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Beyond the ledger: A review of gamification in accounting education (2014-2023)

Carmen Maria Queiro-Ameijeiras[1,2*], Jose Marti-Parreño[1], Elies Seguí-Mas[3]

[1]*Universidad Internacional de Valencia (Spain)*

[2]*Universitat Politècnica de València (Spain)*

[3]*eSMART Research Center for Entrepreneurship, Sustainability, Marketing, Accounting, Corporate Responsibility and Digital Technology, Universitat Politècnica de València (Spain)*

[*]*Corresponding author: cmqueiro@universidadviu.com*

jmartip@universidadviu.com, eseguim@upv.es

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Abstract

Purpose: The use of gamification in education is increasingly used to engage and to motivate students in the learning process. However, research on the application of gamification in accounting education is limited. This study aims to address this research gap by reviewing the academic literature on gamification in accounting Education.

Design/methodology/approach: Using a descriptive exploratory approach, 69 articles were analysed to identify: a) methodological approaches and research designs, b) primary independent and dependent variables in empirical research, c) data analysis techniques, d) major findings (effects), and e) types of gamifications utilized.

Findings: The results show that a majority of studies adopted a quantitative approach (59.42%). Regression analysis emerged as the most frequently used data analysis technique (13.89%), and 67 independent variables and 70 dependent variables were identified. Cognitive effects account for 47.00% of the identified outcomes, followed by affective effects (31.00%) and behavioural effects (22.00%). Serious games created by instructors were the most commonly used form of gamification (37.50%), followed by simulation games (25.00%).

Research limitations/implications: One of the main limitations of this study is that, although two major academic databases (Web of Science and Scopus) were used to collect the sample for analysis, there are other databases and sources that could further enrich the results. Future research could adopt a Systematic Literature Review approach to include additional databases, such as subject-specific repositories or alternative sources like doctoral theses, conference proceedings, and others. Moreover, this study has a language limitation, as it only includes publications written in English, Spanish, and Portuguese.

Practical implications: Gamification has the potential to transform accounting education by making it more interactive and student-centered, encouraging its adoption within educational institutions. This could lead to the design of more effective training programs, enhancing learning outcomes through specialized technological tools. Based on the analysis of the most commonly used game types and variables supporting cognitive, affective, and behavioral effects, this study offers instructors a concrete, evidence-based framework for designing gamified activities tailored to specific accounting learning objectives. Moreover, by identifying the most frequently studied variables and the most commonly used

analytical techniques, researchers and educators are better positioned to direct future investigations or interventions toward unexplored areas and pedagogical innovations.

Social implications: Gamification can promote more inclusive access to accounting education, making it more appealing to students from diverse backgrounds. It also fosters collaboration among students, enhancing their social skills and teamwork abilities. Furthermore, it may positively influence student attitudes and well-being, encouraging a culture of innovation within the educational system.

Originality/value: These findings provide valuable insights for instructors willing to integrate gamification into accounting courses. It also identifies research opportunities related to the use of gamification in accounting education. The analysis of existing studies further allows for the identification of key trends and best practices in gamification application, facilitating its effective adoption by educational professionals and optimizing teaching and learning processes.

Keywords: Accounting education, Gamification, Game-based learning, Serious game, Content analysis, literature review

Jel Codes: A22, M41

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1. Introduction

There is a call for instructors to adopt new learning methodologies such as gamification to enhance students' motivation to learn, stemming from the need to adapt to the new generations and their current situations (Abd-Rahim, Afthanorhan, Ilias, Zin, Abdullah & Ahmad, 2021; Koivisto & Hamari, 2019; Hamari, Hassan & Dias, 2018). This need is aligned with the European Commission's 2015 report on priorities for European cooperation in the field of education and teaching, which highlighted the need for a change so that higher education can respond to the demands of society and the job market (European Commission, 2015). This urgency has been reiterated in subsequent initiatives, such as the European Commission's communication on achieving the European Education Area by 2025 (European Commission, 2020) and the strategic framework for European cooperation in education and training for the period 2021-2030 (European Union, 2021). These frameworks emphasize the necessity of reforms to ensure graduates' employability and competitiveness in the labor market. Also aligned with this rationale, the World Forum on Education called in 2016 for innovation with new specific learning strategies that encourage the development of social and emotional skills (World Economic Forum, 2016). More recent reports from the World Economic Forum continue to emphasize the need for innovative educational strategies that integrate technology to foster essential 21st-century skills (World Economic Forum, 2023). The development of these skills could be fostered using games in education. In fact, there is a long tradition in the academic literature providing examples of pioneering works advocating for the use of games as powerful learning tools (Malone & Lepper, 1987; Malone, 1980; Piaget, 1962).

Salen and Zimmerman (2006) assert that games are systems in which the players engage in an artificial conflict, defined by rules, leading to a quantifiable outcome. The main goal is to achieve a specific outcome or performance at the end of the activity. Moreover, the academic literature highlights the relationship between play and student behaviour, emotions, and cognitive development (e.g. Aries, Vional, Saraswati, Wijaya & Ikhsan, 2020); performance improvement (Moccozet, Tardy, Opprecht & Leonard, 2013; Simões, Vilas, Aguiar & Díaz-Redondo, 2013); and the opportunity to learn from a try-and-error strategy (Kapp, 2012). Games can also stimulate critical thinking and provide students with a sense of control over their learning (e.g. Kapp, 2012). According to Connolly, Boyle, Macarthur, Hainey and Boyle (2012), games manifest an active, experiential process based on problem-

solving and feedback, which enables more effective learning. Games provide an immersive and engaging environment where students can actively participate, make decisions, and learn from the consequences of their actions (Squire, 2008). This interactive and dynamic nature of games promotes a deeper understanding of concepts and enhances the learning experience (Sugahara & Cilloni, 2021; Plass, Homer & Kinzer, 2015). By presenting challenges and opportunities in a problem-solving approach, games offer a platform for active learning and meaningful engagement, leading to increase learning effectiveness (Connolly et al., 2012).

Van-Eck (2006) proposed a game-based learning strategy based on: i) the use of commercial video games used for educational purposes, ii) the use of serious games, and iii) the use of student-authored games. The first strategy involves utilizing existing commercial off-the-shelves (COTs) video games that have potential educational content embedded within them. Therefore, COTs are adapted or used to support learning objectives. Serious games involve the development of games with the primary objective of facilitating learning, this is, serious games are specifically designed to address educational goals while incorporating game elements to engage and motivate learners. Finally, the third strategy is based on students creating their own games, which facilitates the development of skills and problem-solving abilities. This approach allows students to take an active role in the design and implementation of the game, promoting creativity and ownership of the learning process. While Van-Eck's (2006) proposal focuses on video games, Marti-Parreño, Méndez-Ibáñez and Alonso-Arroyo (2016) suggested all these three strategies can be applied to traditional games such as boardgames, pen-and-pencil games, etc.

In the field of business, there is a long tradition in the use of games (mostly simulation-like games) to teach business subjects. It has been pointed out that business games "arrived on the scene in the late 1950s, spawned by the fusion of developments in war games, operations research, computer technology, and education theory" (Keys & Wolfe, 1990: page 307). One pioneering example is *Harvard Business Game* (Baldwin, 1974). The field of entrepreneurship has been especially fruitful in developing gamification approaches (mostly simulations and serious games) to teach the skills needed to become a successful entrepreneur. These approaches include gamification developed for high school and university students (e.g. *Industry Player*), business school students (e.g. *The Balance Sheet Game*), and professionals (e.g. *Sim Venture*) (Bellotti, Berta, De-Gloria, Lavagnino, Antonaci, Dagnino, Ott et al., 2014). Through simulations, participants come to understand the complex interrelationships that exist within a company, providing additional experiences by representing everyday life situations. Therefore, students can experience and solve problems from perspectives that may not be feasible in real life, creating a safe environment for potential errors and facilitating feedback through experimentation (Huebscher & Lender, 2010).

In the field of accounting, the application of games for teaching purposes encompasses various possibilities. These possibilities include board games designed for professional development of practicing accountants such as *MG* (Sugahara & Lau, 2019), as well as games used at the university level such as *Easy-Cost* (Alves, da-Silva & Damasceno, 2019). Some games are specifically designed to assess the development of accounting competencies, such as *Platform Wars Simulation* (Calabor, Mora & Moya, 2018). Other games, like *Accounting Challenge* (Seow & Wong, 2016), address different knowledge levels. These games provide interactive and engaging environments that facilitate the acquisition and application of accounting knowledge and skills in various educational settings. COTs games have also been used in accounting education. For example, *Monopoly* (Vijayakumar-Bharathi & Kulkarni, 2020) and *LEGO* (Elkelish & Ahmed, 2021). Simulation-based games include *Anaplan* (Sidorova, Kopus & Yurasova, 2023), *BugaMap* (Queiro-Ameijeiras, Martí-Parreño & Summerfield, 2019), *Jacket Factory* (Eckhaus, Klein & Kantor, 2017), *Game-BSG* (Durso, Reginato & Cornacchione, 2017), and *Working Capital Simulation* (Carenys, Moya & Perramon, 2017a; 2017b) among others.

Despite a growing trend in the use of gamification in accounting education, Rosli, Khairudin and Saat (2019) pointed out that there has been limited research exploring how gamification is used in accounting education. This scarcity of research prevents to better understand how this stream of research is developing along with the effects and benefits of using gamification in accounting education. The literature on gamification in accounting education has shown sustained growth in recent years, highlighting its positive effects on student motivation, knowledge retention, and the development of cognitive and social skills (Sugahara & Cilloni, 2021; Sidorova et al., 2023). However, there remains a limited systematic understanding of how this topic has been examined within academic research.

To date, existing reviews focus on highly specific aspects. For instance, the bibliometric studies by Bhavani, Mehta and Dubey (2020) and Morales-Sierra, Cardona-Valencia, Castañeda-Gómez, Uribe-Ortiz and Ríos-Gallego (2020) provide a quantitative overview of publication trends, but do not examine content, methodologies, or empirical findings. Similarly, Rincón, Solano and Lemos-de-la-Cruz (2021) focus on the use of simulators in accounting education but overlook other gamification strategies and their associated outcomes. The review by Carenys and Moya (2016) offers a more comprehensive perspective but is limited to digital game-based learning (DGBL), without addressing other forms of gamification such as board games, analog simulations, or hybrid strategies. Furthermore, it does not provide a systematic breakdown of methodological approaches or the types of variables studied.

Despite these contributions, no review to date has offered an integrated analysis of the cognitive, affective, and behavioral effects of gamification in accounting education. Nor has there been a structured evaluation of the methodological evolution of the field, including the types of gamification employed, the analytical techniques applied, and the most frequently studied variables. This lack of integration limits the ability to identify key trends, research gaps, and best practices in the field.

In this context, the present study aims to provide a comprehensive and structured overview of gamification in accounting education. It analyzes 69 academic articles using an exploratory and descriptive approach to identify prevailing methodological frameworks, independent and dependent variables, data analysis techniques, key findings, and types of gamification applied. This contribution seeks to establish a solid foundation for future research and to inform the improvement of pedagogical practices in accounting education.

Additionally, this review updates and expands the existing literature by incorporating recent studies published in high-impact journals in education and accounting (e.g., *Computers & Education*, *Journal of Accounting Education*, *Educational Technology & Society*), thereby enhancing the study's relevance.

To achieve this objective, the study is guided by the following research questions (RQs):

- *RQ1: Which are the main methodological approaches (quantitative, qualitative, mixed-methods) and research designs (e.g. statistical) used in this stream of research?*
- *RQ2: Which are the main independent and dependent variables used in empirical research in this stream of research?*
- *RQ3: Which are the main data analysis techniques used?*
- *RQ4: Which are the main findings (effects) of the studies (e.g. cognitive, affective, etc.)?*
- *RQ5: Which type of gamification is being used in accounting education?*

By addressing these research questions, this study will contribute to the literature of gamification and accounting education providing instructors with a better knowledge of how gamification is used in accounting education and for what purposes. It will also provide researchers with useful information regarding research gaps that might be addressed in future research. Therefore, this study will provide valuable insights to the existing knowledge of the use of gamification in accounting education. To achieve these goals, firstly, the academic literature on gamification is addressed. Secondly, the methodology used in this study is explained. Thirdly, the results are presented. Finally, the conclusions, limitations, and future research lines are presented.

2. Literature Review

According to Braghirolli, Ribeiro, Weise and Pizzolato (2016) the academic literature uses a wide range of terms to describe and refer to games in educational contexts, including digital games for learning, game-based learning, simulators, educational entertainment games, serious games, among others. However, Martí-Parreño et al. (2016) found in their literature review that the most common terms used in the academic literature were Game-Based Learning (GBL), used in 33.1% of the cases; serious game, used in 25.9% of the cases; and gamification, used in 7.19% of the cases. Game-based learning (GBL) includes "a whole plethora of experiences ranging from the use of full-fledged games (both commercial and educational) to the inclusion of isolated game elements in the learning process in the so-called gamification" (Martí-Parreño, Oceja-Castañedo & Kocadere, 2022: page 2521). Plass et al. (2015) approached the definition of Game-Based Learning (GBL) from a psychological and

educational perspective. Please note that whereas gamification can be applied in different settings (e.g. business), GBL applies only to educational contexts.

The concept of serious games was coined by Abt (1970) and refers to games that are not just intended for entertainment purposes but have an explicit and carefully designed educational purpose. Serious games gained momentum with the advent of computer-based systems and are usually presented in the shape of tailored-made video games with educational purposes or COTs video games. It has been pointed out that using COTs rather than tailored-made computer games have several advantages including "their low cost, advanced graphics, and the possibility to reach millions of individuals worldwide" (Pallavicini, Pepe & Mantovani, 2021: page 1). However, it is important to emphasize that "not all commercial video games are equal, and their effects strongly depend on specific characteristics of the games" (ibidem).

Simulations have been conceptualized as instruction delivered through a personal computer that immerses learners in a decision-making exercise in an artificial environment, aiming to understand the consequences of their decisions (Carenys et al., 2017a; 2017b). Please note that, like in the case of serious games, although simulations are usefully computer-based, the academic literature also provides examples of non-computerized simulation games (Keys & Wolfe, 1990).

Finally, the term "gamification" was first documented in 2008 (Paharia, 2010) and gained momentum in the mid-2010s as "the use of game design elements in non-game contexts" (Deterding, Khaled, Nacke & Dixon, 2011: page 9). This broad approach of the use of game design elements in non-game contexts applies not only to education but also to other settings such as advertising (e.g. the so-called advergames or marketing communications video games). For Huotari and Hamari (2017), gamification refers to the design of systems, services, and activities that can generate experiences and motivations similar to those of games, with the additional objective of influencing user behavior. Deterding et al. (2011) laid the groundwork for this definition, which has been widely adopted in subsequent research. This conceptual framework is essential for understanding how gamification can transform educational environments by making learning more engaging and interactive. In contrast, Landers (2014) delves deeper into the theory of gamified learning, establishing a connection between serious games and gamification in educational contexts. Consequently, his study is of significant importance for comprehending the theoretical foundations of gamification.

Recent studies have expanded the understanding of gamification by integrating adaptive technologies and personalized learning pathways. For instance, Zhang and Huang (2024) explored the impact of adaptive gamified assessments in blended learning environments, highlighting improvements in learner motivation and engagement. Yang, Fang, Xu, Zhang and Pan (2024) explore how gamification can enhance various aspects of learning motivation within metaverse environments, contributing to improved learning outcomes and increased engagement. Sudsom and Phongsatha (2024) compare forgetting and retention strategies in gamified assessments versus formative assessments, examining their impact on learning motivation.

Therefore, gamification encompasses a broad conceptualization that applies not only to games but the elements of game design in general. It goes beyond restricting the use of a specific game but instead involves transforming an educational setting into a game-like experience by incorporating game elements (Hanus & Fox, 2015). A standard gamified learning activity can include the use of rewards, rules, leaderboards, and other game-related elements to create a more engaging and interactive learning environment (Sailer, Hense, Mandl & Klevers, 2013).

The implementation of gamification in higher education and virtual learning environments has garnered increasing interest in recent research. Systematic studies have begun to explore students' perceptions of gamification and its impact on learning. For instance, Pegalajar-Palomino (2021) conducted a systematic review on student perceptions in higher education, finding that gamification can significantly enhance student motivation and engagement. This finding is crucial, as student acceptance and positive perception of gamification are essential for its success as an educational tool. Additionally, Sailer et al. (2013) contribute psychological perspectives on motivation through gamification, which are fundamental for understanding how game elements can influence the learning process. Khaldi, Bouzidi and Nader (2023) highlight a growing use of storytelling, challenges, personalized feedback, and the sustained positive effects of these elements on student engagement in higher education.

As a summary, we can state that gamification is the broadest approach to the use of game elements in all non-game contexts ("not just for fun") including business, personal development, and education. GBL applies games specifically in the educational context. Serious games and simulations are game-like tools used in gamification and GBL. Figure 1 depicts a graphical representation of this typology of the use of games in education. Table 1 provides a conceptualization of gamification and related constructs.

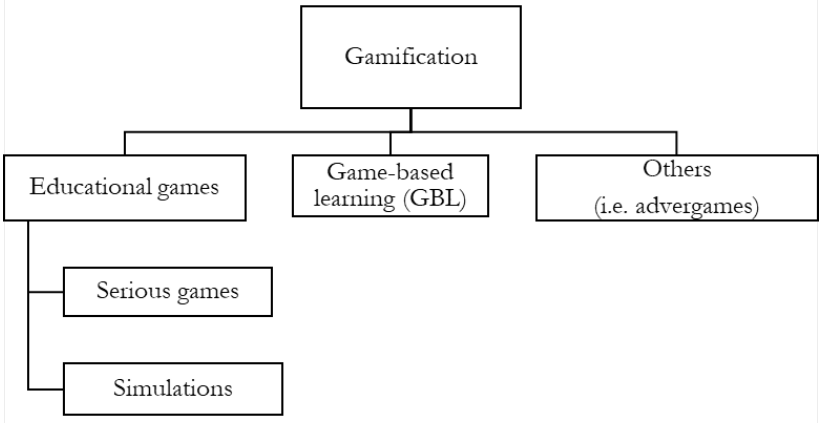

Figure 1. Typology of the use of games in education

Construct	Conceptualization	Source
Gamification	Using techniques, mechanics, and dynamics of games in non-game contexts.	Huotari and Hamari (2017); Deterding et al. (2011)
Game-based learning	The use of commercial or educational games is identified as being associated with entertainment and is applied exclusively within educational settings.	Plass et al. (2015); Pivec, Dziabenko and Schinnerl (2003)
Serious games	Serious games are specifically designed to facilitate learning and to promote the development of skills and competencies.	Gürbuz and Celik (2022); Abt (1970)
Simulations	Instruction delivered through a personal computer that immerses learners in a decision-making exercise in an artificial (simulated) environment	Carenys et al. (2017b); Sitzmann (2011)

Table 1. Conceptualization of gamification and related constructs

Regarding the benefits of using a gamified approach in education, the academic literature provides broad evidence of positive effects on cognitive, affective, and behavioural outcomes. For example, Platz (2022) suggests advantages of GBL concerning subject knowledge when compared to other methodologies. López-Fernández, Gordillo, Lara-Cabrera and Alegre (2023) found out that two instructor-authored educational video games of different genres were effective from a knowledge acquisition and motivational perspective. Zhan, He, Tong, Liang, Guo and Lan (2022) examined the effects of game types, gamification applications, pedagogical agents, programming types, and schooling levels on students' academic achievement, cognitive load, motivation, and thinking skills, finding out that gamification has positive effects on students' motivation and academic achievement. (Plass et al., 2015)

In addition to its general benefits, gamification has proven effective in developing specific skills across various disciplines. García-Álvarez, González-Rivas, Marín-Uribe and Soto-Valenzuela (2022) conducted a systematic review on the application of gamification strategies in the academic training of physical education teachers, demonstrating how gamification can facilitate the acquisition of practical skills and enhance performance in this field. The application of gamification extends across different educational levels; for example, Faure, Calderón and Gustems (2022) carried out a systematic review on digital gamification in secondary education, also reporting positive outcomes in terms of student motivation. These studies highlight the versatility of gamification and its potential to improve education across multiple contexts and levels. In the field of accounting

education, it may offer similar benefits in terms of practical skill development and active student engagement. Furthermore, Puig, Rodríguez, Rodríguez and Gallego (2023) evaluated learner engagement with gamification in online courses, finding that well-designed gamified elements can significantly increase student participation and satisfaction. This suggests that incorporating gamification into accounting education could lead to higher levels of student involvement and improved learning outcomes.

Previous research has also identified different effects of using games in accounting education. From a cognitive perspective, the academic literature highlights numerous benefits associated with the use of games in accounting learning, including an enhancement of knowledge retention (Moncada & Moncada, 2014; Rosli et al., 2019), critical thinking and problem-solving abilities (Rosli et al., 2019; Silva, Rodrigues & Leal, 2019; Morales-Sierra et al., 2020), and better integration between theory and practice (Bhavani, et al., 2020). Students also develop competencies through simulating scenarios (Lozano-Abad, Rosales-Doria & Giraldo-Cardozo, 2018) which contribute to enhancing decision-making skills, a fundamental competence for accounting professionals (Silva, Freitas-Santos & Vieira, 2014; Urquiza, Cerezo & Arce, 2014; Cunningham, 2014).

From an affective perspective, games and gamification elements enhance concentration and engagement in learning (Morales-Sierra et al., 2020; Silva, et al., 2019). The affective effects associated with increased motivation are attributed to the appeal and enjoyment of the material (Moncada & Moncada, 2014) or the inherent fun of games (Rosli et al., 2019). Philips and Graeff (2014) concluded that through gamified simulations students gained confidence, satisfaction, and enjoyment in the learning process. Also, Malaquias, Malaquias and Hwang (2018) pointed out that games' usefulness perception has a positive influence on the motivation to use games, leading to improved student attitudes towards academic content (Bhavani, et al., 2020; Dichev & Dicheva, 2017).

Finally, from a behavioural perspective, the use of games has been found to significantly increase active student participation in the learning process (Morales-Sierra et al., 2020; Cano, Chamizo & Curós, 2019; Rosli, et al., 2019; Moncada & Moncada, 2014). Beatson, Gabriel, Howell, Scott, van-der-Meer and Wood (2019) pointed out that consistent and continuous participation in gamified activities can enhance concentration, interest, and engagement compared to traditional teaching methods. The integration of gamified activities in the classroom allows for the natural introduction of technology, aligning with the perceptual and leisure habits of new generations, as advocated by Tandiono (2021). Another behavioural aspect identified in the literature is the development of practical skills that can contribute to enhancing employability, with a special emphasis on teamwork (Silva et al., 2019; Magueta & Veloso, 2017), social interaction (Abd-Rahim et al., 2021), and communication skills (Silva et al., 2014). Armenia, Barnabè, Nonino and Pompei (2024) also found that gamification enhances participation, communication, and teamwork, while fostering social interaction and collaborative work.

These findings reinforce the idea that the use of games in education, and particularly in accounting, is not only a motivational tool but also an effective pedagogical strategy for developing transversal competencies. In this regard, Wolk and Nikolai (1997) had already emphasized the need for accounting education to foster the comprehensive development of both technical and interpersonal skills. This perspective remains relevant today, as methodologies such as gamification and simulations offer experiential learning approaches that contribute to shaping more well-rounded professionals capable of adapting to dynamic and demanding environments. As Barr (2018) suggests, gamification may have a significant impact on learning, and its implementation in accounting education is increasingly viewed as a promising avenue for enhancing student motivation, engagement, and performance.

In recent years, technological development has significantly expanded the scope and effectiveness of gamification in higher education. Learning management systems (LMS), such as Moodle and Canvas, have incorporated gamified features such as badges, levels, and leaderboards. Likewise, emerging technologies such as artificial intelligence (AI) and adaptive learning enable the personalization of gamified experiences based on students' profiles, performance, or cognitive styles (Marisa, Supriyanto, Hardiyanto & Musrifatun, 2020). However, recent literature also acknowledges potential limitations. For example, Sailer, Hense, Mayr and Mandl (2017) highlight the risk of superficial participation if game elements are not meaningfully aligned with learning objectives. Moreover, Koivisto and Hamari (2019) suggest that excessive reliance on extrinsic rewards may

undermine long-term motivation. Therefore, the design and implementation of gamified strategies must be pedagogically grounded and contextually adapted to sustain engagement and foster meaningful learning.

3. Method

This study uses a multi-method approach involving bibliometric analysis and content analysis. Thus, by scrutinizing a sample of studies in a shared thematic domain, a literature review strives to deduce overarching principles and/or paradigms grounded in assertions unearthed within the academic corpus (Pasadeos, Phelps & Kim, 1998).

3.1. Sample Description

All documents were retrieved from two major academic databases: Web of Science (WoS**)** and Scopus. These platforms are widely recognized for their comprehensive coverage of peer-reviewed literature and have been extensively used in academic studies (Li, Rollins & Yan, 2018).

In the case of Web of Science, the search strategy included the terms "*gamification*," "*educational games*," "*game-based learning*," "*serious games*," and "*simulation*." The selection of these keywords was based on their frequent appearance in the academic literature addressing the use of game elements in education (Queiro-Ameijeiras, Martí-Parreño & Calma, 2018; Martí-Parreño et al., 2016). The specific search query applied in WoS on December 18, 2023, was: TS= ((gamification OR "educational games" OR "game-based learning" OR "serious games" OR "simulation") AND (accounting OR accountability)). Since some of these keywords may also be relevant in fields outside education or business (e.g., biology or medicine, as noted in Rincón et al., 2021), data refinement was performed by restricting the search to relevant research areas. All categories were excluded except "Education Educational Research," "Business," "Management," "Finance," and "Economics." The language filter was limited to English, Spanish, and Portuguese, and document types were restricted to journal articles and conference proceedings. This search resulted in an initial dataset of 797 documents. Following the PRISMA protocol (Page, McKenzie, Bossuyt, Boutron, Hoffmann, Mulrow et al., 2021), the authors screened titles and abstracts to ensure alignment with the inclusion criteria—specifically, that the study focused on the use of gamification in accounting education. After this screening, a total of 45 documents from WoS were selected for further analysis. The PRISMA flow diagram is presented in Appendix A.

In the case of Scopus, the search was conducted using the fields Title, Abstract, and Keywords, with the following strategy: TITLE-ABS-KEY ((gamification OR "educational games" OR "game-based learning" OR "serious games" OR "simulation") AND (accounting)). This query yielded 28,314 records, which were then refined by limiting the subject areas to "Social Sciences" and "Business, Management and Accounting." Other areas were excluded, except for "Economics, Econometrics and Finance," "Decision Sciences," and "Computer Science." The search was further restricted to the same publication years and languages as those used for the WoS query. After applying these filters, 613 documents remained. These records were exported to an Excel file including author, title, abstract, keywords, year, and source of publication, among other metadata. The researchers then carefully reviewed titles and abstracts to verify relevance according to the same inclusion criterion: that the study addressed gamification in accounting education as its main focus. This resulted in a selection of 42 relevant documents from Scopus. The PRISMA flow diagram is presented in Appendix B.

Subsequently, the results from both databases were cross-checked to identify and eliminate duplicates and errata. After this final data refinement process, a total of 69 unique articles were retained as the final sample for analysis. As noted by Goh and Ritchie (2011), this sample size is appropriate for exploratory research of this nature.

Figure 2 provides the distribution pattern based on the year of publication of the documents. Additionally, we provide the main venues of publication (journals), along with knowledge areas, and geographical distribution of the studies in Appendix C.

Regarding the distribution pattern, our sample exhibits a two-year cycle peaks of production starting from 2017 (Figure 2) suggesting a recurrent interest on the subject over time. In terms of publication venues, *Accounting Education* ranks number one with 10 articles published on the topic, followed by *Journal of Education for Business*, *Journal of Higher Education Theory and Practice*, and *Issues in Accounting Education* with three publications each. In

terms of knowledge areas, in Wos, 20 articles are classified under *Education & Educational Research*, while 19 were categorized under *Business*. Two publications were identified in both the *Business and Management* areas. Furthermore, one publication has been categorized under *Business and Management*, spanning across all three categories: *Business, Education & Educational Research*, and *Management*. In Scopus, 23 articles were categorized under both *Business, Management and Accounting and Social Sciences*, 17 were classified exclusively under *Social Sciences*, and only 3 articles were listed solely under *Business, Management and Accounting*. Lastly, the geographic distribution of the studies depicts a total of 18 countries where this research has been conducted. The main countries based on the number of studies include Spain (15 publications), followed by USA (11), Malaysia and Portugal with 7 studies each, Brazil with 5 publications, and Indonesia with 4 studies.

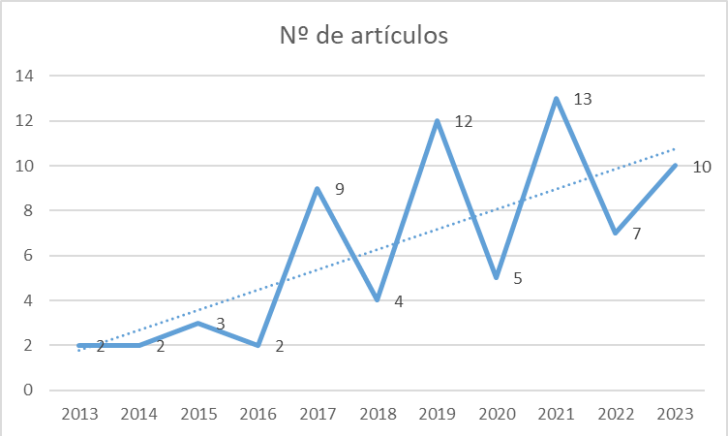

Figure 2. Distribution pattern of the sample

3.2. Coding Categories

The sample was content-analysed using a total of 63 categories. Four categories were used to analyse the methodological approach (conceptual/theory, quantitative, qualitative, and mixed method research). Twenty-two categories were used to analyse the research design (e.g. bibliometric analysis, lab experiment, webography, etc.). The data analysis techniques were coded using twenty-nine categories (e.g. ANOVA/MANOVA, Bayesian analysis, canonical correlation, etc.). The type of gamification was also coded using 5 categories from game-based learning to simulation-based games. To analyse the main results, we have used Faria's (2001) approach, which uses three coding categories for effects: cognitive, affective, and behavioural. Appendix D presents the coding categories.

The coding scheme was primarily informed by previous literature, particularly the framework developed by Malhotra (2020), which provided a foundational structure for classifying methodological approaches and data analysis techniques. Rather than emerging inductively during the review, the categories were adapted and expanded from this established framework to fit the specific context of gamification in accounting education. This approach ensures methodological consistency and theoretical grounding.

Regarding the inclusion of terms such as *"simulation"* and *"educational games"* in the search strategy, although we acknowledge that these terms were not considered in the cited literature (Li et al., 2018), we decided to include them due to their relevance to gamification for several reasons. First, a previous bibliometric review identified these terms as the most frequently used (Queiro-Ameijeiras et al., 2018). Second, the literature review suggests that these terms are often used interchangeably to refer to the use of games or game elements in education (Martí-Parreño et al., 2016). Finally, excluding terms such as *simulation*, which is highly relevant in the field of business studies in general and, in particular, in accounting, could result in the omission of relevant works in our search (Kuang, Adler & Pandey, 2021).

4. Results

4.1. Main Methodological Approaches

RQ1 addresses the main methodological approaches (quantitative, qualitative, mixed methods) and research designs (e.g. statistical) used in this stream of research. Table 2 summarizes the main methodological approaches and research designs used in the reviewed studies. A clear pattern emerges linking each methodological approach to specific types of research design, revealing underlying research logics and priorities in the field.

Studies employing a quantitative approach (59.42 %) most frequently adopt statistical (41.76 %) and survey-based designs (14.29 %), reflecting a strong emphasis on measuring the impact of gamification through numerical data, often with large sample sizes. The presence of quasi-experimental (17.58 %) and pre-experimental (1.1 %) designs underlines the interest in evaluating causal relationships between gamified interventions and learning outcomes.

In contrast, qualitative studies (18.84 %) are more closely associated with designs such as case studies (7.69 %), in-depth interviews (4.4 0%), and content analysis (4.40 %). These designs suggest a focus on exploring the context, perceptions, and processes involved in implementing gamification, rather than generalizing outcomes across broader populations.

Mixed-method research (14.49 %) appears to bridge these two paradigms, often combining statistical tools with qualitative methods such as interviews or case studies, to provide both breadth and depth. Although not always explicitly labeled as such, many studies integrate data sources to capture both student performance and experience.

The category of conceptual/theoretical work (7.25 %) is linked to designs such as literature reviews (5.49 %) and bibliometric analysis (1.1 %), which aim to synthesize existing knowledge or map the evolution of the field.

Overall, this relationship between methodological approaches and research designs demonstrates a methodological alignment that reflects the diverse aims of the literature—ranging from assessing effectiveness, to understanding implementation, to building theoretical frameworks. Table 2 provides the main methodological approaches and research designs.

Methodological approach		Research design	
Quantitative	59.42%	Statistical	41.76%
		Quasi experimental	17.58%
		Survey	14.29%
		Experimental	1.1%
		Preexperimental	1.1%
Qualitative	18.84%	Case study	7.69%
		Content analysis	4.40%
		In-depth interview	4.40%
		Observation	1.1%
Mixed method research	14.49%	Combined designs (e.g., surveys + interviews, case studies + statistical tests)	–
Conceptual/theory	7.25%	Literature review	5.49%
		Bibliometric analysis	1.1%

Table 2. Methodological approaches and research designs of the studies.

Note: some studies employed more than one research design. The categorization reflects the main designs identified within each methodological approach.

4.2. Main Independent and Dependent Variables

RQ2 seeks to identify the main independent and dependent variables used in empirical research in this stream of research. A total of 67 independent variables and 70 dependent variables were identified in the sample. Based on

their frequency the top independent variables in our sample include methodology of gamification, game experience, participation, perception of gamified tool, perception about the gamification, autonomy, challenge, motivation, social interaction and attitude. Top dependent variables include motivation, perceived learning, satisfaction, learning outcomes, academic performance, engagement, flow, enjoy, comprehensive and collaboration. Table 3 provides the top 10 independent and dependent variables based on frequency in our sample.

Independent variables	% of the sample	Dependent variables	% of the sample
Methodology of gamification	6.77 %	Motivation	8.67 %
Game Experience	5.26 %	Perceived learning	6,00 %
Participation	4.51 %	Satisfaction	6.00 %
Perception of the gamified tool	4.51 %	Learning outcomes	4.67 %
Perception about the gamification	3.01 %	Academic performance	4.00 %
Autonomy	3.01 %	Engagement	4.00 %
Challenge	3.01 %	Flow	3.32 %
Motivation	2.26 %	Enjoy	3.32 %
Social interaction	2.26 %	Comprehensive	2.67 %
Attitude	2.26 %	Collaborative	2.67 %

Table 3. Top 10 independent and dependent variables based on frequency

4.3. Main Data Analysis Techniques

Regarding the main data analysis techniques used in this stream of research (RQ3), the results show 21 different data analysis techniques with linear regressions being the most used data analysis techniques (13.89 %) followed by both structural equation modelling (SEM) and content analysis (9.72 %). ANOVA represented 6.94 % while partial least squares (PLS) comprised 1.39% of the top 5 data analysis techniques based on frequency in our sample. Table 4 presents a representative selection of ten studies from our sample, offering detailed information on the methodological approaches, research designs, independent and dependent variables, and data analysis techniques employed. The studies were chosen based on their thematic relevance, methodological rigor, and/or the innovative nature of the gamification strategies implemented. For instance, works such as Kuang, Agustina and Monalisa (2023), Silva, Rodrigues and Leal (2021), and Carenys et al. (2017b) demonstrate strong methodological design and execution, while Malaquias, Malaquias, Borges-Junior and Zambra (2018) and Seow and Wong (2016) stand out for their original approaches to gamification.

This selection is not intended to be exhaustive but rather illustrative of the most salient methodological trends identified in our systematic review. Specifically, the table highlights how different methodological approaches (quantitative, qualitative, and mixed methods) are combined with specific research designs (e.g., case studies, quasi-experimental, exploratory designs), reflecting the conceptual and methodological diversity in the field.

Source	Methodological Research design	Variables		Data analysis technique
		Independent	Dependent	
Kuang et al. (2023)	Quantitative Statistical	Ease of use, Perceived usefulness, Learning opportunities, Curriculum relatedness, Experience of use, DGBL frequency	Intention to use, Ease of use, Perceived usefulness, Learning opportunities	Structural Equation Modeling (SEM)
Sercemeli & Baydas-Onlu (2023)	Quantitative Statistical	Competition, Entertainment experienced, Engagement, Expected Outcome, Intention of use, Students' perceptions of a Gamified Learning Environment, GLE scores, Participation, Pre-midterm and post-midterm participation levels	Perceived learning, Academic performance, Relation GLE scores and participation levels, Pre-midterm and post-midterm GLE scores, Response speed	Linear Regression ANCOVA
López-Hernández, Lizarraga-Álvarez & Soto-Pérez (2023)	Mixed method research Statistical Observation	Experiential learning, Learning Motivation, Self-efficacy	Actual Academic performance, Self-perceived academic performance	Partial least squares (PLS) Repeated measures analysis Content analysis
Ortiz-Martínez, Santos-Jaén & Palacios-Manzano (2022)	Quantitative Statistical Quasi-experimental	Average score, Average subject score	Continuous Assessment Score, Exam Score, Subject mark	Linear regression
Kuang et al. (2021)	Quantitative Statistical Quasi-experimental	Methodology of gamification	Higher-Order Thinking, Knowledge Retention long-term	ANOVA
Silva et al. (2021)	Quantitative Statistical	Motivation, Attitude, Flow	Perceived Learning, Attitude, Motivation	Structural Equation Modeling (SEM)
Silva et al. (2019)	Quantitative Statistical Quasi-experimental	Concentration, challenges, Autonomy, Social interaction, Perceived learning, Clarity, Feedback	Flow	Structural Equation Modeling (SEM)
Malaquias, Malaquias, Borges-Junior et al. (2018)	Quantitative Statistical Quasi-experimental	Methodology of gamification	Academic performance	Descriptive Statistic
Carenys et al. (2017b)	Quantitative Statistical	Type of learning environment used: Methodology of gamification	Attributes, Motivation, Learning outcomes.	Factor Analysis, mean, t-test
Seow & Wong (2016)	Quantitative Statistical	Perception of the gamified tool	Motivation, Attitude, Flow, Perceived learning.	Descriptive Statistics

Table 4. Methodological approach, research designs, theoretical framework, variables under analysis, and data analysis technique used in the studies from selected papers

4.4. Main Findings (Effects) of the Studies

Regarding the main findings (effects) of the studies (RQ4), 47.00 % of the identified effects are cognitive, followed by affective effects (31.00 %), and behavioural (22.00 %). For example, Kuang et al. (2023) examined factors determining the intention of accounting and business lecturers in Indonesia to use digital games in their courses. The researchers find out that both perceived ease of use and perceived usefulness are the factors significantly determining lecturers' behavioural intention to use digital games in class. Table 5 provides a selection of papers with the identified effects. As previously mentioned, these studies were chosen based on their methodological rigor and the innovative nature of the gamification strategies they examine.

Source	Title	Educational level	Effect	Main findings
Kuang et al. (2023)	Acceptance of digital game-based learning by accounting and business lecturers: empirical evidence from Indonesia based on the extended Technology Acceptance Model	Higher Education (Degree studies)	Affective Cognitive	Perceived usefulness, ease of use, learning opportunities, and curriculum-relatedness, are important in predicting the behavioural intention towards Digital Game-Based Learning (DGBL).
Sercemeli & Baydas-Onlu (2023)	Prediction of students' learning outcomes by various variables in gamified online accounting courses	Higher Education (Degree studies)	Affective Cognitive	Expected outcome and engagement significantly predicted perceived learning.
López-Hernández et al. (2023)	Enhancing learning of accounting principles through experiential learning in a board game	Higher Education (Degree studies)	Affective Cognitive	Positive correlation between experiential learning and self-perceived performance.
Ortiz-Martínez et al. (2022)	Games in the classroom? Analysis of their effects on financial accounting marks in higher education	Higher Education (Degree studies)	Cognitive	Gamified activities improve students' outcomes.
Kuang et al. (2021)	Creating a Modified Monopoly Game for Promoting Students' Higher-Order Thinking Skills and Knowledge Retention	Higher Education (Degree studies)	Affective Cognitive	Enjoyment, enthusiasm, and greater knowledge retention in gamified activities.
Silva et al. (2021)	Game based learning in accounting education: which dimensions are the most relevant?	Higher Education (Degree studies)	Affective Behavioral	Motivation and attitude influence perceived learning. Flow alone is not sufficient to impact learning.
Silva et al. (2019)	Play it again: how game-based learning improves flow in accounting and marketing education.	Higher Education (Degree studies)	Affective Behavioral	Concentration, challenge, autonomy, interaction, fun, and entertainment have a positive influence on flow.
Malaquias, Malaquias, Borges-Junior et al. (2018)	The use of a serious game and academic performance of undergraduate accounting students: an empirical analysis	Higher education (Degree studies)	Cognitive	Improved academic performance.
Carenys et al. (2017b)	Is it worth it to consider videogames in accounting education? A comparison of a simulation and a videogame in attributes, motivation and learning outcomes	Higher education (Post graduate studies)	Affective Cognitive	Enjoyment and satisfaction are higher in Virtual Design Games. Transfer of knowledge to the professional world is higher in simulations.
Seow & Wong (2016)	Using a mobile gaming app to enhance accounting education	Higher education (Degree studies)	Affective Cognitive	The students exhibit high satisfaction with the app, which is perceived as challenging and conducive to facilitating learning.

Table 5. Main findings of the studies (selected papers)

4.5. Type of Gamification

Finally, addressing RQ5, our findings reveal the prevalence of different gamification types in accounting education. Specifically, 37.50 % of the sample utilized serious games authored by the instructor (e.g., López-Hernández et al., 2023; Selamat & Naglim, 2022), followed by simulation-based games (e.g., Sidorova et al., 2023; Calabor et al., 2018) with 25.00 % and game-based learning approach with 23.44 % (e.g., Sercemeli & Baydas-Onlu, 2023; Ortiz-Martínez, Santos-Jaén & Marín-Hernández, 2023) of the sample. Additionally, only 14.06% of the sample incorporated Commercial Off-The-Shelf (COTs) games such as Monopoly (e.g., Kuang et al., 2021).

5. Discussion

This study provides a detailed overview of the application of gamification in accounting education, highlighting both the methodologies employed and the theoretical foundations underlying research in this emerging field. A key feature of our work is the categorization system used to organize and classify the reviewed studies. This system encompasses various dimensions of gamification use, such as dependent and independent variables, the types of gamification employed, and the methodologies applied. This categorization structure has been essential in interpreting the results, offering a clear view of observed trends and patterns, as well as identifying gaps that contribute to the robustness of research in the field.

Our findings emphasize the predominance of quantitative approaches, particularly statistical designs such as Structural Equation Modeling (SEM), linear regression, and ANOVA, which together account for over 30 % of the studies in our sample. This predominance aligns with broader trends in the social sciences, where quantitative methods are often preferred for their ability to yield generalizable results and statistical validity (Hulland & Houston, 2020). While this trend is not surprising given the established reputation of quantitative methods, we believe it highlights a significant opportunity to incorporate qualitative approaches that could offer deeper insight into the lived experiences of students and instructors. The integration of qualitative methods could enrich the understanding of individual and contextual processes and provide a more comprehensive perspective on how gamification impacts learning outcomes in real educational settings.

Methods such as case studies, ethnographies, or in-depth interviews anchored in theoretical frameworks like Self-Determination Theory (Deci & Ryan, 1985), for example, could shed light on how specific gamified elements interact with students' basic psychological needs for autonomy, competence, and relatedness. While a quantitative study may indicate increased motivation, a qualitative approach could explain *how* and *why* this motivation emerges, thereby enhancing the ecological validity of the findings.

One of the most notable findings is the scarcity of conceptual or theoretical studies in the literature, with only 7.25 % of the papers in our sample falling into this category. This finding reflects similar trends in other academic fields, where empirical research often overshadows theoretical contributions. However, in an emerging area such as gamification in accounting education, the lack of a solid theoretical foundation poses a significant vulnerability. We argue that theoretical studies play a fundamental role in offering robust explanatory frameworks to guide applied research and to interpret observed effects from a more integrated perspective. Frameworks such as Self-Determination Theory, developed by Deci and Ryan (1985), and Flow Theory, introduced by Beck (1992), have already proven useful in explaining the impact of gamification on motivation and engagement. Moreover, the integration of combined theories, as recommended by Putz and Treiblmaier (2015) and Suckake (2019), would not only provide a more holistic view but also enhance the triangulation validity of the findings, thereby contributing to a more robust empirical basis for gamification strategies. In this regard, we consider that future research should place greater emphasis on theoretical approaches, as they offer the necessary foundation for advancing empirical work and achieving a broader understanding of gamification.

With regard to variables, we identified a wide range of independent and dependent variables used across the analyzed studies. Our categorization system allowed us to classify these into three main groups: cognitive, affective, and behavioral. This classification facilitated the identification of the most researched areas and those that still require attention. The most commonly studied dependent variables—such as motivation, satisfaction, and flow—are closely aligned with the theoretical models identified by Krath, Schürmann and Von-Korflesch (2021) in their review of gamification research. For instance, motivation was the most frequently examined variable in our sample, underscoring its central role in gamification studies and the pressing need to identify methodologies that positively influence accounting students' learning.

When addressing the cognitive, affective, and behavioral effects of gamification in accounting education, our findings provide compelling evidence of its positive effects on learning outcomes, particularly in terms of memory retention and student engagement. However, it is important to highlight that, while cognitive and affective dimensions have received considerable attention, behavioral outcomes remain underexplored. Future research should design studies that capture long-term and higher-order behavioral outcomes, such as decision-making and problem-solving skills. These may involve the use of behavior-based performance metrics.

Linking these behavioral effects to theoretical frameworks such as Ajzen and Fishbein's (1980) Theory of Reasoned Action and Bandura's (1986) Self-Efficacy Theory could provide a solid conceptual basis for exploring how gamified experiences translate into enduring professional competencies, rather than merely producing short-term academic gains.

In terms of types of gamification, our findings reveal that Commercial Off-the-Shelf (COTS) games are the least utilized in accounting education. This is surprising, as COTS games are readily accessible and provide engaging learning experiences, suggesting that there may be barriers limiting their adoption. One possible explanation could be the difficulty in adapting these games to the specific learning objectives of the accounting discipline, or a general preference for more tailored solutions such as serious games.

This is a critical issue that deserves further investigation to understand the reasons behind the limited use of COTS games, despite their potential benefits in terms of cost-effectiveness and accessibility. For example, exploring educators' perceptions and needs regarding COTS games, as well as analyzing success stories in other disciplines, could help develop more effective implementation strategies. It would also be valuable to explore hybrid models that combine the accessibility of COTS with customized elements. By understanding and overcoming these barriers, we may unlock a vast repository of potentially effective and low-cost learning resources, thereby expanding the gamified toolkit available to accounting educators.

6. Conclusion, Limitations & Future Research

Our findings indicate that research on gamification in accounting education is gaining momentum, with a noticeable diversity in methodological approaches. This variety reflects a dynamic and evolving field, but one that still requires deeper theoretical grounding and practical reflection. Beyond summarizing immediate results, future studies should engage in a broader interpretation that connects empirical findings with robust theoretical frameworks and long-term educational implications.

One critical insight from our review is the scarcity of conceptual and theoretical contributions in the literature. Despite the growing number of empirical studies, theoretical development remains limited, restricting the field's explanatory and predictive capacity. Strengthening theoretical foundations will support the formulation of more comprehensive models and frameworks to guide empirical work. In this regard, theories such as Ajzen and Fishbein's Theory of Reasoned Action (1980) and Bandura's Self-Efficacy Theory (1986) provide valuable lenses to understand students' behavioral intentions and beliefs in their own capabilities—key aspects in gamified learning environments.

Furthermore, while cognitive (e.g., memory, knowledge retention) and affective (e.g., motivation, satisfaction) dimensions have been extensively studied, behavioral outcomes remain underexplored. Investigating how gamification influences long-term behaviors—such as autonomous engagement, decision-making, and problem-solving—could provide richer insights into its lasting impact beyond immediate classroom settings.

Based on these reflections, we propose the following key directions for future research:

- Greater Emphasis on Theoretical Development: Increasing the number of conceptual and theory-driven studies would help consolidate the field's foundations, enabling more precise hypotheses and consistent cross-study comparisons.
- Systematic Exploration of Behavioral Outcomes: Future research should address how gamification shapes student behaviors over time, including post-course engagement, decision-making processes, and the application of skills in professional contexts.
- Use of Meta-Analytical Techniques: Given the growing body of empirical literature, meta-analyses could synthesize findings, identify moderating variables, and reveal broader trends that inform educational practice.
- Diversification of Research Methods: Although quantitative methods dominate, we advocate for more qualitative and mixed-methods studies. These approaches can capture the nuances of student and instructor experiences, and better account for contextual factors influencing gamification outcomes.

- Broader Research Scope: Expanding research across educational levels, geographic regions, and cultural contexts will offer a more comprehensive understanding of gamification's effectiveness and adaptability across diverse settings.

This study provides a comprehensive overview of current research on gamification in accounting education. Through a detailed classification system, we identified key methodological trends, theoretical gaps, and opportunities for further exploration. The field shows clear signs of growth, yet requires stronger conceptual consolidation and methodological diversification to reach its full potential.

Practically, our findings support more informed decision-making among educators and curriculum designers regarding the implementation of gamification strategies. Theoretically, they underscore the need for deeper integration of frameworks that address the cognitive, affective, and behavioral dimensions of learning in gamified environments.

This study has several limitations. First, the literature sample was drawn exclusively from Web of Science and Scopus, potentially excluding relevant contributions from specialized databases, doctoral dissertations, conference proceedings, and other forms of grey literature. Second, the review focused only on publications in English, Spanish, and Portuguese, which may limit the global scope of the findings. Future research should expand linguistic and database coverage to capture a more diverse and inclusive range of perspectives.

Gamification holds significant potential as an innovative pedagogical tool in accounting education. This study provides a foundational step toward understanding its applications, challenges, and opportunities. However, for the field to mature, it must move beyond surface-level trends toward a more integrated, theoretically grounded, and contextually informed research agenda. Strengthening the dialogue between theory and practice will be key to realizing gamification's promise in higher education.

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The authors report there are no competing interests to declare.

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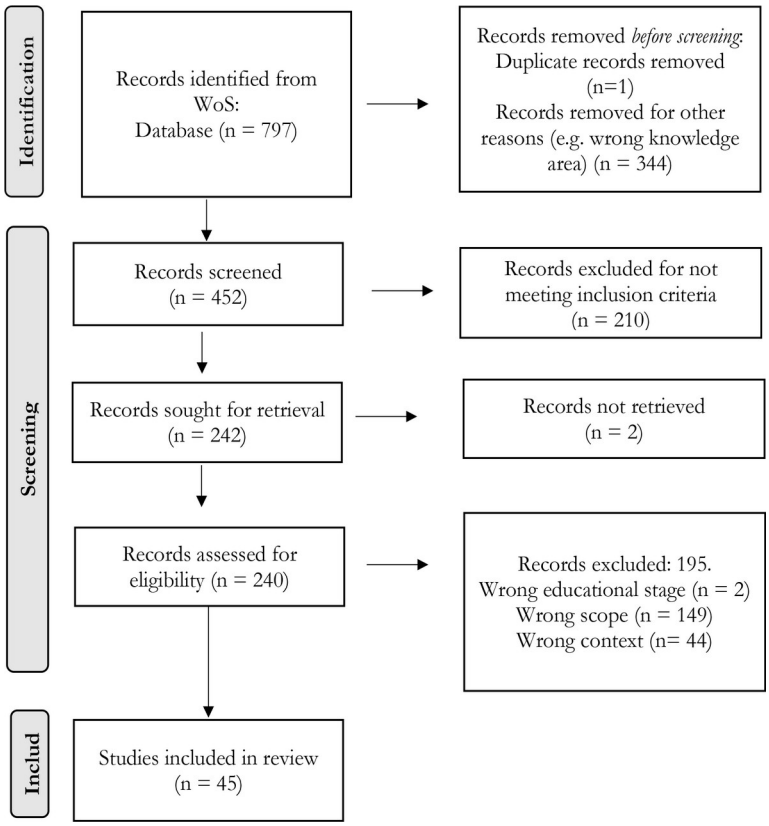
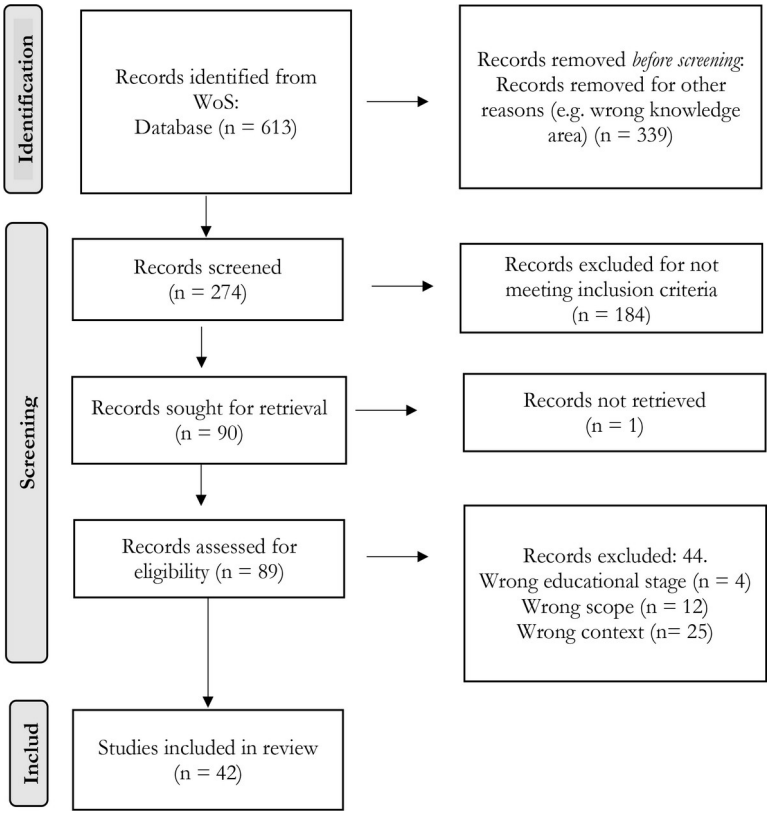
Appendix A

PRISMA 2020 flow diagram: Identification of studies via databases Wos



Appendix B

PRISMA 2020 flow diagram: Identification of studies via databases Scopus



Appendix C

Sample descriptors

Journals	# Articles
Accounting Education	10
Journal of Education for Business	3
Journal of Accounting Education	3
Journal of Higher Education Theory and Practice	3
Issues in Accounting Education	3
Revista de contabilidad	2
Education and Information Technologies	2
International Journal of Game-Based Learning	1
Business Management and Education	1
Academia y Virtualidad	1
The International Journal of Management Education	1
Ambiente Contabil	1
Cadernos Educacao Tecnologia E Sociedade	1
Campus Virtuales	1
Universidad y empresa	1
Turkish Online Journal of Distance Education	1
International Journal of Accounting and Information Management	1
International Journal of Emerging Technologies in Learning	1
Revista Geintec-Gestao Inovacao E Tecnologias	1
International Journal of Information and Communication Technology Education (IJICTE)	1
Formación Universitaria	1
Academy of Entrepreneurship Journal	1
Journal of Entrepreneurship Education	1
International Journal of Higher Education	1
Estudios sobre el Mensaje Periodístico	1
TOJET: The Turkish Online Journal of Educational Technology	1
The International Journal of Technologies in Learning	1
Journal of International Business Education	1
Heliyon	1
International Journal of Evaluation and Research in Education	1
International Journal of Information and Education Technology	1
Decision Sciences Journal of Innovative Education	1
Smart Innovation, Systems and Technologies	1
KNOWLEDGE AREA	
Education & Educational Research	20
Business, Finance	19
Business; Education & Educational Research	2
Management	2
Business; Management	1
Business; Education & Educational Research; Management	1
Business, Management and Accounting & Social Sciences	23
Social Sciences	17
Business, Management and Accounting	2

Journals	# Articles
Geographical Area	
Spain	15
USA	11
Malaysia	7
Portugal	7
Brazil	5
Indonesia	4
Japan	3
Colombia	2
Polonia	2
New Zealand	2
Hungary	1
India	1
Iran	1
Israel	1
Mexico	1
Rusia	1
Singapore	1
Turkey	1
Ecuador	1
Philippines	1
Taiwam	1

Appendix D

Coding categories

Topic	Categories	
Gamification type	Game-Based Learning Educational Game (Serious Games-COTs) Educational Game (Serious Games-Instructor-Authored) Educational Game (Serious Games-Student-Authored) Educational Game (Simulation-Based Game)	
Methodological approach	Conceptual/Theory Quantitative Qualitative Mixed Method Research	
Research design	Bibliometric Analysis Case Study Content Analysis Ethnography Event Study Field Experiment Focus Group Grounded Theory Historical Analysis In-Depth Interview Lab Experiment Literature Review Longitudinal Analysis	Mathematical Analysis Meta-Analysis Multiple Methods Observation Pre-Experimental Quasi Experimental Statistical Survey Systematic Literature Review (SLR) Textual Analysis True Experimental Webography Other
Data analysis technique	Anova/Manova Bayesian Analysis	Growth Curve Analysis Hierarchical Linear Models

	Canonical Correlation Classification Trees Cluster Analysis Concept Mapping Conjoint Analysis Content Analysis Correspondence Analysis Critical Incidence Technique Data Envelopment Analysis Data Mining Delphi Technique Discriminant Analysis Genetic Algorithm Ground Theory	Inventory Analysis Linear Regression Log-Linear Models Moderation/Mediation Analysis Multidimensional Scaling Multitrait-Multimethod Matrix (MMTH) Partial Least Squares Applications (PLs) Path Analysis Repeated Measures Analysis Structural Equation Modeling (SEM) Text Mining Other N/A