

PAPER

Beyond Points and Badges: Deepening Engagement in MOOCs through Gamification

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ABSTRACT

Despite massive open online courses (MOOCs') widespread acceptance, the substantial dropout rate among learners remains a significant challenge in remote education. Although gamification has been identified as a potential strategy to address this issue, preliminary research on this topic is limited in scope and methodology. Therefore, this study aims to explore the application of gamification in MOOCs and its impact on participant engagement and course completion rates. Twenty-two articles were systematically nominated and reviewed under preferred reporting items for systematic reviews and meta-analyses (PRISMA) guidelines. They were extracted from 225 articles indexed in the Scopus database for various criteria, including peer-reviewed articles published within the last five years to ensure we use articles with the latest technological developments. The analysis emphasizes that despite its limitations, gamification in MOOCs positively influenced learner engagement and completion rates through strategies such as badges, leaderboards, and challenges. The findings of this study offer valuable insights into the potential of gamification to enhance learner engagement and improve course completion rates in MOOCs, contributing to more effective remote education strategies. The study concludes by identifying the need for future research on long-term effects across different types of MOOCs and the sustainability of engagement over time.

KEYWORDS

educational technology, e-learning, gamification, massive open online courses (MOOCs)

1 INTRODUCTION

In recent years, there has been a substantial increase in the adoption of massive open online courses (MOOCs) as a form of digital learning technology, particularly since their introduction in 2006 [1]. By 2012, MOOCs had gained widespread acceptance as a dominant teaching method, facilitated by platforms such as edX, Coursera, and Udacity, primarily driven by prestigious institutions such as MIT and Harvard [2, 3]. Since then, MOOCs have revolutionized conventional education by

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eliminating time and location constraints. This innovation enabled learners to conveniently study anytime and anywhere through the Internet without substantial access to costs [4, 5]. However, despite the considerable potential of MOOCs, the high dropout rate remains a critical issue, with the average completion rate reported to be as low as 13%, or even lower in some cases [6, 7]. For instance, Li and Wei [8] stated that completion rates are alarmingly low, often less than 5%. High dropout rates in MOOCs can be linked to psychological, social, personal, course, and time-related factors, as well as unforeseen hidden costs [9]. Another reason is related to the flexibility of MOOCs, in which learners drop out after completing a specific learning chapter that they need [10]. This aligns with Goopio and Cheung [7], who stated that completing the course is not the primary goal for many students who enroll in MOOCs. Several studies have attempted to address this issue by exploring various strategies, including the use of gamification [2, 11–14].

Regardless of the growing body of research on gamification, previous studies have been limited in scope, largely focusing on general applications in education rather than offering a comprehensive examination of how gamification impacts learner engagement and course completion in MOOCs. A gap remains in the literature regarding the specific effects of gamification on participant retention and success rates in MOOCs [15–17]. To fill this gap, this study aims to provide an in-depth literature review on the application of gamification in MOOCs, addressing four key research questions: (1) How is gamification implemented in MOOCs? (2) How does gamification influence learner engagement and course completion in MOOCs? (3) What other benefits can be gained from implementing gamification in MOOCs? and (4) What are the limitations and challenges of gamification in massive open online courses?

This study is structured into several sections, starting with an overview of *digital learning technologies in education*, highlighting the rapid growth of digital learning tools and their impact on education, including discussing how MOOCs have transformed education. *Challenges in MOOC retention and completion* addresses the key factors contributing to high dropout rates and potential strategies to improve learner retention. Finally, the section on *gamification in MOOCs* explores the use of gamification in education, especially to enhance engagement and completion rates in massive open online courses.

2 DIGITAL LEARNING TECHNOLOGIES IN EDUCATION

The rapid growth of ICT and digital learning technologies in recent decades has significantly transformed education and daily life [18–20]. These technologies support digital and hybrid teaching models, enhancing accessibility and learner engagement [21]. In corporate settings, digital tools have replaced traditional training by utilizing big data for learner analysis, improving talent strategies, and economic benefits [22]. In health sciences, tools such as simulations and virtual reality provide personalized, real-time feedback to improve educational outcomes [21]. Higher education has similarly benefited, with studies showing digital formats enhance participatory learning and motivation, and reduce resource costs for both students and institutions [23–25]. Virtual laboratory platforms further boost learning outcomes, cognitive skills, productivity, and engagement [26, 27]. The integration of digital literacy into teaching offers professional development opportunities through e-learning and augmented reality [24, 28].

Massive open online courses build on these advancements by providing global, open access to education. As a platform offering digital content to large numbers

of users, MOOCs democratize education, allowing individuals from diverse backgrounds to improve their skills at minimal cost [29, 30]. Originally seen as disruptive, MOOCs now support universities in offering online master's programs for professionals [31]. Positive student responses, especially in courses with practical digital models, have been noted [32]. For example, in Saudi Arabia, MOOCs improved educational outcomes by 65% [33]. During the COVID-19 pandemic, MOOCs helped maintain educational continuity, with increased enrollment [29], while also promoting lifelong learning and social entrepreneurship [34, 35]. To support social equity, MOOCs must be designed with marginalized learners in mind, offering personalized support [36], and fostering digital entrepreneurship through learning ecosystems [37].

3 CHALLENGES IN MOOC RETENTION AND COMPLETION

One of the most significant challenges faced by MOOCs is the substantial dropout rate among learners. Research has consistently reported that the average completion rate for MOOCs remains relatively low, with some studies citing rates as low as 5% [8]. Psychological, social, personal, and time-related factors contribute to this high dropout rate, which poses a major challenge to the effectiveness of MOOCs [9]. Moreover, factors such as web quality and self-efficacy are critical in influencing students' intentions to complete MOOCs. Another contributing factor is the flexibility of MOOCs, where learners often drop out after completing the specific chapters they are interested in [10]. This is consistent with the findings of Goopio and Cheung [7], who noted that course completion is not the primary objective for many students who enroll in MOOCs. Addressing these issues requires platforms to focus on improving user retention and satisfaction, with gamification offering one potential solution [38].

4 GAMIFICATION IN MOOCS

Gamification in education utilizes game design elements to enhance engagement, motivation, and interaction, yielding significant benefits across different educational contexts. Studies highlight that gamification boosts motivation and active participation, which are crucial for improving learning outcomes [39]. It also positively affects cognitive and behavioral learning, particularly in higher education, by fostering critical thinking, problem-solving, and persistence [40, 41]. However, the effectiveness of gamification depends on clear rules and thoughtful implementation, with short-term strategies often resulting in more impactful behavioral changes than long-term ones [40]. Additionally, gamification enhances knowledge retention and student motivation [42, 43], solidifying its role as an innovative tool for promoting active learning and improving academic performance [44].

Gamification, defined as the application of game-design elements in non-game contexts, has gained traction as a means of addressing the challenges faced by MOOCs, including high dropout rates and low completion levels [40, 45, 46]. The use of gamification elements such as badges, leaderboards, and challenges has shown potential to increase engagement, motivation, and retention in MOOCs [13, 47]. Gamification strategies have been successfully implemented in educational settings to provide an influential and motivational studying process, which can significantly enhance

learner engagement [13]. Research has also shown that gamification improves the overall satisfaction of learners and helps organizations achieve better performance outcomes [48].

Several studies have indicated that gamification reduces dropout rates and boosts course completion in MOOCs. For instance, Nesterowicz et al. [49] demonstrated how gamification strategies significantly reduced dropout rates. Jarnac de Freitas and Mira da Silva [50] further reported positive outcomes such as increased participation and retention rates through gamification in MOOCs. However, while the benefits of gamification are clear, further research is required to fully understand the nuances of its implementation and long-term effectiveness.

5 METHODS

5.1 Systematic review framework

This study followed the systematic literature review framework proposed by Okoli and Schabram [51], and Robinson and Lowe [52]. The selection of articles was guided by the preferred reporting items for systematic reviews and meta-analyses (PRISMA) guidelines [53].

5.2 Search strategy

Scholarly articles were obtained from the Scopus database using the following search queries: TITLE-ABS-KEY ((MOOCs OR “Massive Open Online Courses”) AND gamification). Furthermore, to guarantee credible, up-to-date, and relevant information, only articles from the past five years were used.

5.3 Data extraction and analysis

To address the research questions (RQs), a thematic analysis was conducted based on Braun and Clarke [54], identifying key themes across the selected articles. This process included familiarization, coding, and theme identification. The familiarization phase was conducted during the article selection process, as depicted in the PRISMA flow diagram (see Figure 1). Themes were drawn from recurring trends that emerged across the reviewed articles. In addition, data on publication years, article sources, and author affiliations were extracted to provide an overview of the literature.

5.4 Screening and selection process

Figure 1 shows that the article selection process started with a predefined search query in the Scopus database, initially resulting in 225 articles, and refined to 22 articles using specific criteria such as: (1) the publication type was peer-reviewed journal articles that clearly presented research questions, methods, and interpretations based on theory and evidence, (2) must be written in English, (3) studies focusing on the use of gamification in MOOCs and the impact

on participant engagement, (4) open access articles, and (5) those published from 2020 to 2024 to ensure the relevance of the information and data. The use of the Scopus database ensures the credibility and relevance of the information employed in this study. Meanwhile, the inclusion of articles in English eliminates any language barriers.

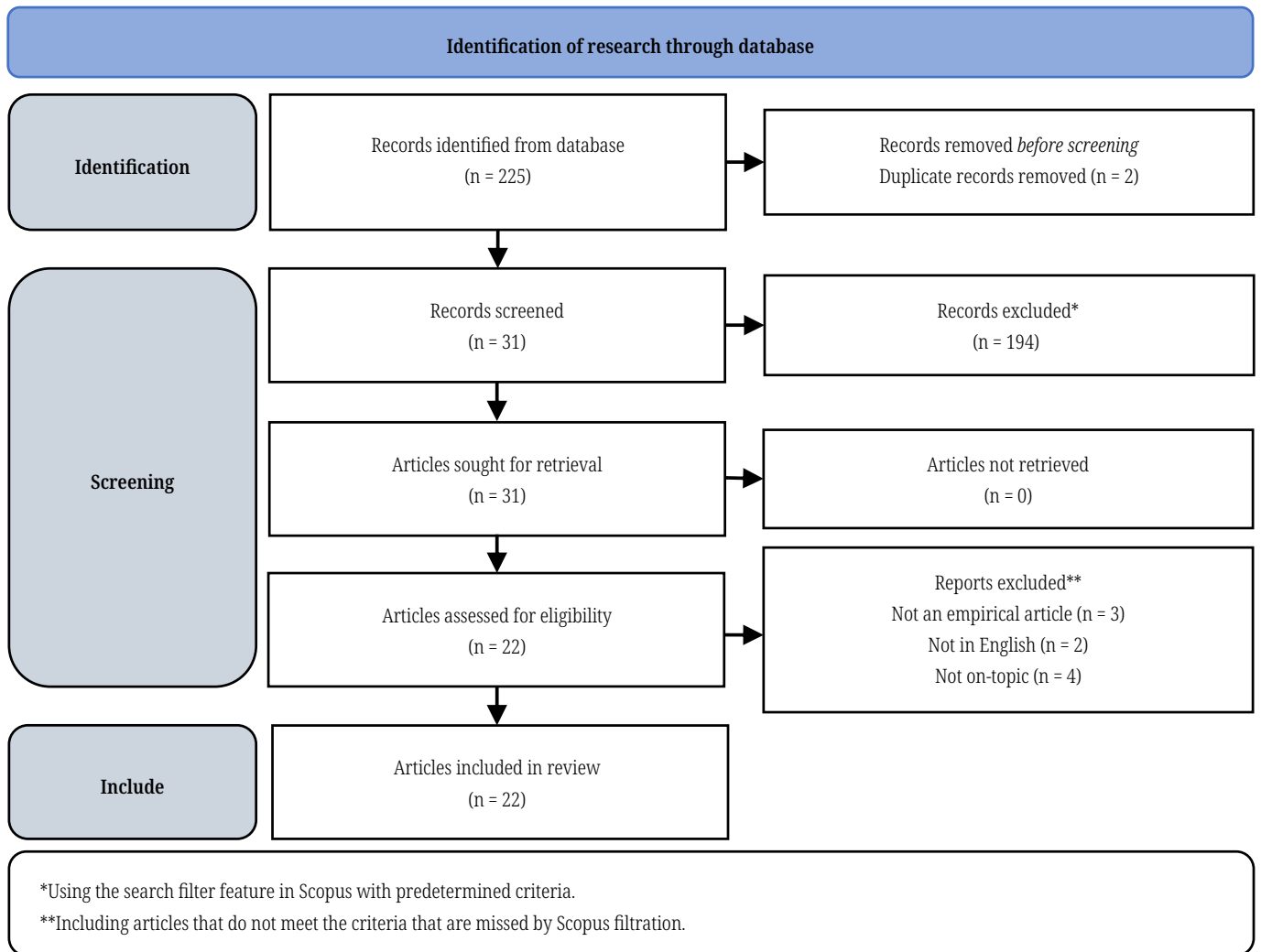


Fig. 1. PRISMA flow diagram

5.5 Bibliographic analysis

The initial search results in Scopus (225 articles) were examined using VOS viewer software to get a broad picture of the research trends on the implementation of gamification in MOOCs before analyzing the findings of the PRISMA selection process. This tool visualized the connections between each keyword node and cluster, generating a network configuration [55]. Each node represented a specific keyword, with larger ones representing a higher number of more associated articles. Conversely, a cluster consisted of several keyword nodes with a common theme.

(nine articles) and 2020 (six articles). The decline observed in 2024, suggesting ongoing research since the year's data is incomplete.

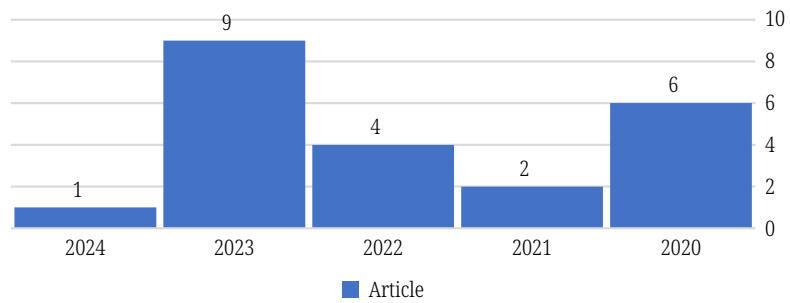


Fig. 3. Article publication year distribution

6.3 Institutional distribution

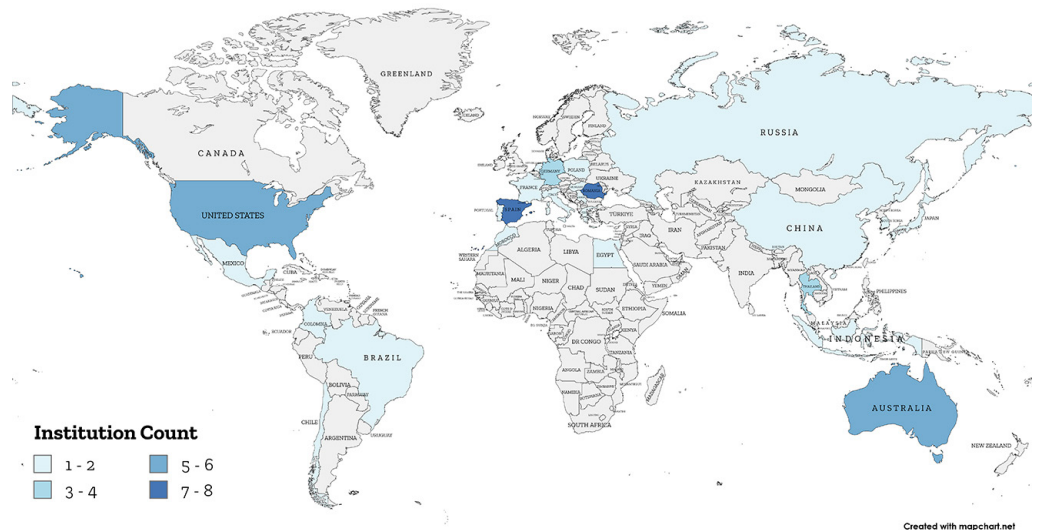


Fig. 4. Affiliation distribution map

A total of 57 authors and co-authors from 25 countries, representing 61 distinct institutions, contributed to the eligible articles. Figure 4 shows a visualization of the number of institutions from various countries that have published eligible articles. The five countries with the most institutions represented are Spain (8), Romania (7), the United States (5), Australia (5), and Germany (4), demonstrating significant global interest in the implementation of gamification in massive open online courses.

6.4 RQ1: How is gamification implemented in MOOCs?

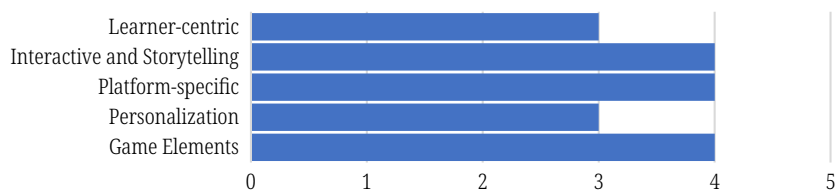


Fig. 5. Strategy used in gamification implementation in MOOCs

Based on the findings in Figure 5, gamification in MOOCs is implemented by incorporating game design elements [13, 56–58], personalization [11, 59, 60], platform-specific applications [2, 12, 14, 61], interactive activities and storytelling [62–65], and learner-centric strategies [66–68]. These methods aimed to motivate and engage learners by providing achievement badges, leaderboards, points, quests, and progress bars that offer a sense of accomplishment and visible progress. Personalization is essential, with adaptive models that shape the experience of individual learner profiles, ensuring the relevance and effectiveness of game elements. The implementation of gamification through the following platforms—MyMOOCspace, Gamifire, GamiTool, and WandaBelajar—showed the practical application of these concepts in various learning environments. Interactive activities and storytelling enriched the experience by transforming traditional learning methods into dynamic, game-like scenarios. Lastly, a learner-centric perspective is crucial, focusing on internal motivations and engagement to enhance problem-solving, creative thinking, and decision-making skills.

6.5 RQ2: How does gamification influence learner engagement and course completion in MOOCs?

Gamification in MOOCs effectively enhanced learner engagement and course completion. This was realized by introducing interactive and fun elements that make learning more appealing [2, 13, 14, 57, 58, 62, 67]. The use of game design elements such as achievement badges, leaderboards, points' quests, and progress bars add a certain degree of fun and challenge, motivating learners to engage more deeply with the content. This gamification method leads to increased encouragement, heightened engagement levels, and improved knowledge retention.

Personalization and adaptation are also crucial, as these provide a customized learning experience that adapts to individual interactions and preferences [11, 59, 60]. This ensured that the learning path remained relevant and captivating for each learner, thereby encouraging complete online activities and courses. The implementation of the MMS mobile application [61], the FGPE platform [56], reward-based strategies [12], and gamified assessments [64] has successfully enhanced learner engagement, optimized resource usage, and increased student motivation, all crucial for course completion.

From the learner's perspective, gamification promotes openness [63], shifts motivation from external rewards to internal satisfaction [66], and encourages cognitive engagement and creativity [68]. These aspects led to improved retention [69] and potentially higher completion rates [65], particularly when integrating MMORPG elements into collaborative learning environments. However, the effectiveness of gamification varies among learners, depending on individual learner preferences and the specific design of the gamified elements. As Amorim et al. [70] noted, while gamification can significantly improve engagement and completion rates, it may not always be the primary driver of learner participation.

6.6 RQ3: What other advantages can be gained from the implementation of gamification in MOOCs?

Gamification in MOOCs offered several advantages beyond simply enhancing learner engagement. Preliminary studies have reported that it significantly

improved learner satisfaction [13], fostering a sense of fulfillment and persistence in course participation. Consequently, this led to higher course passing rates and consistent access to learning resources [61, 67], essential for the entire process [71]. Gamification supports the generation of an immersive learning experience that captivates learners' interest [2], as well as sustains commitment over time.

One of the main advantages is the personalization it offers. Adaptive gamification methods, such as GamiTool, have the potential to enhance motivation and satisfaction, empowering learners to design personalized learning trajectories in line with the individual objectives and learning styles [11, 59, 60, 68]. This personalization caters to learner preferences and also introduces a variety of game elements that keep the learning experience engaging. Furthermore, gamification in MOOCs is scalable [14], enabling the accommodation of a large number of learners without compromising the quality of the educational experience. Another significant advantage is the platform independence, enabling seamless integration across various MOOC platforms, thereby broadening the reach of gamified learning.

The ability of gamification to capture the interest of the best-performing students is remarkable, supporting mastery learning, especially in complex subjects such as programming [56]. This structured yet flexible learning environment proves beneficial for learners. Additionally, the facilitation of automatic question generation (AQG) through gamification is also perceived as a tool for enhancing learning, providing challenges that adapt to the progress of the learner [64].

In terms of digital literacy and teaching quality, gamification was also instrumental in raising standards [72]. It encouraged learners to engage with digital tools and content in an educational and enjoyable manner, leading to improved digital skills and a better understanding of the subject matter. From the perspective of the learner, the advantages of gamification are profound. It generates a positive engagement trajectory, moving learners along the motivational spectrum from extrinsic rewards to intrinsic satisfaction [66]. Additionally, gamification fosters healthy competitive behavior [57], providing a motivational experience that influences purchase intentions [69]. This tool enhanced learner autonomy, diversity, openness, and interactivity, all essential components of a vibrant learning community [65]. This finding is in line with Mohamad et al. [73], which states that content design in MOOCs can affect student performance in learning.

However, gamification is not a one-size-fits-all solution. Its effectiveness depends on the design of the gamified elements and the individual preferences and needs of the learners, as noted by Amorim et al. [70], which stated that the effectiveness varies based on the design of the gamified elements, including the individual preferences and needs of the learners. Additionally, Kim and Castelli [40] noted that short-term strategies tend to produce more significant behavioral changes compared to long-term approaches. Consequently, the application of gamification in MOOCs offered numerous advantages that can transform the educational landscape, making learning more engaging, personalized, and effective.

6.7 RQ4: What are the limitations and challenges of implementing gamification in MOOCs?

The reviewed studies show that the application of gamification in MOOCs presented several challenges and limitations. Rohan et al. [13], Maher et al. [59], Rodríguez et al. [60], Klemke et al. [14], Panyajamorn et al. [62], and Bachiri et al. [64] studied the difficulty of ensuring the relevance and effectiveness of gaming elements

to educational outcomes. These studies focused on finding the ideal combination between adaptation, gamification, learning preferences, and OER consideration. Other challenges include accurately capturing the dynamic player profiles, designing meaningful gamification that integrates with learning processes, managing massive assessment and evaluation, and ensuring that gamified elements do not detract from the learning process.

Furthermore, technical constraints and complexities also posted significant challenges. Ramírez-Donoso et al. [61], Ortega-Arranz et al. [12], Rincon Flores et al. [71], and Panagiotarou et al. [72] focused on certain limitations such as the availability of MMS only for Android devices, the complexity of MOOC orchestration for instructors, the technological constraint of the xMOOC platform, and ensuring the digital readiness of educational organizations. Engagement and motivation of learners are other critical areas of concern. Amorim et al. [70], Hagedorn et al. [63], Qi et al. [68], Aguilos and Fuchs [57], Puig et al. [11], Ramansyah et al. [2], and Yang and Lee [67] stated that gamification features were not critical drivers of participant engagement or influenced course completion. Some learners also expressed dissatisfaction with the storytelling aspect, contributing to low retention rates and limited engagement in MOOCs. Additionally, there was a challenge in effectively engaging unmotivated students. Lastly, Swacha and Szydłowska [56], Medina-Labrador et al. [69], Poce [58], and Danka [65] focused on the limitations and challenges related to ensuring student engagement with facultative assignments, the need for a comprehensive knowledge source alongside the gamified environment, time constraints, inconsistency between course content and the proposed game, as well as ensuring that gamification goes beyond merely increasing difficulty while ensuring compatibility with connectivism principles.

7 CONCLUSION

In conclusion, the implementation of gamification in MOOCs serves as a powerful tool to enhance learning experiences, increase learner engagement, and improve course completion rates. This method incorporates game design elements, personalization, platform-specific applications, interactive activities, and learner-centric strategies, offering significant benefits such as enhanced learner satisfaction, immersive learning, and scalability. Specific elements such as achievement badges, leaderboards, points' quests, and progress bars motivate learners, while personalization ensures the relevance and effectiveness of these features. However, challenges such as the relevance of gamified elements to educational outcomes, technical constraints, and varying levels of learner engagement remain significant. These challenges require careful consideration from educators and MOOC designers to optimize the effectiveness of gamification.

The key findings of this study offer valuable insights for MOOC designers and educators seeking to enhance course engagement and completion rates. Specifically, addressing the challenges of personalization and technical constraints could lead to more effective strategies. Additionally, this review highlights the limitations of relying solely on existing literature, as well as the variability of gamification's effectiveness across different learner demographics.

For future research, empirical studies focusing on the diverse learner characteristics that influence gamification's effectiveness are essential. Investigating the long-term effects of gamification on learner retention and success across different types of MOOCs could provide a deeper understanding of its overall impact.

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