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Gamification in Education: A Systematic Review of the Literature

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ABSTRACT

The growing demand for innovative, inclusive, and engaging educational methodologies justifies the interest in gamification as a pedagogical strategy in the contemporary scenario. The present study aimed to analyze recent evidence on the use of gamification in education, considering its impacts, applications, and limitations in different contexts. To this end, a systematic literature review (RSL) was adopted in the Web of Science database, with open access filters, period between 2021 and 2025 and clipping for review articles, resulting in 225 publications, of which 20 were selected for greater alignment with the theme. The results were grouped into five categories: basic education/STEM, higher education, health/technical training, languages/humanities and methodological innovation. It was evident that gamification promotes gains in engagement, retention, motivation, and development of skills, especially when articulated with hybrid practices, inclusive policies, and flexible curricula. On the other hand, barriers such as lack of teacher training, infrastructure, and standardization in evaluation methods limit its consolidation. It is concluded that gamification is a relevant tool to enhance meaningful learning, as long as it is contextualized, supported by institutional support and accompanied by consistent evaluation strategies.

INTRODUCTION

Contemporary education has faced profound transformations in the face of technological revolutions, recent health crises, and growing demands for inclusion and equity. In this scenario, traditional pedagogical practices have been questioned, making room for more dynamic, participatory methodologies aligned with the competencies of the twenty-first century. Gamification, by integrating playful elements into the teaching-learning process, emerges as a promising strategy for engagement and development of cognitive and socio-emotional skills. Such approaches become even more relevant in contexts of social vulnerability and in hybrid learning environments. Thus, the need to understand how gamification has been applied justifies the proposed investigation.

This study aims to analyze the latest scientific evidence on gamification in education, focusing on its practical applications, benefits, and challenges at different levels and contexts of education. The intention is to understand how gamified approaches have contributed to student engagement, skills development, and curricular innovation. In addition, it seeks to identify emerging trends and theoretical gaps in the current literature. The theme is timely in the face of the expansion of hybrid practices and the growing interest in innovative pedagogical solutions. The critical analysis of the results

seeks to offer subsidies to researchers, teachers and educational managers.

To achieve this objective, the Systematic Review of the Literature (RSL) method was adopted, with data collection in the Web of Science database, based on specific descriptors related to gamification and education. After applying open access filters, time frame (2021–2025) and document type (review articles), a set of 225 articles was obtained. Based on qualitative analysis, the 20 most aligned with the theme were selected to compose the final sample. These studies were triangulated with the previously established theoretical framework, allowing a critical and interpretative reading of the findings. The thematic categorization of the results guides the following discussion.

LITERATURE REVIEW

Contemporary education has been marked by intense social, technological and health transformations, causing the need to redesign pedagogical practices and curricular policies, especially in socially vulnerable and rural contexts. This scenario highlights the urgency of actions that promote access, inclusion, and personalization of teaching, with emphasis on the potential of blended learning to promote flexibility and equity in various realities (Gonçalves *et al.*, 2024).

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In the context of Brazilian blended learning, recent literature points out that the integration between face-to-face and digital activities has resulted in advances in student participation and access to education, especially during and after the critical moments of the pandemic. Bibliometric analysis shows that blended learning models expand learning opportunities, as long as they are supported by investments in infrastructure, continuing education of teachers, and inclusive policies (Lima *et al.*, 2025).

The resignification of the curriculum emerges as an essential component to meet the demands of the twenty-first century, allowing the development of cognitive, digital and socio-emotional skills. A systematic study shows that curricular adaptation mediated by digital technologies reinforces student engagement, critical thinking, and resilience, requiring institutional support and articulated strategies for pedagogical innovation (Veloso *et al.*, 2025). In the field of socio-emotional skills, evidence indicates that their incorporation into the school environment is related to improved self-regulation, cooperation, well-being, and student permanence. The research highlights that structured initiatives, aligned with the BNCC and supported by approaches such as mindfulness, restorative justice, and body percussion, are relevant for the integral development of students, even if they face challenges in terms of conceptual clarity and teacher training (Silva *et al.*, 2025).

In concrete experiences, the implementation of blended learning in rural communities demonstrates that the offer of new technologies such as satellite internet and digital platforms contributes to the maintenance of the school bond and reduces dropout, even in the face of geographical barriers and logistical challenges, showing the role of public investment and teacher mediation in ensuring permanence and quality (Gonçalves *et al.*, 2024). International studies consolidate that the adoption of digital learning environments, combined with active methodologies, personalization of teaching, and curricular innovation, result in greater engagement and acquisition of critical skills, although inequalities in access and structural asymmetries between developed and developing countries persist (Banihashem *et al.*, 2024).

Recent analyses highlight that institutional support, teacher training focused on experimentation and the construction of learning communities are determinant for the success of innovative practices. Collaborative and continuous efforts between managers, teachers, and the school community create favorable conditions for the consolidation of hybrid teaching as a viable strategy in the current scenario (Veloso *et al.*, 2025).

The development of socio-emotional skills is consistently linked to stress reduction, enhanced communication, and improved academic performance. Practices based on social learning theory and the contributions of Goleman and Vygotsky reinforce the need for educational environments that promote empathy, resilience, and curricular integration, especially in contexts of inequality and vulnerability (Silva *et al.*, 2025).

The challenges on the implementation of innovation and blended learning remain linked to barriers such as institutional resistance, digital fatigue, and lack of standardization in impact assessments. Researchers suggest that, in order to overcome such obstacles, it is essential to advance in public policies that integrate technology, infrastructure, and contextualized training processes (Lima *et al.*, 2025).

In the international context, it is highlighted that the literature recommends greater personalization of teaching, the use of learning analytics, and the alignment between hybrid practices and training objectives. There is a consensus that these actions favor active learning, autonomy, and the adaptation of curricula to the demands of different school audiences, strengthening the role of the school as a dynamic and transformative space (Banihashem *et al.*, 2024).

Research reveals that didactic innovation initiatives in specific disciplines, such as science and biology, have been effective in incorporating educational games and digital play practices. These strategies increase student motivation, interest, and performance, bringing significant gains in conceptual understanding and retention of complex content (Sumandal, 2023).

Approaches such as the use of board games in chemistry serve as a supplement to traditional teaching, favoring creativity, socialization, and learning of challenging content, in line with international practices and stimulating student protagonism (Alejandria *et al.*, 2023).

The theoretical path followed so far shows that the integration between hybrid teaching, curricular innovation and the development of socio-emotional skills is consolidated as the basis for responsive and adaptive educational environments. In this scenario, gamified approaches emerge as a transition trend, bringing together playful, motivational, and formative elements that will be detailed below in the discussion of the results, consolidating their importance to boost pedagogical practices and promote meaningful learning at different levels and contexts of education.

MATERIALS AND METHODS

The present research adopts the method of systematic review of the literature with a qualitative and exploratory approach, with the objective of identifying and analyzing empirical and theoretical evidence on the use of gamification in the contemporary educational context.

The search was carried out in the Web of Science database, using the descriptors: “gamification” OR “game-based learning” AND “education” OR “teaching” OR “learning” AND “systematic review” OR “literature review” OR “bibliometric analysis”, resulting in 943 articles.

To refine the results and ensure greater adherence to the scope of the search, the following filtering criteria were applied:

Publication period: 2021 to 2025

Document type: review articles

Open access

Language: English or Portuguese

After applying the filters, the total number of results was reduced to 225 articles. Then, an exploratory reading of titles, abstracts and keywords was carried out, identifying 20 articles with greater thematic alignment with the proposal of analysis of gamification in education, considering its relationship with hybrid teaching, curricular innovation and socio-emotional skills.

These 20 studies were triangulated with the database literature previously mapped from the CAPES journal database, in order to establish robust interpretative categories that would support the critical discussion of the findings.

The analysis of the selected studies was conducted through qualitative thematic analysis, grouping the data into five categories: (1) Basic Education and STEM; (2) Higher and Vocational Education; (3) Health and Technical Training; (4) Languages and Human Sciences; (5) Methodological Approaches and Innovation.

Such categorization allowed interpreting the results in the light of consolidated theoretical axes and the emerging demands of contemporary education, ensuring methodological rigor and alignment with the objectives of the review.

RESULTS AND DISCUSSION

The analysis of the twenty most aligned articles identified in the systematic review shows five major thematic categories of application and impact of educational gamification: (1) Basic Education/STEM, (2) Higher and Professional Education, (3) Health and technical training, (4) Languages and Human Sciences, and (5) Methodological Approaches, Instruments and Trends.

Category: Basic Education, STEM and Vulnerable Contexts

Romero-Rodríguez *et al.* (2024) show that gamification enhances engagement, soft skills, and bonding in STEM areas in basic education, with stronger results in contexts with greater curricular adaptation. This reinforces the argument of Gonçalves *et al.* (2024) that, in vulnerable and rural settings, innovative practices need to be designed to ensure school access, flexibility, and permanence, especially when anchored in hybrid and personalized strategies.

Ruiz *et al.* (2024) highlight that gamification influences school engagement in a multidimensional way emotional, behavioral, and cognitive requiring broad evaluations and diverse instruments in addition to motivation. As Lima *et al.* (2025) point out, only blended learning integrated with inclusive technologies and policies expands opportunities for participation, especially during disruptions such as those of the pandemic.

Vankus (2021) reveals that gamification in mathematics brings remarkable affective gains, especially in student motivation and attitude, as long as it is associated with rigorous evaluation. This analysis dialogues with Veloso *et al.* (2025), for whom curricular resignification focused on

socio-emotional and digital skills is essential for integral development.

Hui and Mahmud (2023) confirm the positive impact of game-based learning on affective and cognitive domains of mathematics, aligning with the challenge posed by Veloso *et al.* (2025): articulating technologies, curricular innovation, and institutional support to enhance critical thinking, engagement, and resilience.

Kalogiannakis *et al.* (2021) point out that games in science increase interest and conceptual understanding, especially when integrated with technological practices. These findings echo Gonçalves *et al.* (2024), who highlight how appropriate digital solutions strengthen school bonds, especially in rural and peripheral realities.

Sumandal (2023) shows that digital games in Biology developed with Lumi increase motivation, cooperation, and performance, being effective especially when aligned with 21st century competence learning objectives. As Lima *et al.* (2025) highlights, digital resources must be supported by infrastructure, teacher training, and inclusive policies.

Alejandria *et al.* (2023) prove that board games in Chemistry promote performance, creativity, and socialization, working as a practical supplement to conventional curricula. As Veloso *et al.* (2025) argue, flexible and hybrid curricula that value playful approaches boost multiple academic competencies.

Category: Higher Education and Vocational Training

Khaldi *et al.* (2023) demonstrate that digital gamified environments increase university engagement and autonomy, but are only truly effective when accompanied by institutional policies and innovative curricula a challenge pointed out by Veloso *et al.* (2025) for pedagogical sustainability.

Montenegro-Rueda *et al.* (2023) emphasize gains in performance, participation, and active learning through innovative experiences, integrating feedback with personalization; this line converges with the need, presented by Lima *et al.* (2025), to invest in continuing education so that teachers can consolidate such practices. Pegalajar Palomino (2021) observes a positive predisposition of university students to gamified experiences, but reinforces that expansion depends on a strong theoretical foundation and institutional support, as predicted by Veloso *et al.* (2025) and Gonçalves *et al.* (2024) when discussing curricular innovation and inclusion.

Lester *et al.* (2023) show that the effectiveness of gamification in universities is conditioned by institutional support, infrastructure, and teaching time barriers that are in line with the diagnosis of Lima *et al.* (2025) and Veloso *et al.* (2025) on the challenges of overcoming digital fatigue and resistance to change.

Dahalan *et al.* (2024) reveal that digital simulations provide practical skills in engineering and health, especially when anchored by training policies and contextualized assessment, agreeing with Silva *et al.* (2025) who advocate interventions designed to balance technical and socio-

emotional skills.

Videnovik *et al.* (2023) point out that the use of games in computing stimulates critical thinking and problem-solving, but lacks standardization in instructional designs, reinforcing Veloso *et al.*'s (2025) call for robust and integrated curriculum models for digital innovation.

Category: Health, Vocational Training & Equity

Kanaan *et al.* (2023) show gamification gains in learning retention in Health, showing that digital resources improve practical skills when monitored with structured assessments, echoing the referential's pleas for robust metrics and equity policies (Silva *et al.*, 2025).

Tavares (2022) identifies positive effects on engagement and retention of content for nursing education, but warns of the need to balance innovative and traditional practices, reflecting the concerns of Gonçalves *et al.* (2024) with adaptation and permanence in vulnerable contexts.

Allan *et al.* (2024) discuss gamified practices for equity in health education, showing attitudinal and cognitive progress, but requiring longitudinal assessment and adaptation to diverse groups. This reiterates the warning of Silva *et al.* (2025) about the need for personalized practices and systematic follow-up to promote well-being and inclusion.

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Category: Languages, Humanities and Digital Environments

Al-Dosakee & Ozdamli (2021) illustrate advances with gamification for integration and motivation in languages, whose effectiveness is conditioned to the overcoming of technological barriers, as the framework points out when demanding policies for personalization and infrastructure (Lima *et al.*, 2025).

Hwang *et al.* (2023) demonstrate that interactive tasks gamified in languages enhance engagement and results, especially when based on active methodologies a key point to strengthen autonomy and critical thinking, according to Veloso *et al.* (2025).

Helvich *et al.* (2023) report teacher satisfaction but

highlight that limited training and infrastructure prevents the consolidation of innovative practices, in line with the central argument of Lima *et al.* (2025) about the importance of contextualized training processes.

Marcilio *et al.* (2023) reveal the benefits of gamification in linguistic and social development in preschool, but signal the need for consistent evaluation instruments to ensure effectiveness, in line with the debate on equity and adaptation defended by Gonçalves *et al.* (2024).

Category: Methodological Innovation, Instrumentation and Customization

Krath *et al.* (2021) state that gamification theory is scattered, recommending integrated models for robust innovative practices; such conceptual alignment is an essential basis according to Veloso *et al.* (2025) and Silva *et al.* (2025).

Oliveira *et al.* (2023) point out that gamification personalization is promising, but lacks robust empirical evidence, an argument that reinforces the challenge, highlighted by Lima *et al.* (2025), of adapting strategies to diverse audiences.

Banihashem *et al.* (2024) highlight the role of learning analytics as a differential for personalized pedagogical decisions, in line with the recommendations of the framework for intelligent use of educational information and innovation anchored in data.

Behl *et al.* (2022) point to personalization, game elements, and engagement as central to the e-learning agenda, converging with the axes of public policies and curricular innovation highlighted by Veloso *et al.* (2025).

Sun *et al.* (2023) point out that teacher scaffolding is essential for successful gamified experiences, standing alongside the recommendations of the framework on human valorization, mediation, and continuing education

CONCLUSION

In the face of the transformations that challenge contemporary education, such as health crises, technological demands, and social inequalities, the search for innovative methodologies becomes urgent. Gamification, by incorporating playful dynamics into teaching, appears as a relevant strategy to promote engagement, the development of skills, and the personalization of learning. The present study started from the need to understand how these practices have been applied at different educational levels, with a view to contributing to more responsive and inclusive environments.

The analysis of the 20 most aligned articles revealed that gamification has a positive impact on several fronts, especially in contexts of vulnerability, STEM disciplines and technical training. Evidence of increased engagement, motivation and retention of content was confirmed, both in basic and higher education. However, challenges such as lack of standardization, lack of teacher training and dependence on infrastructure were also identified. These findings confirm most of the hypotheses discussed in the framework, but also warn of institutional and structural

limits that still need to be overcome.

Thus, it is concluded that gamification represents a relevant trend for educational innovation, especially when integrated with inclusive policies, flexible curricula and hybrid pedagogical strategies. The consolidation of gamified practices requires institutional support, continuing education, and systematic evaluation. It is recommended that future research broaden the scope to different regional realities and deepen the investigation into the long-term effects of gamification on the educational process.

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