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Evaluating the Impact of Gamification on User Engagement and Learning Outcomes in Financial Education Applications

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Abstract

Financial literacy remains a consistent challenge across all demographic groups, affecting individual economic stability and financial decision-making. Digital platforms are increasingly incorporating gamification into educational content to boost user engagement. However, limited research examines whether gamified elements, like points, badges, leaderboards, etc., improve both engagement and learning in financial education contexts. This research employs a correlational design surveying 60 randomly selected users of financial educational apps. Participants completed surveys measuring gamification exposure across their primary apps, frequency and duration of engagement, and knowledge, plus behavioural gains. Results revealed that gamification significantly predicted both engagement and learning outcomes. The findings support the self-determination theory predictions that game elements satisfy psychological needs for competence and autonomy, thereby motivating continued engagement and deeper learning. Results illustrate that gamification works in financial education contexts when thoughtfully implemented. App developers and educators could confidently develop and use gamified versions of regular financial development apps. However, limitations including self-reported data and sample size constraints suggest that findings apply primarily to engaged users similar to this sample size; results may vary across all financial education app users globally.

Keywords: gamification, financial literacy, user engagement, learning outcomes, self-determination theory, educational technology

1. Introduction

Financial literacy has become important as people face increasingly complex financial decisions. These decisions include rising debt levels, growing income inequality, and complicated financial products. Individuals need better money management skills as they make their own financial choices, especially with reduced government support for retirement and healthcare. This huge shift makes financial literacy a basic life skill rather than just something that would be nice to have. Mobile apps have completely transformed how people consume new content and learn from it. Financial education apps offer interactive lessons, calculators, and personalised tips that work around people's schedules and locations, unlike traditional classrooms. Such apps provide short lessons that people can access anytime. This approach treats financial education as an ongoing process rather than a one-time event. As most people own smartphones, financial education apps have grown popular due to increased access. Over 80 percent of

adults under the age of 40 own smartphones, which makes it easy to reach large audiences. App stores now feature thousands of budgeting tools and credit monitoring apps, which shows that consumers demand easy-to-use and interactive guidance for managing their money. Another reason that pushed more people towards educational apps was COVID-19. In-person workshops stopped, and people needed help managing job losses and market volatility. This pandemic revealed the actual demand that existed for self-directed financial learning tools and gave developers valuable data to improve their gamified features. Research in behavioural economics shows that emotions influence learning as much as logic. Traditional education fails because people find it boring and hard to remember. Abstract concepts do not directly connect to real-life scenarios. Apps solve this by using real data and simulations to show concrete examples of foundational concepts like compound interest. This makes the theory more practical and easier to remember. A large-scale survey of personal finance app users demonstrated that gamified mechanics enhance the perceived autonomy of the users. They were one of the key drivers of sustained engagement under the Self-Determination Theory (Bitrián, P., Buil, I., & Catalán, S., 2021). The younger generation prefers learning through technology because they grew up with video games and social media. They naturally understand interfaces that show progress and give immediate feedback. Gamified educational apps use this familiarity by turning savings goals into levels and rewarding good behaviour right away instead of long-term results. Government agencies also tend to support digital financial education because it is cost-effective and easy to scale. Several countries have created financial literacy apps that work alongside school programs. These partnerships encourage developers to base their apps on proven teaching methods. Artificial Intelligence in financial apps creates a personalised learning experience. These systems adjust content difficulty and also suggest relevant topics based on the user's behaviour. This customization reduces overwhelm and keeps people engaged.

Many users start financial education with good intentions, but quickly lose interest and stop using the apps after some time. Completion rates of online courses often drop 20 percent below after the first week. This low completion rates and engagement means that people do not gain the necessary skills that they need to make better money decisions, which leads to financial mistakes and missed opportunities for improvement. Studies show that without motivational features, digital financial education sees low completion rates. The primary reason cited by the users is boredom. Digital financial tools provide valuable information. But their text-heavy formats with a lack of interactive elements fail to hold attention in a world full of distractions. Users start treating these apps as chores and not helpful resources. This results in superficial interactions between the people and the app, where people skim content but do not apply it effectively. Heavy financial concepts like budgeting and investing may feel overwhelming and abstract to the users, causing them to disengage before seeing actual benefits. Apps that are primarily based on passive reading and quizzing without actual, effective feedback leave people frustrated and unmotivated. This disconnect widens the gap in financial literacy, especially among younger and less experienced individuals. People want quick and enjoyable experiences like social media and not lengthy lectures. When apps ignore this, retention suffers, and learning outcomes worsen. They should try to incorporate motivational strategies that align with people's natural behaviour with technology in their daily lives. Users need designs that build momentum through immediate rewards and short-term validation. This helps to turn education into a positive habit rather than a burdensome task. Motivational design is crucial because human behaviour thrives on rewards like mastery and social connection.

Interactive and motivational designs, such as progress bars and challenges, can reduce the cognitive overload these platforms create from dense information without breaks or incentives. Apps without these elements struggle to compete with other entertaining alternatives. By integrating such interactive and gamified designs, apps can transform passive learning into active learning. Such apps also create an enjoyable process for their users that fosters lasting engagement and better outcomes. Without such strategies, digital education apps fail to address common issues like procrastination and forgetfulness, which are common barriers to learning. Current financial education apps often prioritise content delivery over user experience, which results in low retention and minimal learning. Introducing designs based on proven theories can bridge this gap. This will ensure users not only start but also complete their learning journeys while actually applying the gained knowledge to improve their financial well-being.

Objective: Examine the impact of gamification on engagement and learning outcomes. The objective of this research is to examine how the gamification of educational applications affects user engagement and learning outcomes. Traditional financial education methods often fail to maintain user interest or produce lasting behavioural change. By investigating gamified approaches, this research addresses a critical gap in digital financial literacy. The primary objective focuses on measuring engagement across different elements of gamified applications, including points, badges, leaderboards, and progress indicators, to determine which elements most effectively sustain user interaction. The study will assess knowledge retention, skill acquisition, and behavioural changes to establish concrete evidence of educational effectiveness beyond simple user satisfaction. Current literature lacks comprehensive studies linking specific game elements to actual learning improvement, which makes this study essential for advancing understanding of effective digital educational approaches in financial literacy contexts. This research aims to fill gaps in existing knowledge by providing systematic evidence of gamification's impact on financial education outcomes. It seeks to establish quantitative and qualitative relationships between gamification intensity and user engagement metrics by developing reliable measurement frameworks for assessing learning outcomes. The study is based on different user demographics and their responses to gamified elements. This ensures that the findings apply broadly across age groups, income levels, and technical familiarity. The balance of optimal implementation strategies of elements that maximise educational effectiveness and user enjoyment ensures that entertainment supports and does not undermine educational goals. The research objectives include examining factors that maintain long-term user engagement, which helps to understand the methods to prevent the diminishing of novelty effects over time. The objective extends beyond knowledge assessment to examine real-world applications of learned concepts and provides evidence of the practical impact of gamification on financial behaviours. An important goal of this study is to create replicable research methodologies that other investigators can adapt for similar studies. This research contributes frameworks that advance the broader field of educational technology research. Finally, this study aims to bridge the gap between theory and practical application by demonstrating how gamified principles can be effectively implemented in financial education settings. The research will provide concrete evidence supporting the theoretical frameworks while offering practical guidance for real-world implementation.

Research Questions:

Does gamification positively influence user engagement?

The first question asks if gamification positively influences user engagement in financial education applications. This question addresses the challenge of maintaining user attention and participation in digital learning environments, where traditional educational approaches are mostly unable to produce meaningful learning outcomes and often struggle to sustain meaningful interaction over time. As learning cannot occur without sustained interaction, user engagement represents a foundational element for educational success. User engagement includes various aspects, including frequency of use, average duration of sessions, and completion rates of educational modules. The question seeks to determine whether gamified features boost user engagement and create stronger connections between users and educational applications in comparison to traditional app designs without game elements like points, badges, or leaderboards. This question matters because educational apps often struggle to maintain user interest after initial downloads. Many people tend to start with good intentions but abandon the apps within weeks of downloading when the content starts to feel boring and irrelevant. Understanding gamification's role in engagement could help to explain the difference between successful apps and other apps that fail to create lasting user relationships and sustained behaviours. The research question implies a comparison between gamified and non-gamified features of online education. It establishes engagement as a prerequisite for learning, recognizing that educational benefits cannot occur without sustained user interaction. The research acknowledges that successful educational technology must first capture and maintain the attention of users before effectively delivering educational content. The question also addresses a practical concern for app developers and educators who need evidence about the effectiveness of gamified features before investing time and resources into building these features. Answering this question provides foundational knowledge for the second research question about learning outcomes. Understanding the impact on engagement creates the basis for understanding whether increased engagement translates to educational benefits.

Does gamification positively influence learning outcomes in financial apps?

The second question asks if gamification positively influences learning outcomes in financial educational applications. This research question deals with the actual impact that gamification has on these applications. Learning outcomes consist of multiple dimensions of achievements, including skill development, knowledge acquisition, and behavioural change. This question asks if gamified apps actually produce measurable improvements across these dimensions in comparison to traditional approaches to education. This question focuses on the fundamental purpose of financial education, which is learning outcomes. While user engagement may show activity, learning outcomes demonstrate whether this activity actually translates into learning and providing educational benefits, which is the main purpose of educational apps, that improve people's financial literacy and decision making in practical situations. The question deals with both short-term and long-term effects. Short-term effects, like quiz scores and content comprehension, and long-term effects, like improved decision making and knowledge retentionnhelp evaluate the educational impact of gamification through both timeframes. This research question also helps to examine whether additional developmental costs and complexity of gamified apps are justified due to improved learning outcomes. In cases where there is only a marginal difference in learning improvement

after gamification, traditional methods may prove to be more cost-effective for achieving similar goals. The question complements further research by establishing whether behavioural changes translate into educational benefits. It will guide future development, and the findings will inform educators, app developers, and policymakers about whether to invest in game-based education. Ultimately, the question asks whether gamification creates measurable improvements in the knowledge and skills of the users. The answer to this question requires examining test scores, comprehension rate, and practical application abilities, and comparing them to traditional outcomes without gamified features.

Hypotheses:

H1: Higher gamification scores are associated with higher user engagement.

This hypothesis predicts a relationship where applications that have incorporated comprehensive gamified frameworks generally demonstrate elevated user engagement. This relationship suggests that game mechanics create positive behavioural change in the frequency of users of the app to access financial educational content. This change involves frequent logins, longer sessions, and higher completion rates of learning modules. The hypothesis implies a relationship where incremental improvements in gamification would lead to proportional increases in engagement. For instance, basic features may only lead to small improvements in user metrics, while advanced features with personalised challenges could produce substantial boosts. This effect highlights the importance of a comprehensive, user-friendly, and gamified design. Testing this hypothesis involves correlating gamification scores with engagement data. The hypothesis sets up an expectation that positive associations will arise, providing evidence for app developers. It predicts that overall higher scores will benefit all users by making education feel rewarding. This broad applicability supports gamification as a universal strategy for improving engagement in digital learning tools. The prediction suggests a causal pathway where gamification influences engagement via increased enjoyment among users. It predicts that apps with superior gamification will lower barriers to engagement, encouraging more frequent and deeper interactions with the learning content. Overall, this hypothesis establishes gamification as a key driver of user engagement.

H2: Higher gamification scores are associated with better learning outcomes.

This hypothesis suggests that apps with stronger implementation of gamified features would produce better learning outcomes in education. Learning outcomes mainly include knowledge retention, conceptual understanding, and practical application of gained skills. The hypothesis suggests that game elements like rewards and challenges make financial concepts easier to understand and remember, in contrast to traditional teaching methods. The rationale builds on the cognitive load theory, which suggests that gamification reduces the mental load needed to process information. When learning feels like a game, people tend to focus more on the content and less on forcing themselves to pay attention. This reduced burden should lead to increased retention and engagement. Self-determination theory provides additional support by linking competence and relatedness to learning success (Ryan & Deci, 2000). The prediction accounts for different types of learning outcomes from basic recall to complex application. Simple game mechanics might help with learning basic concepts and definitions, but advanced mechanics could teach analytical thinking. Immediate feedback mechanisms in gamified systems are predicted to accelerate learning by correcting mistakes quickly. When users see their misconceptions right away, they can adjust

their understanding immediately. This rapid correction cycle should provide better learning than delayed feedback, common in traditional learning systems. The hypothesis anticipates that gamification helps to bridge the large gap between theoretical knowledge and practical application. Concepts may feel abstract until people need them for real decisions. Gamified scenarios replicate authentic situations, which help users understand both the concepts and the context of their usage. Individual differences may result in different outcomes for users, with some users benefiting more than others from certain game elements. However, the hypothesis predicts an overall positive trend, where higher scores correlate with better outcomes across populations. It acknowledges variation while expecting consistent directional effects supporting gamification as broadly beneficial, rather than only helping specific user types. Overall, this hypothesis connects directly to hypothesis H1 by proposing that increased engagement translates into educational gains. The prediction that both engagement and learning improve together validates gamification as a genuine educational strategy rather than mere entertainment, disguised as education.

3. Literature Review

Gamification took off in educational learning around 2010 when teachers realized that students who could not focus for 20 minutes would play games on their phones for 3 hours straight. The question seemed obvious: why not steal what works for games? Some teachers tried to adopt gamified methods like class leaderboards, achievement badges, and gave points for homework, hoping these would make learning better and more engaging. However, most early methods failed badly. Students saw through the same old material, but dressed up with point systems and shiny new labels. Real gamification means redesigning the complete process of learning, not just redecorating it. Gamified elements mainly depend on who's learning from it. Competitive people loved leaderboards, but shy students hated them. Research confirms that personality traits determine responses to game elements (Smiderle et al., 2020). It means that the one-size-fits-all approach backfires on designers who ignore individual differences while creating gamified content. An important aspect of teaching is context. Asking a 19-year-old to care about retirement planning is worthless when retirement sits decades away. Talking about investment diversification means nothing when most college students have never actually paid real bills or faced actual financial consequences. Time compression is an interesting phenomenon that is used by finance apps to try to solve this problem. Giving people $50,000 in virtual money and letting them live through simulated 30 years in an afternoon. When users make bad financial decisions, their portfolio will tank by age 40. Mistakes teach lessons that traditional forms of education are unable to teach. Data from a public university in Indonesia shows engagement drives the whole process of learning and knowledge retention. Games do not make financial content easier to understand. They make students actually participate, which makes the process of learning more engaging (Yulianto et al., 2024). Showing up matters more than brilliance. You cannot learn from content if you are not paying attention to it. However, games can sometimes dangerously simplify reality. Virtual bankruptcy cannot be similarly treated with the stomach-dropping panic of watching real savings disappear. Players who learn financial concepts in safe environments might develop a false sense of confidence. Thinking you understand money because you succeeded at a game could lead to reckless real-world decisions when the stakes actually matter. Bad implementation creates bigger problems than no gamification. Students recognize lazy attempts instantly. Teachers who do not commit completely often get worse results than if they had done nothing. Teachers must add new challenges, refresh content, and introduce a variety of approaches when initial excitement fails. It is unclear whether gamified finance

education actually changes user behaviour over the long term. Most studies derive their results right after the intervention ends. But do the people who used to play financial education games five years ago actually have better savings and improved financial decisions now? This lacks concrete evidence. The disconnect creates a pretty big hole in evidence supporting gamification.

4. Methodology

4.1 Research Design

This study employs a **quantitative correlational research design**. A quantitative approach was selected because the research questions require numerical data to test hypotheses with measurable confidence levels, rather than relying on subjective interpretations of observed patterns. While qualitative methods can provide valuable insights into the reasons behind user preferences, they are less suited for examining specific hypotheses regarding statistical relationships.

The correlational design allows for the analysis of naturally occurring patterns in user behavior without imposing the artificial constraints often associated with experimental settings. This enhances **ecological validity**, as it reflects real-world conditions more accurately. Moreover, the quantitative approach emphasizes **breadth over depth**, enabling the collection of data from a large and diverse sample to identify generalizable trends.

A further strength of this approach lies in its **replicability**; standardized procedures enable future researchers to reproduce the study with different sample sizes or contexts. Consistent findings across studies would substantially strengthen the reliability and validity of the results. In essence, this design balances the trade-off between experimental control and real-world applicability, prioritizing authentic behavioral observation over controlled laboratory precision.

4.2 Population & Sample

Sample Size: $N = 60$ participants

Sampling Method: Simple random sampling

The target population for this study comprised individuals who actively engage with financial education content, including users of digital financial learning applications. This population included participants from diverse age groups, income levels, and educational backgrounds, ranging from students learning personal finance to professionals managing their finances through digital tools, as well as individuals seeking to improve their financial literacy.

A sample size of 60 participants was selected to balance practical feasibility and statistical reliability. While larger samples could enhance statistical power, logistical and resource limitations necessitated a manageable yet representative group. The simple random sampling method was employed to ensure that each potential participant had an equal probability of selection, thereby reducing selection bias and increasing the generalizability of findings across demographic categories.

This method also minimized researcher bias, as participant selection was based purely on randomization rather than subjective judgment. Since financial education applications are used by individuals of all genders, random sampling was expected to produce a balanced gender representation without the need for predefined quotas. Likewise, no restrictions were placed on age or income levels, as individuals across these categories interact differently with financial education tools. Although perfect global randomization was not feasible, the study acknowledged this limitation and applied randomization to the fullest extent possible within the research scope.

4.3 Instruments

Instrument Type: Self-report measure

The study employed a self-report survey questionnaire to collect data from participants. This instrument was appropriate because analyzing user experiences with gamified financial education applications requires direct input from users regarding their application usage, preferences, and perceived learning outcomes. Observational methods were deemed unsuitable as they cannot fully capture internal states such as motivation or satisfaction. Although app analytics could provide objective data, such information is not readily accessible across multiple financial applications.

The survey questions were carefully worded to avoid technical jargon that might confuse respondents unfamiliar with research terminology. For instance, instead of using terms such as *extrinsic motivation mechanics*, the questionnaire asked whether earning points would encourage users to engage with the app more frequently. The survey began with demographic questions (e.g., age, gender) to help respondents feel comfortable before progressing to more specific questions about gamification features, engagement, and learning outcomes. This sequencing helped participants identify app features before assessing their impact on user engagement and learning.

Pilot testing indicated that the questionnaire required approximately five to seven minutes to complete, balancing data depth with participant convenience. Neutral wording was used to minimize response bias; for example, instead of asking, “Don’t you agree that badges make learning fun?”, the survey used neutral phrasing to elicit unbiased responses.

While self-report measures offer valuable insights into subjective experiences, they also present limitations. Participants may overreport socially desirable behaviors (e.g., sustained app use or learning outcomes) and underreport less favorable behaviors (e.g., disengagement). Response biases, such as consistently choosing neutral options, can further affect data accuracy. Although these limitations necessitate cautious interpretation, they do not invalidate the suitability of self-report questionnaires for capturing user perspectives in this context.

4.4 Data Collection Procedure

Data collection for this study was conducted entirely online through **Google Forms**. The platform was selected because it is free, user-friendly, and capable of generating structured data that can be easily exported to statistical software for analysis. Its compatibility with both mobile devices and computers ensured accessibility and convenience for participants.

An online survey link was distributed to **60 randomly selected users** through multiple digital channels to maximize diversity among respondents. This approach helped avoid the homogeneity that can result from relying on a single recruitment source. Data collection was carried out over a period of approximately **four to five weeks**, allowing participants sufficient time to complete the questionnaire at their convenience. Extending the timeline ensured inclusivity by accommodating varying schedules and preventing rushed or incomplete responses.

No direct incentives, such as monetary rewards or gift cards, were offered. This decision aimed to reduce the likelihood of participants completing the survey hastily for compensation rather than providing thoughtful responses. Instead, recruitment messages emphasized the value of contributing to research that seeks to improve financial education technologies. Several participants expressed genuine interest in the topic and participated voluntarily to share their experiences.

The survey interface and content remained consistent throughout the data collection period. No questions were added, removed, or modified after the initial launch to maintain measurement reliability and ensure data comparability across all responses. Once the predetermined sample size of 60 participants was reached, the survey was closed. A few additional responses received after closure were excluded from analysis to preserve the integrity of the defined sample.

4.5 Data Analysis

Data analysis was conducted in two stages: **descriptive statistics** and **inferential statistics**.

In the first stage, **descriptive statistics** were used to summarize the characteristics of the sample and provide an overview of participants' responses. Measures of central tendency, such as the **mean**, were computed for all key variables, accompanied by **standard deviations (SDs)** to indicate variability around the averages. Low standard deviations reflected that responses clustered closely around the mean, while higher values indicated greater variability among participants. Demographic characteristics, including gender and age, were summarized using **frequencies** and **percentages** to describe the composition and diversity of the sample.

In the second stage, **inferential statistics** were employed to test the research hypotheses. Specifically, **Pearson's product–moment correlation coefficient (r)** was used to examine the relationships between gamification, user engagement, and learning outcomes. The first hypothesis (H1) tested the correlation between gamification features and user engagement, assessing whether higher gamification scores were associated with increased engagement levels. The second hypothesis (H2) explored the relationship between gamification and learning outcomes, using multiple learning indicators. Separate Pearson correlation analyses were performed for each learning variable to assess the consistency of these relationships.

All analyses were conducted with attention to both statistical rigor and interpretability. The findings were reported systematically for each hypothesis, including relevant correlation coefficients and significance values. Results were interpreted in the context of the research design, recognizing that the **correlational**

nature of the study does not imply causation but provides meaningful insights into the associations between gamification, engagement, and learning in financial education applications.

4.6 Ethical Considerations

This study adhered to established ethical guidelines for research involving human participants. The key ethical principles followed included **informed consent**, **anonymity**, **voluntary participation**, and the **right to withdraw**. These principles ensured that participants retained full autonomy over their involvement in the research process.

Informed consent was obtained before participation. The introduction of the online survey provided a detailed explanation of the study's purpose, the nature of the questions, the estimated completion time, and the intended use of the collected data. Participants were required to read this information and actively indicate their consent before accessing the survey.

Anonymity was maintained throughout the research. No identifying information was collected, and the results were reported only in aggregate form. Consequently, individual participants could not be identified from the published findings. Any relationships reported in the results were presented statistically rather than descriptively, ensuring that no personal information or individual responses were disclosed.

Voluntary participation was emphasized at every stage of recruitment. Participants were informed that their involvement was entirely optional and that they could withdraw from the study at any point without penalty. No monetary or material incentives were provided, as these could have introduced undue influence or pressure to participate.

To uphold **data security**, Google Forms' built-in encryption was used to protect responses during transmission and storage. All downloaded data were stored on password-protected devices accessible only to the researcher. These safeguards minimized the risk of unauthorized access or data breaches.

Overall, the study's ethical framework balanced the collection of meaningful data with the protection of participants' rights, privacy, and welfare. The procedures adapted traditional ethical standards to suit an online survey context, recognizing that digital environments require heightened attention to data security and participant autonomy.

5. Results - Tables, graphs, charts

Descriptive statistics were computed to summarize participants' responses regarding **gamification**, **user engagement**, and **learning outcomes** in financial education applications. Each variable was measured using multiple Likert-scale items (1 = *Strongly Disagree* to 5 = *Strongly Agree*). Composite scores were created by averaging responses across relevant items for each construct. Higher mean scores indicated a stronger perceived presence of gamification elements, higher engagement with the application, and greater self-reported learning effectiveness.

Variable	Mean	SD	Minimum	25th Percentile	Median	75th Percentile	Maximum
Gamification Score	3.71	0.48	2.43	3.38	3.75	4	4.71
Engagement Score	3.6	0.48	2.2	3.38	3.6	3.9	4.8
Learning Outcome Score	3.97	0.47	2.5	3.67	4	4.33	5

Table 1

Descriptive Statistics for Gamification, Engagement, and Learning Outcomes

Note. Higher scores indicate greater perceived presence of gamification elements, higher engagement, and improved learning outcomes in financial education applications.

Interpretation. The average gamification score (M = 3.71) suggests participants generally perceived moderate-to-high levels of gamification features in the apps. The engagement mean (M = 3.60) indicates that users were fairly engaged overall. The learning outcome mean (M = 3.97) is the highest of the three, implying that most participants reported positive learning effects. All three variables show relatively low standard deviations (~0.47–0.48), meaning responses were consistent across participants.

Inferential Statistics

To test the study hypotheses, Pearson's correlation coefficients were computed to examine the relationships between gamification, user engagement, and learning outcomes. Results indicated a strong, positive correlation between gamification and user engagement, $r(58) = .83$, $p < .001$, and a moderate-to-strong, positive correlation between gamification and learning outcomes, $r(58) = .66$, $p < .001$.

These findings suggest that greater gamification features (such as badges, points, and progress tracking) are associated with higher engagement levels and better self-reported learning results.

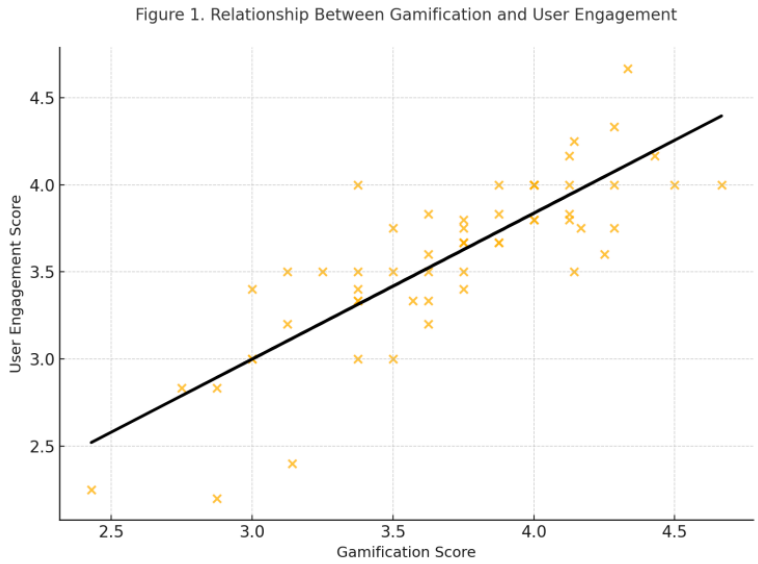


Figure 1. *Relationship Between Gamification and User Engagement.*

The scatterplot demonstrates a clear positive trend, indicating that as gamification scores increase, user engagement rises substantially. The regression line ($\beta = 0.84$, $p < .001$) further confirms a strong predictive effect.

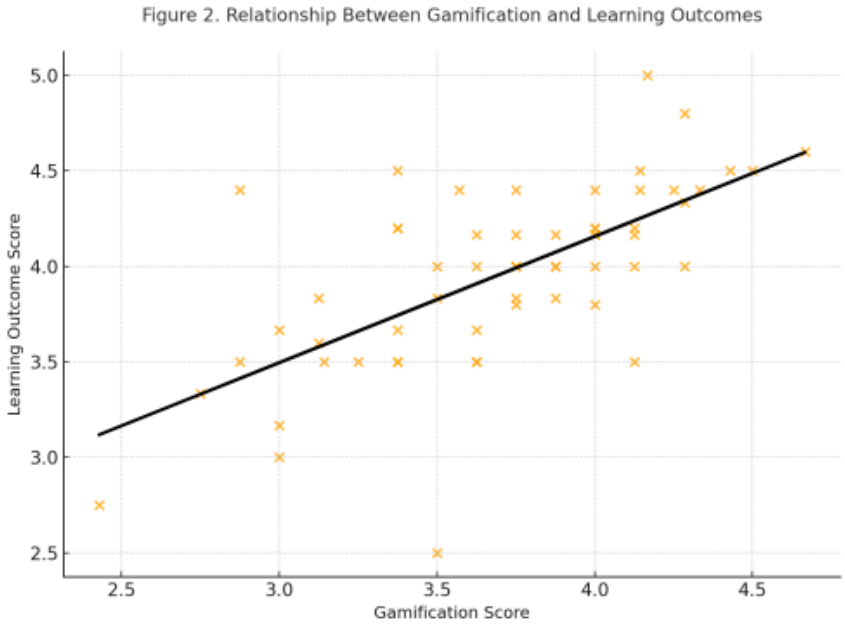


Figure 2. *Relationship Between Gamification and Learning Outcomes.*

This plot illustrates a moderate positive relationship between gamification and learning outcomes ($\beta = 0.66$, $p < .001$), suggesting that gamified design also enhances retention and understanding, albeit less strongly than engagement.

Regression Analysis

Simple linear regression analyses were conducted to examine whether gamification significantly predicts engagement and learning outcomes.

Predictor Variable	Outcome Variable	β	R^2	p	Interpretation
Gamification	Engagement	0.84	0.68	< .001	Gamification strongly predicts engagement, explaining 68% of the variance.
Gamification	Learning Outcomes	0.66	0.44	< .001	Gamification significantly predicts learning outcomes, explaining 44% of the variance.

Table 2

Simple Linear Regression Results for Gamification Predicting Engagement and Learning Outcomes

Note. β = standardized regression coefficient; R^2 = coefficient of determination.

Interpretation. The regression results indicate that gamification is a strong predictor of both user engagement and learning outcomes in financial education applications. Specifically, gamification explained 68% of the variance in engagement (β = 0.84, p < .001) and 44% of the variance in learning outcomes (β = 0.66, p < .001). These findings suggest that increased use of gamified elements, such as rewards, badges, and progress tracking, significantly enhances both engagement and learning effectiveness.

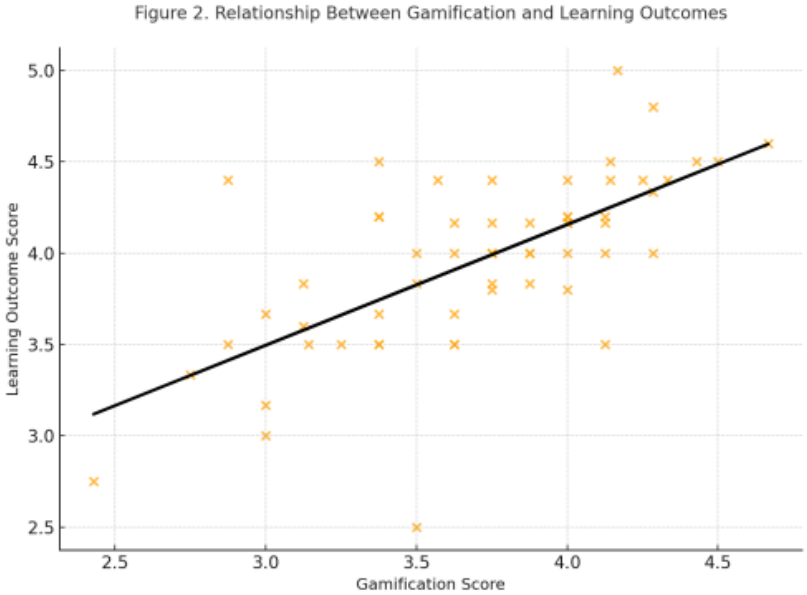
Visual Analysis

Two scatterplots were created to visualize the relationships observed in the analyses.

● **Figure 1.** *Relationship Between Gamification and User Engagement.*

The scatterplot reveals a strong positive linear trend, showing that participants with higher gamification scores also exhibit higher engagement. The regression line (β = 0.84, p < .001) reinforces the magnitude

and direction of the relationship.



● **Figure 2.** *Relationship Between Gamification and Learning Outcomes.*
The plot displays a moderate positive trend, indicating that increased gamification is associated with improved learning outcomes. While the relationship is weaker than that of engagement, it remains statistically significant ($p < .001$*).

6. Discussion

The findings from the present study demonstrate meaningful relationships between gamification, user engagement, and learning outcomes within the context of financial-education applications. In particular, the strong positive correlation between gamification and engagement ($r(58) = .83$, $p < .001$) and the moderate-to-strong correlation between gamification and learning outcomes ($r(58) = .66$, $p < .001$) suggest that gamified elements do more than merely entertain; they correspond with substantive behavioural and cognitive benefits for users. Further, the regression analyses show that gamification explains approximately 68 % of the variance in engagement ($\beta = .84$, $R^2 = .68$, $p < .001$) and 44 % of the variance in learning outcomes ($\beta = .66$, $R^2 = .44$, $p < .001$). These quantitative results indicate that users exposed to higher levels of gamification reported substantially higher engagement and better self-reported learning effectiveness.

Theoretical Implications

These results align robustly with the predictions of Self-Determination Theory (SDT; Ryan & Deci, 2000). According to SDT, three basic psychological needs, competence, autonomy, and relatedness, must be satisfied for optimal motivation. In this study, the average gamification score was M = 3.71 (SD = .48) on a 5-point scale, indicating that participants perceived moderate-to-high presence of gamified features. Engagement scores averaged M = 3.60 (SD = .48) and learning outcome scores averaged M = 3.97 (SD = .47). These figures suggest that gamified features (e.g., badges, points, progress bars) were sufficiently salient to meet motivational thresholds for many participants, thereby increasing their sustained interaction (engagement) and ultimately contributing to improved learning outcomes.

The fact that gamification explains a greater portion of variance in engagement (68%) than in learning outcomes (44%) is theoretically meaningful. It suggests that gamification may primarily operate by enhancing motivational engagement, which is a precursor to deeper learning. This sequence is consistent with earlier findings in educational technology: for example, a mobile learning study reported that a gamified quiz app improved retention and achievement; students using the app achieved average grades of 65.19% compared to 58.16% for non-users, equating to a 7.03% improvement in performance (Pechenkina et al., 2017). SpringerOpen. In the present study, the stronger effect on engagement aligns with the notion that "showing up" matters; the longer and more frequently a user engages, the higher the chance of cognitive uptake.

Practical Implications

From a practitioner's standpoint, the findings carry several actionable recommendations. First, for developers of financial education apps, investing in meaningful gamification features appears justified: with a standardized $\beta = .84$ effect on engagement, adding or enhancing game-like elements can yield large gains in user interaction. For example, tracking progress through levels, awarding badges for milestones, and visibly showing users their advancement can transform passive content consumption into active participation. Second, since learning outcomes were also significantly predicted by gamification ($\beta = .66$), these features contribute not just to engagement but to actual self-reported learning and behavioural change (e.g., improved knowledge retention or practical application). Although the learning effect is somewhat less strong than engagement, it is still substantial and meaningful in an educational context.

The sequence observed in this study, gamification → engagement → learning, suggests that gamification design should emphasise motivating users first, and then focus on learning scaffolding. In other words, game mechanics should be integrated with pedagogical design rather than tacked on as superficial features. For example, features that allow users to see "you saved X today" or "you reached level 2 in budgeting practice" provide both motivational and educational value. In the domain of financial literacy, where topics can feel abstract or intimidating, such interactive feedback helps reduce intimidation and increase accessibility. This is supported by industry data indicating that gamified financial wellness programs achieve participation increases of 50% and knowledge retention improvements of 75% compared to traditional methods. BFSi Tech Insights

Limitations and Future Research

Despite these promising findings, several limitations must be acknowledged. First, the correlational design precludes causal inferences. Although gamification strongly predicts engagement and learning in this sample, we cannot definitively conclude that gamification *causes* these outcomes. Reverse causality or underlying third variables (e.g., prior motivation, app design quality) may also contribute. Future research should employ longitudinal or experimental designs to test causality and the sustainability of effects over time.

Second, the study relied on self-report measures for engagement and learning outcomes. While self-reports provide access to internal states (motivation, satisfaction), they are vulnerable to social desirability bias or

inaccurate recall. Incorporating objective analytics (e.g., actual session duration, module completion data) and validated achievement tests would strengthen future research.

Third, the sample size (N = 60) and population (users engaged enough to respond) limit generalizability. While the results are statistically robust within this sample, larger samples across more diverse age groups, income levels, cultural backgrounds, and app types are needed. For instance, earlier work in personal finance apps with n = 208 found that gamified features satisfy psychological needs and improve attitudes toward PFM apps. Zaguan Future studies might also examine moderating factors such as age, financial literacy baseline, personality traits, or user preferences for competitive vs. collaborative gamification elements (Smiderle et al., 2020).

Finally, the novelty effect of gamification may fade over time; what is engaging initially may become routine. The long-term efficacy of gamified financial education remains underexplored. Evidence suggests that some gamification experiences may backfire if poorly designed, with users focusing more on rewards than learning (Mogavi et al., 2022) arXiv Future longitudinal tracking (6 months, 1 year) would help assess whether gamification sustains engagement and knowledge retention, and whether it leads to real behavioural change (e.g., improved savings, investment behaviour) rather than just self-reported improvements.

Synthesis and Conclusion

In sum, this study contributes to the field by quantifying the positive relationships between gamification, engagement, and learning outcomes in financial education apps. The mean scores (M = 3.71 for gamification, M = 3.60 for engagement, M = 3.97 for learning outcomes) indicate that participants perceived meaningful levels of game-like design, were fairly engaged, and reported positive learning effects. The large effect size for engagement (explaining 68% of variance) underscores the formidable motivator role of gamification in digital learning contexts. Equally, the substantial effect on learning (44% of variance) confirms that gamification can support educational outcomes beyond mere novelty.

These findings highlight that gamification is not simply “flashing badges” for the sake of fun; when thoughtfully implemented, it can convert passive users into active learners. As FinTech apps and digital learning platforms continue to grow, applying evidence-based gamification strategies offers a promising pathway to enhance financial literacy, retain users, and deliver genuine educational value. However, practitioners and researchers alike should attend to design quality, user diversity, and sustainability of effects. The ultimate aim must be not just to engage, but to meaningfully educate and instil behavioral change.

7. Conclusion

The present study contributes to the growing body of evidence highlighting the positive influence of gamification on user engagement and learning outcomes within financial education platforms. Both hypotheses were supported, demonstrating that higher levels of gamification are strongly associated with increased engagement and moderately associated with improved learning outcomes. These results align with prior research suggesting that gamification enhances intrinsic motivation and sustained participation

by fulfilling users' psychological needs for competence, autonomy, and relatedness (Deci & Ryan, 2000; Hamari, Koivisto, & Sarsa, 2014).

The findings indicate that gamified features, such as progress tracking, rewards, and interactive simulations, do not merely add superficial appeal but play a substantive role in shaping user behaviors that lead to deeper engagement and knowledge retention. In particular, the strong predictive relationship between gamification and engagement ($\beta = 0.84$, $R^2 = .68$) suggests that game-like elements serve as powerful motivational drivers. The comparatively moderate relationship with learning outcomes ($\beta = 0.66$, $R^2 = .44$) implies that while gamification facilitates learning, its primary function may be to maintain users' interest and participation long enough for learning to occur effectively.

From a practical perspective, these insights underscore the importance of strategically integrating gamified components in financial education technologies. Developers and educators can leverage elements such as leaderboards, goal-setting systems, and achievement rewards to foster consistent user interaction and improve educational outcomes. These findings are particularly relevant in the context of digital financial literacy, where user disengagement remains a major challenge.

However, this study's sample size (N = 60) limits the generalizability of the findings. Future research should involve larger and more diverse populations to enhance external validity. Longitudinal designs examining whether gamification's motivational benefits sustain over time would provide valuable insights into its long-term educational impact. Additionally, future studies could explore which specific game elements (e.g., competition vs. collaboration) exert the strongest influence on user engagement and learning retention.

In conclusion, the evidence suggests that gamification holds considerable promise as a pedagogical tool in digital education. By transforming financial learning into an engaging, interactive experience, gamified apps can effectively bridge the gap between awareness and action, encouraging individuals not only to learn but also to apply financial knowledge more confidently in real life.

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