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## Analysis of the Impact of Gamification on Financial Literacy: A Study with Elementary School Students

*Analysis of the Impact of Gamification on Financial Literacy: A Study with Elementary School Students*

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### Summary

Contemporary society presents complex financial challenges that demand the development of financially literate citizens from basic education onwards. This study investigates the impact of gamification and active learning methodologies on the development of financial mathematics skills in students aged 11 to 13. The central objective was to evaluate the effectiveness of a playful learning object—an interactive board game—in the assimilation of structuring concepts such as budgeting, conscious consumption, savings, and interest. The methodology adopted followed a quantitative-qualitative approach, structured in stages of instructional design, practical application, and results analysis through pre- and post-tests. The findings revealed significant progress in participant performance, with a 35% increase in proficiency in financial planning and a 42% increase in understanding of interest and savings concepts. In addition to cognitive gains, greater engagement and reduced math anxiety were observed through experimentation in a simulated environment. It is concluded that the inclusion of playful strategies in the school curriculum is a powerful tool for the didactic transposition of economic themes, promoting autonomy and preparing young people for conscious decision-making. The research reinforces the need to integrate financial education in an interdisciplinary way for effective citizenship education.

**Keywords:** Financial Education. Gamification. Active Methodologies. Financial Literacy.

### Abstract

Contemporary society imposes complex financial challenges that require the formation of citizens equipped with financial literacy from basic education onwards. This study investigates the impact of gamification and active methodologies on the development of financial mathematical competencies in students aged 11 to 13. The primary objective was to evaluate the effectiveness of a ludic learning object — an interactive board game — in the assimilation of structural concepts such as budgeting, conscious consumption, savings, and interest. The adopted methodology followed a mixed-methods approach (quantitative and qualitative), structured into stages of instructional design, practical application, and results analysis through pre- and post-testing. The findings revealed significant progress in participants' performance, with a 35% increase in financial planning proficiency and a 42% increase in the understanding of interest and savings concepts. Beyond cognitive gains, greater engagement and a reduction in math anxiety were observed through experimentation in a simulated environment. It is concluded that the insertion of ludic strategies into the school curriculum is a powerful tool for the didactic transposition of economic themes, promoting autonomy and preparing youth for conscious decision-making. This research reinforces the need to integrate financial education interdisciplinary for effective citizenship training.

**Keywords:** Financial Education. Gamification. Active Methodologies. Elementary School. Financial Literacy.



## 1. Introduction

Contemporary society presents a scenario of excessive consumption and easy access to... credit, which makes financial mathematics education an essential skill for the training of Children and teenagers. Teaching planning and economics concepts from an early age is crucial for the development of a healthy relationship with money, promoting autonomy and Preventing early debt. In addition to its practical function, financial education in childhood It acts as a tool for reducing social inequalities, empowering new generations to... to make safe and informed decisions about their personal finances (Cunha *et al.*, 2025).

In this context, the integration of these lessons into the school curriculum through methodologies Active learning has proven effective in acquiring skills that accompany an individual throughout their life. The literature suggests that the combination of mathematical concepts and financial practices It significantly improves individuals' confidence and financial literacy (Prado, 2025). However, The challenge lies in translating the theoretical content into accessible and engaging language for the... Children and young people.

The use of educational and recreational games emerges as a dynamic teaching strategy. capable of improving students' engagement and cognitive skills. By experiencing situations In a simulated and safe environment, students have the opportunity to experience everyday life. financial decision-making and observing the immediate impact of your choices. Games that integrate Computational arithmetic, strategy, and collaboration increase interactivity and facilitate understanding of complex themes (Galindo, 2018).

Given this premise, the present article aims to analyze the application of a game. An educational board game, specifically designed to teach basic educational concepts. financial mathematics for children aged 11 to 13. The research seeks not only The goal is to describe the tool, but also to evaluate its effectiveness through a practical approach with real students. the use of playful learning in the retention of concepts and in the development of financial awareness. Criticism.

## 2. Theoretical Framework

In this section, some concepts are important for understanding the work. which was developed.

### 2.1 Interdisciplinarity in Financial Mathematics Education

Financial Mathematics Education goes beyond the simple application of arithmetic formulas. establishing itself as an interdisciplinary field that unites mathematical modeling with management of personal finance. According to Campolieti and Makarov (2021), this integration aims to increase literacy.

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financial literacy, empowering individuals to make informed decisions. Studies indicate that...

The merging of math curricula with practical financial education increases student confidence.

their economic possibilities, making learning more meaningful.

In this scenario, mastering fundamental concepts—such as budgeting, savings, interest, and... Investments — allows the student to understand the dynamics between income, consumption, and time. Understanding elements such as conscious consumption and the impact of inflation on purchasing power. It is essential for young people to develop long-term planning strategies and avoid... uncontrolled debt.

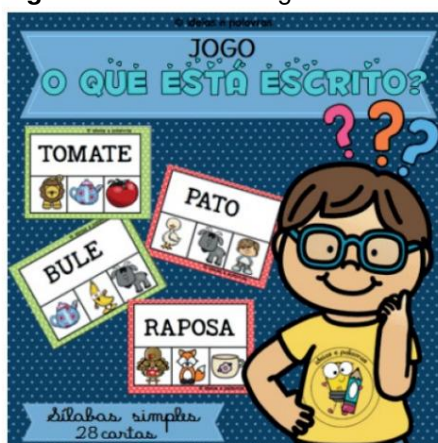
## 2.2 Play as a Catalyst for Learning

Learning in childhood and adolescence is a multifaceted process that depends on social interactions and active regulation of knowledge. While children use mechanisms of Self-explanation as an educational resource, adolescents tend to engage in topics of interest through interactive contexts and mentoring (Barron, 2006).

Educational games emerge as tools capable of harmonizing these interests with... to combine educational objectives with entertainment. According to Mayer (2019), the use of media Interactive methods in mathematics and science education can be more effective than conventional methods because It stimulates cognitive skills such as attention and logical reasoning.

Figure 1 shows an educational game where the objective is for the child to begin learning. Writing a word while looking at a picture.

**Figure 1** - Educational game that teaches writing to a child based on a picture.



Source: Ideas and Words (2024)

The concept of playful games reinforces this premise by incorporating pleasure and cooperation into the process. learning environment. By integrating game strategies and teamwork, playful environments They transform uncertainty and challenge into opportunities for collective learning, where mistakes become... to be a natural step in scientific experimentation (Hong *et al.*, 2009).

Figure 2 shows a playful game where the child enjoys hitting the targets.

balls in perforated cups, in addition to learning how to add up the balls that fall into the box.

**Figure 2** - Playful game teaching the mathematical operation of addition.



Source: Aluno On (2024).

In this work, the idea is to develop an educational and playful game.

### 3. Methodology

The research is characterized by a qualitative approach, based on the development and the application of a playful learning object. The target audience consisted of students in the age range Children aged 11 to 13 years old were selected to validate the effectiveness of the tool in teaching concepts fundamental financial aspects. The methodological approach was structured in five distinct phases:

### 4. Instructional Design and Goal Setting

The game's conception began with the didactic transposition of curricular content — such as Budgeting, savings, interest, and conscious consumption — in rote learning goals. This stage He ensured that the design was strictly aligned with the pedagogical purpose.

### 5. Format Selection and Gamification

The interactive board game format was chosen for its ability to promote social interaction. and to simulate financial transactions in a tactile and intuitive way. The gamification was structured through:

- Narrative and Plot: Creation of a fictional city where players assist characters in Critical decisions, such as saving for long-term goals.
- Reward Mechanics: Implementation of a fictional currency system, where feedback

The immediate response allowed students to observe the consequences of their choices in real time.

## 6. Application of Pedagogical Principles

The methodology incorporated learning through experimentation, ensuring a safe environment for the error. The rules were simplified to avoid cognitive overload, while respecting the level of maturation of the participants.

## 7. Data Collection and Instruments

To measure the impact of the intervention, three main instruments were used:

- **Diagnostic Questionnaire (Pre-test):** Applied prior to the activity to identify students' prior knowledge about planning and debt. The pre-test form and student responses can be viewed in Table 1.
- **Direct Observation:** Recording of interactions and strategic discussions among participants during the matches.
- **Effectiveness Assessment (Post-test):** Reapplication of questions to quantify progress in specific skills.

**Table 1 – Form completed by elementary school students**

| Disciplina: Educação matemática financeira<br>Assunto: Introdução ao planejamento financeiro  | Disciplina: Educação matemática financeira<br>Assunto: Introdução ao planejamento financeiro  |
|---|---|
| <u>Formulário Inicial</u>   | <u>Formulário Inicial</u>   |
| <p>1. O que você acha que significa "ter dinheiro"? O que você pode fazer com ele?</p> <p><i>Ter uma boa qualidade de vida, comprar objetos</i></p>   | <p>1. O que você acha que significa "ter dinheiro"? O que você pode fazer com ele?</p> <p><i>Ter dinheiro é quando você é bem de vida e pode ter muitas coisas, comprar coisas que vai te trazer alegria.</i></p>                                 |
| <p>2. Se você tivesse um salário, como você acha que deveria gastar o seu dinheiro? O que você compraria primeiro?</p> <p><i>Casa, comida e futebolicolas, compraria um PS5</i></p>         | <p>2. Se você tivesse um salário, como você acha que deveria gastar o seu dinheiro? O que você compraria primeiro?</p> <p><i>Eu gastaria com a minha família, eu daria coisas boas pra minha família.</i></p>                                     |
| <p>3. Você sabe o que são "dívidas"? Como você acha que as dívidas podem afetar a vida das pessoas?</p> <p><i>Sim, deixar e passar dívidas.</i></p>   | <p>3. Você sabe o que são "dívidas"? Como você acha que as dívidas podem afetar a vida das pessoas?</p> <p><i>Se não é quando você recebe uma coisa e não consegue devolver, podem trazer coisas ruins pra pessoa.</i></p>                        |
| <p>4. O que significa "economizar dinheiro"? Por que você acha que é importante fazer isso?</p> <p><i>Guardar dinheiro, para ter um caso de emergência.</i></p>                             | <p>4. O que significa "economizar dinheiro"? Por que você acha que é importante fazer isso?</p> <p><i>É guardar dinheiro, não comprar o que você quer e precisa.</i></p>  |
| <p>5. Você sabia que o dinheiro pode acabar se você não souber como gastá-lo? O que você faria se isso acontecesse?</p> <p><i>Sim, arrumaria um trabalho.</i></p>                           | <p>5. Você sabia que o dinheiro pode acabar se você não souber como gastá-lo? O que você faria se isso acontecesse?</p> <p><i>Sim, e H. trabalhar muito.</i></p>  |
| <p>6. O que significa "fazer um orçamento"? Como você acha que um orçamento pode ajudar você a controlar o seu dinheiro?</p> <p><i>Um limite de gastos, organizando melhor os dias.</i></p> | <p>6. O que significa "fazer um orçamento"? Como você acha que um orçamento pode ajudar você a controlar o seu dinheiro?</p> <p><i>É planejar os seus gastos. É escrever aquilo que você vai gastar e gastando quanto o seu dia seguinte.</i></p> |

|  |  |
|--|--|
| <p>Disciplina: Educação matemática financeira<br/>                 Assunto: Introdução ao planejamento financeiro</p> <p style="text-align: center;"><u>Formulário Inicial</u></p> <p>1. O que você acha que significa "ter dinheiro"? O que você pode fazer com ele?<br/> <i>Set bem de vida</i></p> <p>2. Se você tivesse um salário, como você acha que deveria gastar o seu dinheiro? O que você compraria primeiro?<br/> <i>Com um esse, comida e uma casa, um salário economizar</i></p> <p>3. Você sabe o que são "dívidas"? Como você acha que as dívidas podem afetar a vida das pessoas?<br/> <i>Sim, a pessoa pode dever dinheiro e pagar depois</i></p> <p>4. O que significa "economizar dinheiro"? Por que você acha que é importante fazer isso?<br/> <i>Ter sempre um dinheiro sobrando, para não ficar</i></p> <p>5. Você sabia que o dinheiro pode acabar se você não souber como gastá-lo? O que você faria se isso acontecesse?<br/> <i>Sim, economizava e vendia o desnecessário</i></p> <p>6. O que significa "fazer um orçamento"? Como você acha que um orçamento pode ajudar você a controlar o seu dinheiro?<br/> <i>O limite dos seus gastos, sempre ter o dinheiro</i></p> | <p>Disciplina: Educação matemática financeira<br/>                 Assunto: Introdução ao planejamento financeiro</p> <p style="text-align: center;"><u>Formulário Inicial</u></p> <p>1. O que você acha que significa "ter dinheiro"? O que você pode fazer com ele?<br/> <i>Ter um quanta de moeda local. Você pode comprar coisas com ele e economizar para futuras compras.</i></p> <p>2. Se você tivesse um salário, como você acha que deveria gastar o seu dinheiro? O que você compraria primeiro?<br/> <i>Diversos gastos com coisas importantes, como habitar. Os outros comidas necessariamente para muita sobrevivência</i></p> <p>3. Você sabe o que são "dívidas"? Como você acha que as dívidas podem afetar a vida das pessoas?<br/> <i>É algo que você deve. Podem deixar de ter um dinheiro não necessário para habitar</i></p> <p>4. O que significa "economizar dinheiro"? Por que você acha que é importante fazer isso?<br/> <i>Ficar com o dinheiro para outras coisas. Para comprar coisas que você quer</i></p> <p>5. Você sabia que o dinheiro pode acabar se você não souber como gastá-lo? O que você faria se isso acontecesse?<br/> <i>Sim. Tentaria melhorar meu dia de economizar</i></p> <p>6. O que significa "fazer um orçamento"? Como você acha que um orçamento pode ajudar você a controlar o seu dinheiro?<br/> <i>Vou me preocupar de um produto. Você compra o mais barato e fica com uma boa quantidade do dinheiro</i></p> |
|--|--|

Source: Author's own work

## 8. Refinement (Testing) Cycle

Test sessions with the target audience and consultations with experts allowed for adjustments in... interface and the complexity of the challenges, optimizing the user experience before final collection of results.

To verify the game's effectiveness, after completing the form shown in Table 1, Test sessions were conducted with children from the target audience and consultations were held with teachers of mathematics and financial education. The sessions allowed us to observe the clarity of the instructions, the Participant engagement and content suitability were key considerations. Following initial feedback, the game was adjusted to enhance the complexity of the challenges and improve the interface design, seeking to optimize the experience and facilitate the learning process.

Figure 3 shows the constructed game and the children playing. They all received... an initial amount of play money and as they progressed through the game, depending on the In that situation, they were learning how to manipulate, spend, or save that money.

Figure 3 – Application of the game with students of the same age group and school age.



Source: Author's own work

In this way, the robustness of the methodological approach ensured the reliability of the data collection. data, allowing for a precise comparative analysis between levels of prior knowledge and the Results obtained after the playful intervention, as discussed below.

## 9. Results and Discussion

The analysis of the data obtained through the application of the assessment instruments revealed a Significant progress in the participants' financial skills. The comparison The comparison between the pre-test and the post-test showed that playful mediation was crucial for consolidation. of concepts that were previously abstract for the students.

The results indicated an average growth of 35% in performance related to Financial Planning and Conscious Consumption. This increase suggests that the dynamics of the game, when Simulating situations where students had to choose between immediate needs and long-term goals allowed them to... internalize the logic of prioritizing spending. According to Barron's perspective (2006), the Interest generated by active learning environments acts as a catalyst for development. cognitive, which explains the greater retention of these practical concepts.

Even more significant was the progress in the areas of Interest Rates and Savings, which showed a A 42% increase in the success rate. The inherent complexity of compound interest and... Capitalization was mitigated by the board's reward mechanics. When visualizing growth Using their "fictitious capital" through strategic decisions during the rounds, the student overcomes the barrier.



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From memorizing formulas to understanding the time value of money.

The observed effectiveness corroborates Mayer's (2019) theses on the positive impact of media. Interactive methods in science and mathematics education. It was observed that the reduction of "math anxiety" — often associated with financial topics — occurred due to the playful nature of the activity, which shifted the focus from punitive error to safe experimentation.

During the direct observation sessions, it was noted that students aged 11 to 13 years old. They developed cooperation and negotiation strategies that were not initially foreseen. This phenomenon. This indicates that financial education, when taught through gamification, goes beyond the basic content. It is purely mathematical and reaches socio-emotional dimensions, such as self-control and systemic vision.

In summary, the data obtained, combined with the qualitative perception of student engagement, They confirm that the developed board game is not just a recreational resource, but a. A pedagogical intervention tool capable of generating real financial literacy in a short period of time. time.

## 10. Final Considerations

Translating concepts from Financial Mathematics Education into the world of play. It proved to be a pedagogical strategy of high instructive value. Through the development and. In applying the board game, it was possible to observe that the common resistance to learning... Financial issues are mitigated when the student takes on the role of protagonist in a scenario of simulation.

The data presented confirm the effectiveness of the tool: an increase of **35% and 42%** in Student performance validates the hypothesis that gamification facilitates the assimilation of Complex skills, such as interest calculation and budget management. More than just the simple. Through the transfer of information, the project promoted a change in attitude, stimulating thought. Critical thinking and long-term planning skills in adolescents aged 11 to 13.

It is concluded that the inclusion of active methodologies and tangible resources in the school curriculum is... fundamental for the formation of financially literate citizens. However, the success of this. This approach depends on the ongoing training of educators to effectively use these tools. strategic.

As a suggestion for future studies, it is recommended that this methodology be expanded to larger samples and analysis of the long-term impact on the financial lives of these young people after the school period. This article reinforces that educating for finance is, above all, educating for... citizenship and economic sustainability.



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