature on applying online playful methodologies as tools for assessing university students. The research questions of this study are:

1. What is the most commonly employed playful methodology in university evaluation?

2. What are the most frequently used game elements in evaluation?

3. What types of university evaluations are most often mediated by playful strategies?

4. What are the most utilized technological tools in university evaluations mediated by playful strategies?

2. METHODS

The search process adhered to the guidelines outlined in the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) statement (Liberati et al., 2009). The systematic literature review was conducted in May 2024. The objective of this review was to gather all available evidence according to the pre-agreed and designed readability criteria to respond to the previously stated objectives.

2.1. Databases

The databases consulted were Web of Science, Scopus, Dialnet Plus, and PubMed, with a date restriction from 2020 to 2024. The search equation used was in English: ("Gamifica*" OR "Game-Based Learning" OR "Escape Rooms" OR "Serious Games") AND ("Higher Education" OR "University") AND ("Evaluation" OR "Assessment" OR "Formative Evaluation" OR "Authentic Evaluation" OR "Competency-based Assessment" OR "Inclusive Evaluation"). Additionally, restrictions included only peer-reviewed scientific articles published in Spanish or English.

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2.2. Inclusion Criteria

The following inclusion criteria were developed for the selection of articles:
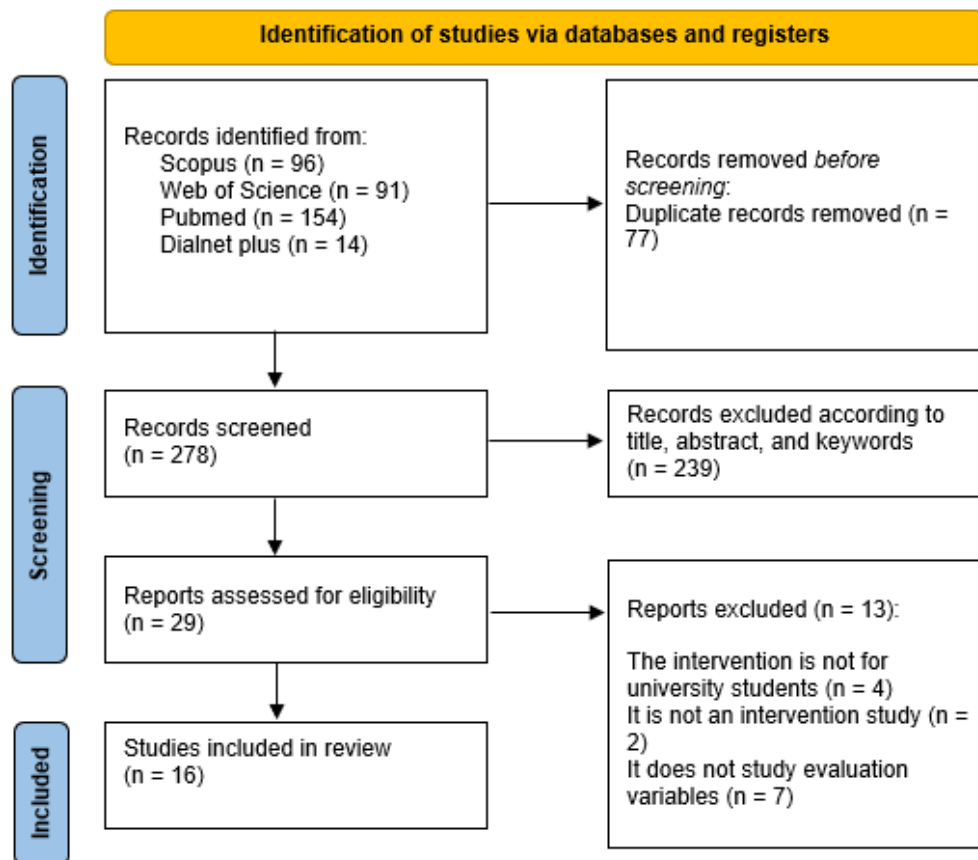
a) Language: Only articles in English or Spanish were accepted.

b) Format: Only articles from peer-reviewed specialized scientific journals were accepted. Articles published on non-specialized websites, blogs, or digital newspapers, as well as books and book chapters, among others, were excluded. Articles not meeting editorial quality and peer-review standards were also not considered.

c) Target Population: The target population was limited to university students, including undergraduate and master's students. However, students from other educational stages, such as high school or postgraduate students, were excluded.

d) Type of Research: Only quasi-experimental or experimental studies were accepted. Theoretical, reflective, or review articles were excluded as they did not meet the review objectives. Studies that did not specify their sample, resources, and/or game elements used were also excluded.

e) Study Topic: Only studies investigating gamification, game-based learning (GBL), escape rooms, or serious games used to measure academic performance or as evaluation tools were accepted. Studies that did not focus on these topics or did not have a clear research focus were excluded.

f) Research Questions: To adequately address the formulated research questions, experimental studies that did not specify their sample, resources, and/or game elements used were also excluded.

2.3. Selection and Data Extraction

To operationalize this review, the Rayyan tool (https://www.rayyan.ai/) was used. Rayyan is specifically designed to conduct systematic reviews, allowing for the integration of data exported from databases and the use of artificial intelligence to compare articles and identify duplicate manuscripts for exclusion. Additionally, this tool enables researchers to discard or accept articles by reading the titles and abstracts of the manuscripts. The included articles were subsequently subjected to full-text reading, allowing for the refinement of the finally included in this systematic review. This entire process is summarized in the flow diagram represented in Figure 1.

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Figure 1

Flow diagram of study search

3. RESULTS

After selecting manuscripts based on the inclusion criteria, 16 were accepted and reported in Table 1.

Table 1

Description of selected studies

Authorship	Intervention time	Playful Methodology	Gameplay Elements	Type of assessment	Platform	Size		
						+	=	-
(Barcena-Toyos, 2022)	One semester	Gamification	Challenges, Badges, and Points	It continues through gamified activities that replace traditional multiple-choice tests at the end of each unit.	Genially, Powtoon, Educaplay y Learningapps	X		

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Authorship	Intervention time	Playful Methodology	Gameplay Elements	Type of assessment	Platform	Size + = -
(Campillo-Ferrer et al., 2020)	One semester, weekly sessions	GBL (Kahoot!)	Competition and rankings	Formative assessment through questionnaires	Kahoot	X
(Cash et al., 2023)	Three consecutive semesters	Escape room	Puzzles	Formative assessment (escape room testing)	Web and zoom	X
(Dæhli et al., 2021)	Four academic years	Gamification	Points, Levels & Ranking	Formative assessment	LearnER (ad hoc designed platform)	X
(Japón et al., 2022)	One academic year	Gamification	Rewards, points, challenges, and goals	Formative assessment through questionnaires	Kahoot, Genially, Word Wall y Quizizz	X
(Jones & Sturrock, 2022)	One academic year	Gamification	Badges, ranking, and levels.	Continuous formative assessment	University Virtual Learning Environment	X
(Kohnke & Moorhouse, 2022)	One semester	GBL (Kahoot!)	Competition and rankings	Formative assessment through questionnaires	Kahoot	X
(Lohitharajah & Youhasan, 2022)	1 session	GBL (Kahoot!)	Competition and rankings	Formative assessment through questionnaires	Kahoot	X
(López-Gómez et al., 2020)	One academic year	Escape room	Enigmas and search for clues	Performance-based formative assessment (observation and individual and group performance assessment rubric)	Microsoft OneNote	X
(Manzano-León et al., 2021)	A single session	Escape room	Enigmas and problems, hidden clues, message encryption, and narrative	Formative assessment through observation and analysis of performance	Genially	X
(Neureiter et al., 2020)	Three days	GBL (Kahoot!)	Competition and rankings	Formative assessment	Kahoot	X
(Ramos & Fincias, 2020)	Two academic years	GBL (Kahoot!)	Competition and rankings	Formative assessment	Kahoot	X

Authorship	Intervention time	Playful Methodology	Gameplay Elements	Type of assessment	Platform	Size		
						+	=	-
(Rosillo & Montes, 2021)	One academic year	Escape room	Enigmas and mathematical problems in a narrative context	Formative assessment through problem-solving	Genially	X		
(Wahyuni & Etfita, 2023)	One academic year	GBL (Kahoot!)	Competition and rankings	Formative assessment through questionnaires	Kahoot	X		
(Yang et al., 2023)	Semesters	Escape room	Interactive tasks, puzzle solving, and clue search	Problem-solving and critical thinking	Purpose-built platforms	X		
(Zhao et al., 2022)	One semester	Serious Games	Rewards and Challenges	Questionnaire-based formative assessment	Unity Platform	X		

3.1. Playful Methodologies Commonly Used in University Evaluation

In the analysis of the 16 selected studies, game-based learning emerged as the most commonly used playful methodology in university evaluation, featuring 6 out of 16 studies (37.5%). Kahoot! is classified under Game-Based Learning (GBL) as it enables interactive, real-time quizzes in a competitive game format. Following GBL, escape rooms were reported in 5 out of 16 studies (31.25%), and gamification appeared in 4 out of 16 studies (25%). Finally, serious games were mentioned in only one study (6.25%). These findings highlight a significant preference for tools with accessible technological features.

3.2. Game Elements Frequently Applied in Evaluation

A summative quantification approach was adopted to analyze the game elements used in the evaluation. This means that if an article included multiple elements, each was individually accounted for, and the cumulative total was subsequently calculated.

The analysis of game elements used in university evaluations revealed various strategies that enhance engagement and learning. Among the most commonly identified elements, competition and rankings were reported in 6 of the 16 studies (37.5%). This element is particularly prominent in tools like Kahoot!, where participants aim to achieve the highest scores based on the accuracy and speed of their responses.

Puzzles and problem-solving were other frequently used elements, reported in 5 of the 16 studies (31.25%), primarily within escape rooms. Similarly, points, badges, and levels, reported in 4 of the 16 studies (25%), are integral to gamification strategies, creating progressive reward systems that motivate students to achieve specific goals.

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Narrative contexts and challenges, reported in 3 of the 16 studies (18.75%), were employed to provide meaningful evaluation scenarios. These contexts are often integrated into escape rooms and gamification.

3.3. University Evaluations Mediated by Playful Strategies

In the analyzed studies, formative evaluations were the most frequently mediated by playful strategies, appearing in 14 out of 16 studies (87.5%). These evaluations are designed to monitor and measure student progress throughout the learning process. This type of assessment is widespread when tools like Kahoot! can be employed at various points in a course to track student progress. Similarly, playful methodologies like Escape Rooms are used in formative evaluations, enabling students to demonstrate practical skills and problem-solving abilities in simulated contexts.

In addition to formative assessments, performance-based evaluations were reported in 2 out of 16 studies (12.5%). These assessments directly measure students' competencies and practical abilities by observing their performance in specific activities.

3.4. Technological Tools Used in Playful University Evaluations

Among the studies analyzed, the most frequently used technological tool for university evaluations mediated by playful strategies was Kahoot!, mentioned in 7 out of 16 studies (43.75%). Kahoot! functions as a GBL platform designed to administer interactive real-time quizzes.

Another notable tool is Genially, reported in 4 out of 16 studies (25%). Genially, it is primarily used in gamification and escape room activities to create interactive environments incorporating visually engaging elements, puzzles, and narrative dynamics. Virtual Escape Rooms, implemented through platforms like Zoom and customized applications, appeared in 3 out of 16 studies (18.75%). These tools facilitate collaborative dynamics in online environments.

Finally, the Unity Platform was used in 1 out of 16 studies (6.25%) to develop serious games. This advanced technical tool enabled the design of customized assessments, standing out for its ability to incorporate complex and tailored elements to meet specific objectives.

4. DISCUSSION

This study aimed to analyze the impact of playful methodologies, specifically Game-Based Learning (GBL), escape rooms, gamification, and serious games, on university educational assessment. Experimental and quasi-experimental studies published between 2020 and 2024 were identified and analyzed through a systematic review following PRISMA guidelines. This analysis highlighted the most frequently used tools, such as Kahoot, Genially, and specific platforms for escape rooms, as well as the most recurring game elements, including competitiveness, puzzle-solving, and immediate feedback. The results demonstrate that these methodologies enhance student participation, motivation, and performance while offering

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more dynamic and comprehensive assessments of competencies, providing an effective and engaging alternative to traditional assessment methods.

First, the findings indicate that the digital tool Kahoot! has been the most used for university-level assessment. Kahoot enables the formulation of questions and synchronous responses from students. Scores are based on the accuracy of their answers and the speed with which they respond, creating a ranking system that transforms the activity into a competitive game. In this context, competition has been identified as one of the most frequently employed game elements, present in both Kahoot (Campillo-Ferrer et al., 2020; Ramos & Fincias, 2020; Lohitharajah & Youhasan, 2022) and the analyzed gamification studies (Dæhli et al., 2021; Jones & Sturrock, 2022). Additionally, puzzle-solving is common in escape rooms and educational gamification (Dæhli et al., 2021; Jones & Sturrock, 2022; Barcena-Toyos, 2022).

Formative assessment is the most used approach in the reviewed studies. Although it is a common feature across all analyzed methodologies, its implementation varies depending on the context and tools used. For instance, Kahoot employs multiple-choice questionnaires, simplifying the collection and grading of responses. This method is efficient but limits evaluation to predefined answers, restricting the measurement of more complex skills. In contrast, escape rooms offer a more comprehensive approach, as shown in Manzano-León et al. (2021), where direct observation and detailed analysis of participants' performance enable the assessment of specific competencies and practical skills. Due to its flexibility, gamification allows for the integration of more varied evaluation techniques (Jones & Sturrock, 2022), including continuous formative assessments adjusted to students' progress through activities designed to evaluate competencies in practical and situational contexts (Barcena-Toyos, 2022).

Regarding the use of technological tools for evaluation, Kahoot also stands out as the most utilized tool. This may be attributed to its similarity to traditional formative assessment approaches (Plump & LaRosa, 2017; Ramos & Fincias, 2020). Other relevant tools include Genially, a versatile platform for designing escape rooms and interactive presentations; Learning Apps, which enables the creation of educational applications with immediate feedback (Japón et al., 2022); and Zoom, which facilitates online collaborative activities such as escape rooms and allows for the direct observation of teamwork skills (Cash et al., 2023).

Escape rooms are the second most frequently used methodology. They combine effective learning and entertainment, fostering teamwork and essential social skills while requiring less preparation than fully developed gamification (Fusco et al., 2022). These tools are notable for their flexibility and capacity to assess both knowledge and practical skills in dynamic environments.

Finally, gamification is the methodology that has been the least utilized. This may be due to the considerable effort required to integrate educational content with playful elements (Araújo & Carvalho, 2022). However, it offers significant flexibility in incorporating content and evaluation methods, enabling creative adaptations that maintain student interest and deepen learning (Boytchev & Boytcheva, 2020).

Tools such as Kahoot and escape rooms stand out for their ability to conduct continuous, real-time assessments. Kahoot provides instant feedback, allowing students to correct mistakes and consolidate information immediately (Wahyuni & Etfita, 2023). In contrast, escape rooms

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promote adaptive evaluation and the development of skills such as problem-solving and critical thinking by designing scenarios tailored to students' levels of competence (Fotaris & Mastoras, 2019).

The game elements used in the playful methodologies within the analyzed studies have proven crucial in improving the evaluation process and, ultimately, the teaching and learning processes in university educational environments. Here are several specific conclusions related to these game elements:

- Competitive Elements: Competitive elements, such as rankings and points on platforms like Kahoot, are highly effective in increasing student motivation and engagement. Healthy competition encourages students to improve their performance while making learning more attractive and less monotonous. However, it is crucial to manage these elements carefully to avoid creating overly competitive environments that could be counterproductive for some students (Zhang & Yu, 2021).

- Immediate Feedback: Immediate feedback is an essential element in playful methodologies. Studies have widely used it to provide students with a clear, real-time understanding of their mistakes and successes. This feature helps improve information retention and allows students to adjust their learning strategies, contributing to a more adaptive and personalized learning experience (Oliveira et al., 2022).

- Narrative Elements: Using narrative elements to immerse students in scenarios that require applying theoretical knowledge to practical problems. Contextualization through stories increases the perceived relevance of the learning material and can help students see the practical application of abstract concepts, improving engagement and understanding (Werbach & Hunter, 2012).

- Puzzles and Challenges: Puzzles and challenges are central elements in escape rooms and other forms of educational gamification designed to promote critical thinking and problem-solving (Veldkamp et al., 2020). These challenges allow students to apply knowledge in new and complex contexts, which is crucial for developing deep analytical skills.

Therefore, the research shows that game elements have facilitated a more interactive and motivating student environment. These elements' correct integration and balance can significantly improve the learning experience and educational outcomes. To further enhance the value and scope of this study, it is essential to address certain limitations and explore future research directions. One of the main limitations is the restriction in the quantity and variety of databases consulted for the literature review. This could limit the breadth of the research and conclusions, especially if relevant studies found in less known or accessible databases are excluded. Therefore, future studies could benefit from expanding the range of databases and disciplines reviewed to include various research and perspectives, thus obtaining a more comprehensive and nuanced view of playful methodologies in education. Another aspect to consider is the geographic and cultural diversity of the included studies, which are concentrated in specific contexts and lack representations from regions such as Africa. This could affect the generalization of the results, as cultural differences in the perception and effectiveness of playful methodologies can be significant. To overcome this limitation,

conducting international comparative studies involving multiple geographic and cultural contexts would be beneficial, providing a better understanding of how cultural differences affect the effectiveness of these methodologies. The rapid evolution of gamification and virtual learning technologies presents another limitation, as some discussed tools and methodologies could quickly become obsolete. The speed of technological advancement could outpace the current research's ability to evaluate its long-term impact. In this regard, conducting longitudinal studies that examine the long-term effects of playful methodologies in education would be advisable. These studies should include academic performance and the impact on soft skills and job market preparedness. Finally, there may be limitations in the depth of learning outcomes evaluation, with many studies focusing on immediate quantitative results without exploring the long-term effects of educational interventions. To address this, future studies could delve deeper into how variations in the implementation of technological tools affect their effectiveness, including factors such as teacher training, curricular integration, and technical support.

5. CONCLUSIONS

This study has delved into applying playful methodologies as assessment tools in the university setting, revealing significant insights into their effectiveness and applicability. It has been evidenced that Kahoot, escape rooms, and gamification foster student engagement and motivation and can improve their comprehension and retention of knowledge by placing them in practical and dynamic contexts.

The predominance of Kahoot can be attributed to its ease of use and the speed with which formative activities can be implemented (Martínez Lirola, 2022), providing a smooth transition to educational technologies without straying from traditional methodologies. Escape rooms offer a more holistic and adaptive assessment, allowing for the measurement of specific competencies and practical skills in immersive contexts (Fotaris & Mastoras, 2022). Although gamification requires more effort and resources, it provides considerable flexibility in evaluating and designing educational activities (Kapp et al., 2014). Game elements such as competition, immediate feedback, and challenges have proven effective in enhancing the learning experience (Barcena-Toyos, 2022; Wahyuni & Etfita, 2023; Zhao et al., 2022).

In conclusion, playful methodologies are a valuable and effective alternative for educational assessment in universities. They adapt to various needs and contexts and foster more meaningful and engaged learning. Future studies should continue exploring and expanding these practices, incorporating different game dynamics and digital elements and evaluating their long-term impact.

6. FUNDING

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7. AUTHORS' CONTRIBUTIONS

Conceptualization, J.M.R.-F; data curation, **J.M.R.-F**; formal analysis, A.M.-L., P.R.R.; funding acquisition, A.M.-L.; investigation, J.M.R.-F, A.M.-L., P.R.R.; methodology, J.M.R.-F; project administration, A.M.-L.; resources, A.M.-L.; software, J.M.R.-F; supervision, J.M.R.-F, A.M.-L., ; validation, J.M.R.-F, A.M.-L., ; visualization, J.M.R.-F, A.M.-L., P.R.R.; ; writing—original draft preparation, J.M.R.-F, A.M.-L., P.R.R.; writing—review and editing, J.M.R.-F, A.M.-L., P.R.R.

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