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GAMIFICATION AND FINANCIAL LITERACY: A SYSTEMATIC LITERATURE REVIEW OF LEARNING AND BEHAVIOURAL OUTCOMES

Chun Wah Yong[1,2], Zeittey Karmilla Kaman[3*], Wei Jen Thor[4], Fui Meng Lee[5]

[1]Othman Yeop Abdullah Graduate School of Business, Universiti Utara Malaysia, Malaysia.
[2]Faculty of Accountancy, Finance and Business, Tunku Abdul Rahman University of Management and Technology, Malaysia.
yong_chun_wah@oyagsb.uum.edu.my https://orcid.org/0009-0003-0472-2596
[3]Othman Yeop Abdullah Graduate School of Business, Universiti Utara Malaysia, Malaysia.
zeittey.karmilla@uum.edu.my https://orcid.org/0000-0002-3592-2801
[4]Othman Yeop Abdullah Graduate School of Business, Universiti Utara Malaysia, Malaysia.
thor_wei_jen@oyagsb.uum.edu.my https://orcid.org/0009-0001-0337-9621
[5]School of Computing & Technology, Asia Pacific University of Technology & Innovation, Malaysia.
TP134085@mail.apu.edu.my https://orcid.org/0009-0002-5082-6663
*Corresponding Author

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Abstract:

Financial literacy has become an increasingly important educational concern as learners are required to develop the knowledge, skills, and confidence necessary to make informed financial decisions in a rapidly changing economic and digital environment. However, conventional financial literacy education may struggle to sustain learner engagement, active participation, and the practical application of financial knowledge. Gamification has therefore emerged as a potential pedagogical approach for integrating game elements into financial literacy education. Despite this, the existing evidence remains dispersed across different educational settings, learning technologies, and pedagogical approaches. This systematic literature review (SLR) aims to examine and synthesise existing research on the application of gamification in financial literacy education and to identify the major issues, applications, and challenges reported in the literature. The review employed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) framework and an advanced search strategy across the Scopus and Web of Science (WoS) databases, using combinations of the keywords "financial literacy" and "gamification". The search covered publications from 2010 to September 2026, followed by predefined screening, eligibility, and inclusion criteria. A

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total of nine primary studies were included in the final qualitative synthesis. The findings were organised into three major themes: (1) Financial Literacy and Education, (2) Game-Based and Adaptive Learning Technologies, and (3) Cooperative and Higher Education Pedagogies. The synthesis indicates that gamification is examined not only as a mechanism for increasing learner engagement but also as an educational approach for supporting financial knowledge development, interactive learning, adaptive learning experiences, collaboration, and practical application of financial concepts. Nevertheless, the literature also indicates continuing challenges related to implementation, pedagogical integration, technological requirements, and the effective alignment of game-based activities with financial literacy learning objectives. The review provides an integrated understanding of the current research landscape and identifies areas requiring further empirical investigation to strengthen the application of gamification in financial literacy education.

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Keywords:

Behaviour, Financial education, Financial literacy, Gamification, Learning

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Introduction

In today's complex economic environment, the importance of financial literacy, an understanding and effective use of a variety of financial skills such as personal financial management, budgeting, and investing, has increased. Even though it's essential, many people, particularly young adults and students, still struggle with basic financial concepts, make poor financial decisions, and face long-term financial problems. Traditional financial education approaches have been found to be unengaging for learners, making them unmotivated to learn about money and hindering knowledge retention. This division has motivated teachers and academics to develop new strategies that may make learning about finances more engaging and productive. One of these strategies is gamification, which uses elements of games such as points, badges, leaderboards, and interactive challenges to foster engagement and motivation in non-gaming environments (Kaur et al., 2024; Muralidharan et al., 2026; Soobhany et al., 2026).

Studies and practical applications have recently shown that gamification for financial literacy can yield strong results across various target groups. Gamified solutions have been proven to boost motivation, participation, and knowledge retention by making financial education fun and engaging. For instance, mobile apps and board games with gamified features successfully engaged young people and students, making complex financial concepts easier to grasp and

remember (Capa & Pereira, 2026; Chernbumroong et al., 2026; Estima & Peguinho, 2024; Santoso & Sebastian, 2025).

Rationale for the Current Systematic Literature Review

While financial literacy empowers people to navigate the intricacies of the financial landscape, traditional pedagogical approaches often face limitations in engagement, comprehension, and effective behavioural translation (Aguzarova et al., 2026; Kaur et al., 2024; Muralidharan et al., 2026). The term "gamification" (translating game-like elements into non-game contexts) appears to be a dominant approach to increase knowledge retention, subjective self-efficacy, and long-term financial decision-making (Agrawal & Sharma, 2025; Kaur et al., 2024; Misara et al., 2026).

Gamified financial education transitions pedagogy away from conventional lecture formats toward experiential learning and self-determination frameworks (Aguzarova et al., 2026; Wang et al., 2025). The use of conventional media, such as books and passive slide lectures, in traditional education generally results in poor classroom interaction with students and low-level learning of banking service concepts (Oktaviani et al., 2025). Incorporating structural elements such as progress bars, level progression, and customised challenges significantly reduces resistance to difficult concepts while fostering active user involvement (Muralidharan et al., 2026; Uppaluri, 2025). In addition, digital tools with microlearning modules and a goal-oriented structure are more effective at engaging users with tasks than tasks alone using separate reward mechanisms (To, 2026; Uppaluri, 2025). Gamified interventions create intrinsic motivation through autonomy, collaboration, and structured competition, which can help maintain engagement in learning about intricate financial topics (Kosasih & Juhana, 2025).

Empirical evaluations across high schools, universities, and rural communities demonstrate that game-based learning substantially bolsters foundational economic concepts (Huizar et al., 2025; Jin et al., 2025; Platz & Zauner, 2025). For the high school results, the effectiveness of the educational game material obtained through the Research and Development (R&D) model was very good, with a moderate level of normalised gain of 0.6594 and an effectiveness of 5.94% for the financial institution comprehension variables (Oktaviani et al., 2025). A quasi-experimental trial involving 892 primary school students, conducted over a semester, identified that education through video game-based activities resulted in lasting gains in understanding of inflation, interest, and insurance concepts during follow-up assessments (Jin et al., 2025). Likewise, introducing interactive video games into first-year university engineering seminars significantly affected completion rates, overall class participation, and financial management confidence levels (Huizar et al., 2025). In addition, cutting-edge approaches have begun to integrate emerging technologies, such as artificial intelligence, machine learning, and decentralised blockchain systems, to enable personalised learning pathways and instant feedback for underserved populations (Muralidharan et al., 2026; Yau & Wong, 2021).

Beyond conceptual acquisition, gamification plays a significant moderating role in translating financial literacy into tangible behavioural conduct (Agrawal & Sharma, 2025; Marpaung et al., 2026). A structural equation modelling investigation of 557 mobile financial app users indicated that gamified reinforcement features moderate the relationships between financial self-efficacy, financial planning, and proactive money management behaviours (Agrawal & Sharma, 2025). Studies evaluating banking applications confirm that user features such as

badges, visual progress trackers, and interactive challenges are directly associated with higher savings rates and more disciplined budgeting routines (Marpaung et al., 2026; Uppaluri, 2025). However, user preferences for these mechanics remain contingent upon preexisting app expertise; individuals with extensive app familiarity leverage both social leaderboards and economic incentives, whereas novices respond primarily to direct economic benefits (Bayuk & Altobello, 2019). In the simulated setting, although financial knowledge was a weak predictor of overall decision scores, the gamified systems aimed to reconcile knowledge and behaviour by developing financial decision-making routines (Chamberland et al., 2026; Wang & Loh, 2023).

Although gamified applications have been widely adopted, critical pedagogical and methodological issues remain in the use of such applications (Helal et al., 2026; Kaur et al., 2024). An audit of financial literacy mobile applications in Gulf Cooperation Council markets revealed that only 12% met baseline educational requirements, with most applications clustering in the low-pedagogy quadrants and only 15% deploying structured curricula that cover higher-order concepts (Helal et al., 2026). Gamified applications were effective in preventing workplace retirement interventions from being future-oriented, addressing the overconfidence bias that pervades traditional interventions based on information graphics. They also boost basic literacy while reducing subjective retirement preparedness, thereby producing a "reality check" that helps participants recognise the complexity of long-term planning (Grobbelaar & Alsemgeest, 2026a). Furthermore, while immersive narratives and simulations mitigate behavioural heuristics such as the disposition effect, excessive emotional tension, or overly simplified mechanics can hinder the comprehension and realism of decisions Kosasih & Juhana, 2025; Wang et al., 2025; Wang & Loh, 2023). Ensuring robust instructional design, pairing strategic mechanics with debriefing reflection prompts, and incorporating longitudinal behavioural measures remain vital to realising the potential of gamification in financial education (Agrawal & Sharma, 2025; Misara et al., 2026; Platz & Zauner, 2025).

Research Question

Formulating research questions (RQs) is a fundamental stage in conducting a Systematic Literature Review (SLR), as they establish the overall direction, scope, and focus of the review. Clearly defined RQs guide the identification, selection, assessment, and synthesis of relevant studies, ensuring that the literature search remains systematic, comprehensive, and closely aligned with the objectives of the review. Well-structured research questions also help reduce potential bias and improve the comprehensiveness of the evidence identified.

In addition, RQs provide a systematic framework for organising, analysing, and synthesising the findings obtained from the selected studies. Clearly articulated questions help maintain consistency throughout the review process and facilitate the identification of recurring patterns, emerging trends, research gaps, and developments within the field. The formulation of precise RQs also enhances the transparency and reproducibility of the review by providing a clear basis for the search and selection processes, thereby enabling subsequent researchers to replicate the methodology or extend the investigation to related research areas.

Defining the research questions is widely regarded as one of the most critical activities in the planning stage of an SLR, as the RQs influence the subsequent methodological procedures of the review (Moher et al., 2009). In accordance with the objective of this review, which is to examine and synthesise the existing literature on financial literacy and gamification, the PICo

framework proposed by Richardson et al. (1995) was adopted to formulate the research questions. PICo is a mnemonic framework comprising Population (P), Interest (I), and Context (Co) and is particularly appropriate for qualitative evidence synthesis and exploratory literature reviews. The framework supports the systematic formulation of focused research questions by specifying the target population, the phenomenon or area of interest, and the context in which the phenomenon is examined.

The application of the PICo framework provides a structured basis for identifying relevant literature and maintaining alignment between the research objectives, search strategy, study selection, and thematic synthesis. Based on the identified themes and the PICo framework, three research questions were formulated to examine the issues and problems, implementation and application, and challenges associated with gamification in financial literacy education, as presented below:

- RQ1: What are the major issues and problems associated with the use of gamification in developing financial literacy among students and learners in educational settings?
- RQ2: How is gamification implemented and applied to support financial literacy education among students and learners in educational settings?
- RQ3: What challenges influence the effective implementation and application of gamification for financial literacy education among students and learners in educational settings?

Material and Methods

This systematic literature review was conducted using the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 framework, one of the internationally established reporting guidelines for systematic literature reviews to improve transparency, completeness, and reproducibility (Page et al., 2021). The PRISMA framework was used to identify, screen, assess eligibility, and include relevant studies, allowing for a solid and transparent synthesis of existing evidence.

Two important interdisciplinary bibliographic databases were chosen as the primary sources for the literature search: Scopus and WoS. These databases were selected for inclusion due to their extensive coverage of peer-reviewed scholarly literature, well-defined indexing criteria, and extensive coverage of the research literature in relevant disciplines. Access to both databases also resulted in the retrieval of a large number of potentially relevant studies and minimised the risk of missing evidence indexed only in one of the two databases.

The review process follows the four phases as described in PRISMA: Identification, Screening, Eligibility, and Inclusion. In the identification stage, a predefined search strategy was used to identify potentially relevant information from the sources: Scopus and WoS. The retrieved records were evaluated against predetermined inclusion and exclusion criteria, and duplicate records and studies that did not meet these criteria were removed. Regarding eligibility, the full texts of potentially eligible studies were systematically appraised for inclusion. Finally, eligible study data were obtained through structured process data collection, in which pertinent key characteristics of the study, methodological aspects, and findings relevant to the research goals were captured.

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This transparent and systematic process has been established to reduce bias and improve consistency in study selection, and to increase the trustworthiness of the evidence synthesis. The methodological procedures and selection criteria were established a priori and adhered to throughout the review to provide a reproducible basis for synthesising existing knowledge and highlighting gaps, emerging themes, and suggested directions for future investigation.

Identification

Performing SLR according to the PRISMA 2020 framework, the identification stage is the first in which we develop a comprehensive and reproducible research strategy to identify all potentially relevant records in selected bibliographic databases. Scopus and WoS have been chosen in this study as the two major databases due to their extensive coverage of scholarly, peer-reviewed literature and their long histories of indexing. The search yielded 189 results using the predefined search strings focused on the concepts of "financial literacy" and "gamification" listed below (Table 1). In particular, 156 records were obtained from Scopus and 33 from WoS. The larger number of records retrieved from Scopus suggests that this database had greater initial coverage of literature on financial literacy and gamification, given the scope of the search strategy. The WoS isolation, however, is an important complementary source of evidence and expands the review's database coverage.

With 189 records retrieved at the identification stage, we have created the first evidence-based foundation for systematic screening and eligibility assessment. Importantly, these records should not be viewed as eligible studies but rather as publications that may be of interest to the review, as the identification process does not capture whether individual records meet the review's inclusion criteria. Another important reason is the difference between the yields of Scopus and WoS: if only one of these two databases is used, relevant publications may be missing from the other; if this happens, it goes without saying that the search is neither valid nor comprehensive. It has therefore been decided that the identified records will move on to the next PRISMA stages: Remove duplicates; Review for inclusion/exclusion. The use of a sequential approach enhances the transparency, reproducibility, and methodological rigour of the SLR by clearly separating the retrieval of evidence from the determination of study eligibility.

Table 1: Gamification and Financial Literacy Search Strategy

Scopus	TITLE-ABS-KEY (("financial literacy" OR "financial education" OR "financial knowledge" OR "financial capability") AND (gamification OR "game-based learning" OR "game mechanics" OR "game design" OR "serious games")) Date of Access: September 2026
WoS	("financial literacy" OR "financial education" OR "financial knowledge" OR "financial capability") AND (gamification OR "game-based learning" OR "game mechanics" OR "game design" OR "serious games") Date of Access: September 2026

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The Search Strategy for Gamification and Financial Literacy

Screening

Following the identification stage, the retrieved records underwent systematic screening based on predefined eligibility criteria. Records were excluded if they were non-English publications, published before 2010, classified as conference papers, books, or reviews, published as "in press," or outside the fields of Social Sciences, Business, Management, and Accounting. Based on these criteria,174 records were excluded, reflecting a rigorous effort to establish a focused and contextually relevant evidence base. The screening process subsequently retained 15 records, comprising 10 records from Scopus and 5 from WoS, for further assessment.

A duplicate-checking process was then conducted to ensure that the same publication indexed across both databases was not counted more than once. This resulted in the removal of 3 duplicate records, leaving 12 unique records for the subsequent eligibility assessment. The systematic application of these criteria strengthens the methodological consistency of the review by ensuring that the retained literature is relevant to the research scope, sufficiently current, published in an appropriate scholarly format, and aligned with the selected disciplinary domains. Search and selection criteria are illustrated in Table 2.

Table 2: Gamification and Financial Literacy Search and Selection Criteria

Search and Selection Criteria

Criterion	Inclusion	Exclusion
Language	English	Non-English
Time line	2010 – 2026	< 2010
Literature type	Journal (Article)	Conference, Book, Review
Publication Stage	Final	In Press
Subject Area	Social Science & Business, Management and Accounting	Besides Social Science & Business, Management and Accounting
Open Access	Gold	Besides Gold

Eligibility

After screening and duplicate removal, the remaining 12 articles underwent a detailed evaluation for eligibility based on the title, abstract, and availability of the full text. In this phase, three were removed for failing to meet the substantive criteria for the review, including subject matter outside the research scope, titles insufficiently relevant to the research focus, abstracts that did not describe the research goals, and full-text content that could not be found. As a result, 12 articles were considered eligible, and 9 studies were ultimately selected based on the predetermined inclusion criteria; of these, 9 were included in the qualitative synthesis.

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The overall inclusion rate was 75.0% (9 of 12); screening and study inclusion criteria successfully reduced the number of studies to those arguably aligned with the review's direction and intent.

Excluding studies that lacked substantive relevance or sufficient accessible information strengthens the synthesis's validity and interpretability by ensuring that conclusions are based only on studies with adequate evidence and clear alignment with the research scope. The final sample of 9 studies, therefore, provides the empirical foundation for identifying key themes, methodological patterns, and research gaps concerning the relationship between financial literacy and gamification.

Data Abstraction and Analysis

An 'integrative analysis' approach to analyse the existing evidence was undertaken, based on a systematic examination, comparison and synthesis of evidence from the nine studies included in the qualitative review (see figure 1). All the publications were analysed systematically to obtain relevant information, such as the study objective, study design, analysis method, main results, and contribution to the understanding of the relationship between financial literacy and gamification. Special focus was placed on findings and evidence which directly applied to the objectives of the current review.

Theme synthesis of the evidence extracted was then performed. The authors independently read the selected studies and compared their findings to identify overlapping concepts and generate initial themes and sub-themes. The thematic structure was subsequently discussed among the authors to ensure that it is supported by evidence from the selected studies. An audit trail throughout the process was maintained by keeping analytical notes that recorded interpretations, comparisons, and emerging patterns. The identified themes were then compared across studies through a continuous iterative process to explore concepts for conceptual coherence and compatibility with the objectives of the review. In cases of disagreement over interpretation, the authors deliberated and reached a consensus. This iterative process improved the synthesis's transparency and analytical rigour, moving it beyond a descriptive summary to an integrated understanding of the available evidence on financial literacy and gamification.

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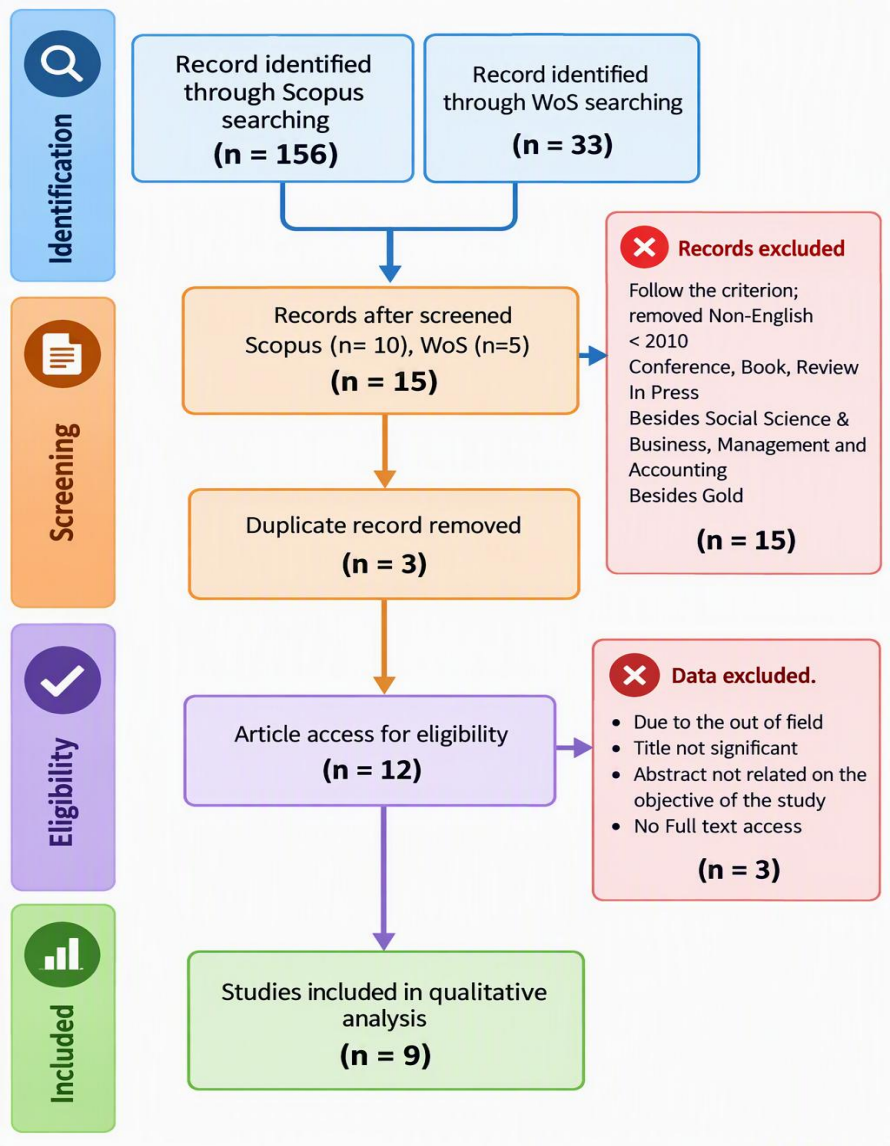

FIGURE 1. Flow Diagram Of The Proposed Searching Study

Quality of Appraisal

After selecting the primary studies, the methodological quality should be systematically examined, as Kitchenham and Charters (2007) recommend, to assess the reliability and relevance of the evidence presented in the included studies for use in the review. Moreover, a quantitative comparative study can be conducted from the results of the quality assessment of the selected studies. This review, therefore, used the quality assessment scheme proposed by Abouzahra et al. (2020), consisting of six quality assessment (QA) criteria. A three-point scoring scale was used to determine each criterion: Yes (Y) was given a score of 1 when the criterion was fully met; Partly (P) was assigned a score of 0.5 when the criterion was partially met but there were limitations and/or deficiencies; and No (N) was assigned a score of 0 when the criterion was not met at all.

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• QA1. Is the purpose of the study clearly stated?
• QA2. Is the interest and the usefulness of the work clearly presented?
• QA3. Is the study methodology clearly established?
• QA4. Are the concepts of the approach clearly defined?
• QA5. Is the work compared and measured with other similar work?
• QA6. Are the limitations of the work clearly mentioned?

The QA process was conducted using a predetermined set of evaluation criteria. Four experts independently evaluated each selected study and scored each criterion "Yes" (Y), "Partly" (P) or "No" (N). Scales' scores for the four experts were then combined into a total quality scale score for each study. For the final stage of the review process, only studies with an aggregated score> 3.0 across the three experts' assessments were considered eligible. This threshold was used to maximise methodological rigour and reliability of the evidence incorporated in the review.

Result and Discussion

Quality Assessment Analysis

The methodological quality of the reporting was exceptionally good, and the overall level of rigour in the literature set was very good. Based on the nine papers evaluated, only eight had a perfect quality assessment score (6/6), indicating complete answers to the quality questions (QA1-QA6). One study, Tsuei and Lu (2025), was also randomly selected and scored 5.5/6 (91.67%) because it did not fully meet the criteria for QA6. As shown in Table 4, across the entire data set, the average quality rating is around 99.07%, indicating that the publications' synthesis and conclusions are well grounded in a reliable empirical basis.

Table 4: Quality Assessment Results of the Selected Studies

Author	Title and year	QA1	QA2	QA3	QA4	QA5	QA6	Total Mark	Percentage (%)
Miras-Rodríguez et al. (2024)	Fostering financial literacy in high school education through a game: the experience of RANOKA (2024)	Y	Y	Y	Y	Y	Y	6	100
Grobbelaar and Alsemgeest (2026a)	Designing a Gamified Retirement Planning Application: Evidence from a Workplace Study of Millennial Employees (2026)	Y	Y	Y	Y	Y	Y	6	100

Grobbelaar and Alsemgeest (2026b)	Multidisciplinary pathways to retirement financial literacy: An experimental comparison of gamified and infographic interventions (2026)	Y	Y	Y	Y	Y	Y	6	100
Chernbumroong et al. (2026)	Learning Finance through Play: Assessing Gamified Environments in Agricultural Board Game Education (2026)	Y	Y	Y	Y	Y	Y	6	100
Ramírez-Montoya et al. (2026)	Enhancing college students' financial literacy skills: An empirical investigation of complex thinking competency (2026)	Y	Y	Y	Y	Y	Y	6	100
Alamin et al. (2025)	Adaptive Game-Based Learning (AGBL) Model: Enhancing Motivation and Engagement through a Financial Literacy Game Prototype (2025)	Y	Y	Y	Y	Y	Y	6	100
Andreatti and Morselli (2026)	Cooperative or Game-Based Learning? Fostering Financial Literacy for Sustainable Citizenship Through Two Contrasting Implementations	Y	Y	Y	Y	Y	Y	6	100

	in Primary Education (2026)								
Platz and Zauner (2025)	Financial Literacy Games—Increasing Utility Value by Instructional Design in Upper Secondary Education (2025)	Y	Y	Y	Y	Y	Y	6	100
Tsuei and Lu (2025)	Enhancing Children's Insurance-Related Knowledge and Learning Attitudes Through Digital Game-Based Learning (2025)	Y	Y	Y	Y	Y	P	5.5	91.67

Thematic Analysis

Theme development in an SLR serves as the structural framework that synthesises individual studies into cohesive academic discussion sections. By analysing research objectives, methodologies, theoretical orientations, and primary findings across the corpus, recurring concepts are aggregated into mutually exclusive themes. This thematic synthesis elevates the review from a collection of isolated summaries to an integrated overview of dominant focuses, practical applications, and overarching research gaps within the domain.

Based on the title metadata provided in the quality assessment matrix, the nine studies align into three major preliminary themes reflecting distinct research directions as summarised in Table 5.

Table 5: Thematic Classification and Research Focus of the Selected Studies

Theme	Focus Area	No. of Studies	Main Research Direction
Theme 1: Financial Literacy & Education	Financial literacy interventions, youth education, and skill enhancement.	3	Investigating educational methods, tools, and frameworks designed to foster financial literacy among children and college students
Theme 2: Game-Based & Adaptive Learning Technologies	Gamification, game design, and adaptive instructional systems.	3	Designing, developing, and evaluating interactive game environments and adaptive learning systems to improve

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Theme	Focus Area	No. of Studies	Main Research Direction
			engagement and learning outcomes
Theme 3: Cooperative & Higher Education Pedagogies	Cooperative vs competitive learning strategies and higher education enhancements.	3	Exploring pedagogical strategies, collaborative dynamics, and student engagement models in college and university settings.

Financial Literacy and Education

The following synthesis examines digital game-based learning and gamified interventions within the theme of financial literacy and education. Across various educational environments, scholars emphasise that traditional instructional methods often fail to adequately engage younger demographics or adequately prepare individuals for real-world monetary decisions. Tsuei and Lu (2025) investigated primary school children learning insurance concepts through a digital role-playing game, finding that interactive digital platforms led to significantly higher learning achievement than conventional direct instruction. Similarly, Miras-Rodríguez et al. (2024) examined high school students participating in the RANOKA game initiative, highlighting that interactive gaming environments spark student motivation and help reduce gaps in financial competence. Building on these principles, Grobbelaar and Alsemgeest (2026b) conducted an experimental comparison between gamified tools and infographic materials for retirement financial literacy, observing that interactive gamified mechanisms effectively heighten learner motivation, self-reflection, and overall behavioural awareness. These studies, taken together, have demonstrated that gamification and digital game-based learning provide an exciting learning ecology that transcends the space of outmoded passive lecture-based learning.

Demographic factors and gender issues have a strong impact on financial education outcomes and learning achievements. The study conducted by Tsuei and Lu (2025) revealed that the learning approach, motivation, and self-efficacy scores of female and low-achievement elementary school students who used the digital game-based learning platform were significantly improved compared to those of students in traditional classrooms. Correspondingly, Miras-Rodríguez et al. (2024) noted gender differences in secondary students' financial competence, highlighting the need for gender-specific financial education strategies to provide across-the-board learning opportunities for secondary students regardless of their academic backgrounds. Furthermore, Grobbelaar and Alsemgeest (2026a) targeted millennials, who frequently exhibit present bias and prioritise short-term gratification over long-term financial security. Their experimental results indicated that targeting young cohorts through digital frameworks helps mitigate behavioural tendencies and fosters foundational money management habits before individuals enter later life stages.

The pedagogical structure and design of the gamified interventions are key elements that impede knowledge acquisition and retention. Tsuei and Lu (2025) used contextualised problem-solving in a digital game to incorporate practical applications, such as insurance decision-making and risk management, into their experience and results, thereby enabling learners to internalise complex economic concepts. Similarly, in financial education, Miras-

Rodríguez et al. (2024) assessed the performance of a gamified activity aligned with their Programme for International Student Assessment (PISA) competencies, reporting positive results for student learning on the concepts of financial education, such as inflation, risk diversification, compound interest, etc., when introduced in secondary school. Meanwhile, Grobbelaar and Alsemgeest (2026b) compared various instructional approaches and found that, although gamified applications have the edge in terms of user engagement, behavioural awareness, and self-questioning, visual communication, such as an infographic format, is highly effective for conveying complex regulatory terminology and dense financial information. Thus, using several teaching styles better provides learners with a complete learning outcome.

For this, researchers propose that the effective long-term use of the learning model is achieved by systematically integrating game-based learning into formal education programs. Tsuei and Lu (2025) highlighted that incorporating digital role-playing tools into elementary school courses enables teachers to foster positive attitudes toward risk management at an early age. Building on these insights, Miras-Rodríguez et al. (2024) urged education authorities to integrate formal, gamified financial instruction as a mandatory cross-sectional component of secondary curricula to counteract widespread adult financial illiteracy. Supporting this structural perspective, Grobbelaar and Alsemgeest (2026b) highlighted that a multidisciplinary approach that includes financial, educational, communication design, psychological, and technological dimensions is essential to address the global retirement preparedness crisis. In conclusion, there is a need for structured, multidisciplinary, digital game-based interventions to promote sustainable, lifelong financial competence.

Game-Based and Adaptive Learning Technologies

This analysis combines findings from empirical studies on game-based technologies and adaptive learning in financial literacy and financial education. It is often noted that the conventional methodology for teaching financial education is insufficient to boost students' interest and to address their diverse social and economic backgrounds and learning needs. Alamin et al. (2025) developed an Adaptive Game-Based Learning (AGBL) framework that extends existing gamification models by integrating adaptive game mechanics with the Attention, Relevance, Confidence, and Satisfaction (ARCS) motivational model. Their framework demonstrates that personalising game complexity and narrative contexts based on student profiles significantly enhances student engagement and learning retention, particularly among learners from diverse socio-economic backgrounds in developing regions. Correspondingly, Platz and Zauner (2025) examined upper secondary students through a serious game intervention, finding that specific instructional configurations, namely, combining strategic game mechanics with direct reflection prompts significantly increased the perceived utility of financial learning content. Complementing these perspectives, Grobbelaar and Alsemgeest (2026a) also researched a gamified retirement planning application for young employees, revealing that game-like features, such as time pressure and immediate feedback, can be valuable tools for fostering financial engagement and prompting active employee involvement. Overall, the studies illustrate how game-based and adaptive platforms can be designed to create interactive, personalised, and engaging learning experiences that go beyond traditional passive learning methods.

The pedagogical role that game mechanics and reflective prompts assume to elicit learning outcomes and cognitive reflection is of paramount importance. In a quasi-experimental design,

Platz and Zauner (2025) found that strategic game mechanisms, combined with direct debrief cues, provide the scaffolding needed to encourage students to relate simulated decisions to their own personal economic significance. In a similar vein, Alamin et al. (2025) utilised the Mechanics-Dynamics-Aesthetics (MDA) framework within their adaptive model to align decision-making scenarios with real-life financial challenges, enabling students to build confidence and perceive direct relevance in their financial management tasks. Further extending the understanding of game mechanics, Grobbelaar and Alsemgeest (2026b) found that placing users in a simulated low-risk decision-making environment provided instant feedback, enabling them to reflect constructively. Interestingly, they found that after completing the gamified simulation, participants' levels of perceived retirement readiness took a slight hit, serving as a constructive "reality check" that broke down overconfidence bias and enabled a more honest assessment of one's individual retirement scenarios.

Targeting specific demographic groups through adaptive and game-based technologies requires careful alignment with user characteristics and contextual realities. Alamin et al. (2025) emphasised that financial literacy tools must account for regional disparities and variations in prior knowledge, and local financial realities, demonstrating that adaptive game mechanics enable students from diverse economic backgrounds to engage with content at an appropriate level of difficulty. Focusing on young working adults, Grobbelaar and Alsemgeest (2026a) identified millennials as a demographic that responds particularly well to "plug-and-play" learning styles, fast interaction, and bite-sized content modules, which help alleviate the anxiety and psychological friction often associated with complex retirement planning. Similarly, Platz and Zauner (2025) focused on upper secondary students who are either transitioning or on the verge of becoming financially independent. They demonstrated that structured game mechanics are instrumental in bridging the gap between abstract economic theory and its value for young people. These findings together reinforce the need to directly map mass-scale adaptive learning platforms to the traits of target groups that are defined demographically, behaviourally, and psychologically.

To achieve sustained use and impact of game-based learning technologies, scholars highlight the need for iterative design, embedding, and use. Alamin et al. (2025) advocate integrating adaptive frameworks into formal school curricula and educational policy, noting that adaptive games offer scalable solutions to resource constraints in developing educational systems. Building on structural design considerations, Grobbelaar and Alsemgeest (2026b) explained how a gamification mechanism that advances users to new game levels through knowledge-based quizzes can help users avoid skipping fundamental calculations while ensuring that gamification is used ethically to help rather than deceive users. In addition, Platz and Zauner (2025) emphasised that game developers and educators need to focus on how action-guiding mechanics are integrated into formative and summative feedback loops to promote learning. In the end, adaptive games, clear reflection mechanisms, and contextual relevance create a model that can continue to develop financial competencies in lifelong learning for a wide range of learners.

Cooperative and Higher Education Pedagogies

The use of gamification and game-based learning in higher education is a game-changer in the learning process towards financial literacy, as it shifts the learning environment from passive lectures to active, experience-based learning. Ramírez-Montoya et al. (2026) reveal that digital tools and gas for learning are also multifaceted instruments for increasing financial literacy,

both by encouraging reflective engagement and complex thinking rather than simple memorisation of content. The actions of students who co-create their learning through exploration and social interaction in authentic environments are also reflected in game-based learning environments aligned with socio-constructivist theory, as described by Andreatti and Morselli (2026). Furthermore, an empirical investigation by Kaur et al. (2024) suggests that the non-gamified board game is effective in presenting basic financial concepts, yet adding gamification features increases behavioural involvement, motivation among learners, and satisfaction with learning. Scholars collectively affirm that game-based approaches create risk-free environments where students can safely make financial decisions, experience errors, and develop practical financial management skills. By providing immediate feedback and collaborative mechanics, game-based learning and gamification effectively improve student participation while bridging the gap between theoretical economic concepts and real-world application.

The pedagogical relationship between instructional mechanics and student cognitive development shows that interactive design directly shapes learning outcomes and critical thinking. According to Ramírez-Montoya et al. (2026), financial decision-making involves complex thinking capabilities, including critical analysis, systems reasoning, and the ability to make decisions in uncertain contexts, that can be systematically developed in game settings. This perspective is shared by Kaur et al. (2024), who emphasise that game environments help students resolve challenging concepts by demonstrating how abstract economic theories apply to real-world scenarios. Additionally, Andreatti and Morselli (2026) indicate that active pedagogical approaches provide the necessary structure to promote deeper conceptual understanding. However, game-based outcomes remain sensitive to implementation factors like competitive design and group orchestration. Interestingly, Ramírez-Montoya et al. (2026) observe a non-linear relationship between perceived learning and objective knowledge gains, as students who reported learning about financial culture through digital games did not always achieve higher financial knowledge scores, underscoring that game engagement does not automatically translate into immediate knowledge retention. However, Kaur et al. (2024) establish that competitive, structured game rules consistently keep students more attentive to financial choices, thereby strengthening their ability to focus on and process complex financial topics.

Demographic, institutional, and socio-economic context significantly influences student engagement and financial knowledge acquisition across game-based learning frameworks. Ramírez-Montoya et al. (2026) demonstrate that student performance in financial literacy interventions varies noticeably by scholarship status, institutional context, and prior practical experience. Their findings reveal that students who regularly utilise real-world banking services achieve higher average financial knowledge scores, suggesting that practical financial exposure complements formal gamified learning. In terms of instructional preferences, Kaur et al. (2024) find that game-based and board-game structures accommodate diverse learning styles including visual, auditory, and kinesthetic making complex fields like economics accessible to a wider spectrum of university students. Meanwhile, Andreatti and Morselli (2026) highlight that cooperative and active learning frameworks foster positive interdependence and peer interaction, making them adaptable across various educational stages and student populations. Furthermore, Ramírez-Montoya et al. (2026) emphasise that digital proficiency correlates strongly with complex thinking competencies, although higher digital skills alone do not automatically lead to higher financial knowledge scores. Consequently,

educational interventions must account for learners' digital competencies and socio-institutional backgrounds to ensure equitable educational outcomes.

To create sustainable and effective financial literacy programs in the higher education context, researchers recommend carefully designing game mechanics, reflective elements, and practical scenarios. Following Ramírez-Montoya et al. (2026, Multidisciplinary Model of Financial Literacy Development, the authors consider the development of financial competence as an emergent ability arising from the interplay among pedagogical strategies, cognitive abilities, digital competencies, socio-institutional factors, and experiential financial exposure. Building on this need for structured instruction, Andreatti and Morselli (2026) emphasise the importance of grounding active learning in sound pedagogical theory, noting that cooperative structures foster long-term accountability and sustained peer interaction, which are necessary for deep learning. In parallel with these insights, Kaur et al. (2024) argue that while physical board games serve as the primary vehicle for knowledge acquisition, gamification elements play a vital complementary role by elevating student interest, satisfaction, and long-term participation. Thus, teachers and curriculum designers are encouraged to integrate gamified learning components and financial experience into formal education. Institutions can promote deeper financial literacy and complex thinking skills among students with thoughtfully designed games, reflective de-briefing and real-world context.

Conclusion

This systematic literature review examined the development and application of gamification in financial literacy education by synthesising studies published between 2010 and September 2026. The review employed the PRISMA framework and advanced searches of the Scopus and WoS databases, using financial literacy and gamification as the principal search concepts. The review focused on studies addressing the use of gamification, game-based learning, and related interactive approaches in financial literacy education. The review was guided by research questions concerning the major issues and problems, implementation and application approaches, and challenges associated with gamification in financial literacy education.

The synthesis of the selected literature identified three major themes: Financial Literacy and Education; Game-Based and Adaptive Learning Technologies; and Cooperative and Higher Education Pedagogies. In all themes, gamification was correlated with increased engagement, motivation, participation, learning about financial concepts, self-reflection, and real-life application. The evidence reviewed also suggests that games can offer learners the opportunity to experiment with making financial decisions in a relatively risk-free environment. Adaptive technologies also have the potential to adapt learning activities to learners' characteristics, prior knowledge, learning needs, and/or contextual differences. Cooperative and experiential learning in higher education facilitates interaction, active participation, complex thinking, and the linking of financial theoretical concepts to financial situations.

The review contributes to the field by bringing together fragmented evidence on financial literacy and gamification and by organising the literature into three complementary dimensions covering educational development, technological innovation, and pedagogical application. The synthesis indicates that effective gamification should go beyond adding points, rewards, competition, or entertainment features. Greater educational value is achieved when game mechanics are appropriately aligned with financial learning objectives, realistic decision-making scenarios, reflection, feedback, and learner characteristics. The findings therefore

provide a more integrated perspective on how gamification can connect financial knowledge with engagement, experiential learning, and practical financial behaviour.

At a practical level, there are implications for education. They can add game-based and adaptive activities to the financial literacy program in the classroom and curriculum, with clear learning goals and effective reflection strategies. Digital financial literacy delivery systems can also be created, which foster variation in background knowledge, prior knowledge, digital capability, and financial experience. Yet, if technology is to be used, it should be guided by sound pedagogical design, as engagement does not necessarily lead to better financial knowledge or changes in behaviour in the long run. The evidence reviewed emphasises the need to link game-based aspects to place-based financial issues, feedback, reflection, and transfer to the real world.

Several limitations should also be recognised. The review was based primarily on Scopus and WoS; therefore, relevant studies indexed in other databases may not have been captured. The application of English-language, publication-type, disciplinary, and date-range criteria may also have excluded potentially relevant evidence. In addition, the literature encompasses diverse learner groups, educational levels, technologies, and research designs, which may limit direct comparisons across studies. Future research should therefore conduct longitudinal investigations to determine whether gamification produces sustained improvements in financial knowledge, financial self-efficacy, decision-making, and actual financial behaviour. Further empirical research is also required to compare different game mechanics, adaptive technologies, cooperative approaches, and instructional designs across diverse demographic and educational contexts.

In summary, the review shows that gamification, as a pedagogical layer added to interactive technology and backed by relevant financial experiences, is increasingly relevant to the field of financial literacy in education. The systematic synthesis of existing evidence strengthens understanding of the link among financial literacy, gamification, learning technology, and educational practice. The evidence base can be strengthened and more effective financial literacy education developed by greater emphasis on continued empirical development, better methodological designs, and longer-lasting behavioural outcomes.

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References

Abouzahra, A., Sabraoui, A., & Afdel, K. (2020). Model composition in Model Driven Engineering: A systematic literature review. Information and Software Technology, 125, Article 106316. https://doi.org/10.1016/j.infsof.2020.106316

Agrawal, G., & Sharma, G. (2025). An evaluation of gamification on financial conduct in relation to the effectiveness of behavioral traits. *Financial Planning Review*. https://doi.org/10.1002/cfp2.70016

Aguzarova, F., Balashvili, D., & Kabisova, A. (2026). Increasing financial literacy of the population based on gamification. *Accounting and Control*. https://doi.org/10.36871/u.i.k.2026.02.03.006

Alamin, R. Y., Zulaikha, E., Gunarta, I. K., Dwitasari, P., & Lee, L. (2025). Adaptive game-based learning (AGBL) model: Enhancing motivation and engagement through a financial literacy game prototype. *International Journal of Information and Education Technology*, *15*(7), 1334–1346. https://doi.org/10.18178/ijiet.2025.15.7.2335

Andreatti, G., & Morselli, D. (2026). Cooperative or game-based learning? Fostering financial literacy for sustainable citizenship through two contrasting implementations in primary education. *Sustainability*, *18*(3). https://doi.org/10.3390/su18031545

Bayuk, J., & Altobello, S. (2019). Can gamification improve financial behavior? The moderating role of app expertise. *International Journal of Bank Marketing*. https://doi.org/10.1108/ijbm-04-2018-0086

Capa, M., & Pereira, J. B. (2026). Gamifying financial literacy: A digital design mobile project to promote financial literacy in young adults. In M. Antona & C. Stephanidis (Eds.), *Lecture notes in computer science* (pp. 50–64). Springer. https://doi.org/10.1007/978-3-032-12781-5_4

Chamberland, C., De Hemptinne, D., & Tremblay, S. (2026). The relationship between financial literacy, self-efficacy, and performance in a financial simulation game. *Acta Psychologica*, *266*, Article 106906. https://doi.org/10.1016/j.actpsy.2026.106906

Chernbumroong, S., Thongthip, P., Worragin, P., Tongpaeng, Y., & Julrode, P. (2026). Learning finance through play: Assessing gamified environments in agricultural board game education. *International Journal of Information and Education Technology*, *16*(5), 1288–1297. https://doi.org/10.18178/ijiet.2026.16.5.2597

Estima, A., & Peguinho, C. (2024). Using gamification to promote financial literacy and consumer education among future generations. In *International Conference on Higher Education Advances* (pp. 825–830). Universidad Politecnica de Valencia. https://doi.org/10.4995/HEAd24.2024.17353

Grobbelaar, C., & Alsemgeest, L. (2026a). Designing a gamified retirement planning application: Evidence from a workplace study of millennial employees. *Electronic Journal of e-Learning*, *24*(3), 1–15. https://doi.org/10.34190/ejel.24.3.4375

Grobbelaar, C., & Alsemgeest, L. (2026b). Multidisciplinary pathways to retirement financial literacy: An experimental comparison of gamified and infographic interventions. *Social Sciences and Humanities Open*, *14*. https://doi.org/10.1016/j.ssaho.2026.103556

Helal, M., Albashrawi, M., Sohail, M., Chae, I., & Dwivedi, Y. (2026). Smart money in the Gulf: A content analysis of financial literacy apps across GCC markets and a research agenda. *Journal of Systems and Information Technology*. https://doi.org/10.1108/jsit-06-2025-0251

Huizar, S., Golding, D., Garcia, V., Geller, H., Golding, P., & Perez, A. (2025). Gamification of a financial literacy course offered to first year engineering students at a Hispanic

serving institution. In *2025 IEEE Frontiers in Education Conference (FIE)* (pp. 1–8). IEEE. https://doi.org/10.1109/fie63693.2025.11328354

Jin, M., Chen, J.-H., & Huang, X. (2025). Game-based intervention to improve child financial literacy: A quasi-experimental study. *Research on Social Work Practice*. https://doi.org/10.1177/10497315251378023

Kaur, N., Gupta, M., Saha, S., Manallack, S., & Gupta, P. (2024). Financial literacy through gamification. In *2024 4th International Conference on Innovative Practices in Technology and Management (ICIPTM)* (pp. 1–6). IEEE. https://doi.org/10.1109/ICIPTM59628.2024.10563365

Kitchenham, B., & Charters, S. (2007). Guidelines for performing systematic literature reviews in software engineering (Version 2.3, EBSE Technical Report EBSE-2007-01). Keele University and Durham University.

Kosasih, W. H., & Juhana, A. (2025). Role of game-based learning in improving financial literacy and investment skills among the young generation. *Jurnal Pendidikan Ekonomi Undiksha*. https://doi.org/10.23887/jjpe.v17i1.86749

Marpaung, B., Marpaung, A. M., & Hidayat, S. F. (2026). Banking gamification and financial literacy in financial management behavior. *Journal of Economics, Finance and Management Studies*. https://doi.org/10.47191/jefms/v9-i7-22

Miras-Rodríguez, M. del M., Martelo-Landroguez, S., Fresneda-Fuentes, S., Escobar-Pérez, B., & Rodríguez-Castro, P. (2024). Fostering financial literacy in high school education through a game: The experience of RANOKA. *EDUCADE - Revista de Educación en Contabilidad, Finanzas y Administración de Empresas*, (15), 65–87. https://doi.org/10.12795/educade.2024.i15.05

Misara, R., Sharma, S., Mittal, S., & Mishra, S. (2026). From play to pay: A systematic review of gamification in modern financial ecosystems. *Acta Psychologica*, *266*, Article 106780. https://doi.org/10.1016/j.actpsy.2026.106780

Moher, D., Liberati, A., Tetzlaff, J., Altman, D. G., & The PRISMA Group. (2009). Preferred reporting items for systematic reviews and meta-analyses: The PRISMA statement. PLoS Medicine, 6(7), e1000097. https://doi.org/10.1371/journal.pmed.1000097

Muralidharan, V., Eswaran, P., Elango, R., Suresh, K. K., Vani, N., & Janani, V. S. (2026). Gamifying financial literacy in the digital era. In *2026 International Conference on Data Science, Agents and Artificial Intelligence (ICDSAAI)* (pp. 1–6). IEEE. https://doi.org/10.1109/ICDSAAI69492.2026.11505146

Oktaviani, D. I., Gusnardi, G., Caska, C., Suarman, S., & Indrawati, H. (2025). Enhancing financial literacy through educational game-based learning materials. *Al Qalam: Jurnal Ilmiah Keagamaan dan Kemasyarakatan*. https://doi.org/10.35931/aq.v19i1.3994

Page, M. J., McKenzie, J. E., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D., Shamseer, L., Tetzlaff, J. M., Akl, E. A., Brennan, S. E., Chou, R., Glanville, J., Grimshaw, J. M., Hróbjartsson, A., Lalu, M. M., Li, T., Loder, E. W., Mayo-Wilson, E., McDonald, S., McGuinness, L. A., Stewart, L. A., Thomas, J., Tricco, A. C., Welch, V. A., Whiting, P., & Moher, D. (2021). The PRISMA 2020 statement: An updated guideline for reporting systematic reviews. BMJ, 372, Article n71. https://doi.org/10.1136/bmj.n71

Platz, L., & Zauner, M. (2025). Financial literacy games—Increasing utility value by instructional design in upper secondary education. *Education Sciences*, *15*(2). https://doi.org/10.3390/educsci15020227

Ramírez-Montoya, M. S., López-Caudana, E. O., Patiño, A., & Portuguez-Castro, M. (2026). Enhancing college students' financial literacy skills: An empirical investigation of

complex thinking competency. *Social Sciences and Humanities Open*, *14*. https://doi.org/10.1016/j.ssaho.2026.103245

Richardson, W. S., Wilson, M. C., Nishikawa, J., & Hayward, R. S. (1995). The well-built clinical question: A key to evidence-based decisions. ACP Journal Club, 123(3), A12-A13. https://doi.org/10.7326/ACPJC-1995-123-3-A12

Santoso, C. J., & Sebastian, D. (2025). Evaluating financial literacy app Saku.in: TELOS-based assessment and gamification impact study. In *2025 5th International Conference on Intelligent Cybernetics Technology and Applications, ICICyTA 2025* (pp. 413–418). IEEE. https://doi.org/10.1109/ICICYTA68677.2025.11362387

Soobhany, A. R., Vaz, K., Turcanu, A., Reuter, J., Dias, M. F., & Ullah, A. (2026). Finance Masters: Game-based financial learning for SME managers. In A. L. Brooks (Ed.), *Lecture notes of the Institute for Computer Sciences, Social-Informatics and Telecommunications Engineering, LNICST* (pp. 367–384). Springer. https://doi.org/10.1007/978-3-032-26996-6_23

To, P. L. (2026). Enhancing financial literacy and management through goal-directed design and gamification in personal finance application. *arXiv*, *abs/2601.08640*. https://doi.org/10.1007/978-3-032-13164-5_5

Tsuei, M., & Lu, H.-C. (2025). Enhancing children's insurance-related knowledge and learning attitudes through digital game-based learning. International Journal of Serious Games, 12(2), 77–90. https://doi.org/10.17083/ijsg.v12i2.879

Uppaluri, R. (2025). Gamification: Revolutionising financial planning systems. *World Journal of Advanced Engineering Technology and Sciences*. https://doi.org/10.30574/wjaets.2025.14.3.0158

Wang, S.-M., Vu, L., & Dang, L. M. (2025). Promoting financial literacy among young adults: A narrative-driven serious game approach. In *2025 IEEE Gaming, Entertainment, and Media Conference (GEM)* (pp. 1–6). IEEE. https://doi.org/10.1109/gem66882.2025.11155335

Wang, Z.-A., & Loh, E. B. (2023). Enhancing financial literacy and decision-making through gamified learning: An empirical investigation of user engagement, effectiveness, and feedback. *Software Engineering and Applications*. https://doi.org/10.5121/csit.2023.131717

Yau, P., & Wong, D. (2021). Powering financial literacy through blockchain and gamification: How digital transformation impacts fintech education. In *Proceedings of the Future Technologies Conference (FTC) 2021, Volume 1*. https://doi.org/10.1007/978-3-030-89906-6_63