Design of a Mobile Learning App for Financial Literacy in Young People Using Gamification

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Abstract—**This research paper addresses the issue of insufficient financial literacy among young people, a challenge that affects their ability to make informed financial decisions. A survey was conducted to assess the current state of financial literacy among young people, whose results show a significant gap in the understanding of key concepts needed to manage their finances, which limits their economic and social development. Based on these findings, an interactive and gamified design aimed at strengthening the level of financial literacy among young people is proposed. This proposal includes wireframes that structure a mobile application, integrating playful elements and educational challenges to promote user participation in their learning process. The methodology of design that is employed focuses on the user experience, which ensures that the tool is accessible and engaging. It is expected that this proposal, based on the survey results, will not only increase the understanding of financial concepts but also motivate young people to apply this knowledge in their daily lives, thus contributing to greater financial independence and a better quality of life.**

Keywords—Financial literacy; gamification; financial education; challenge education

I. INTRODUCTION

With rapid evolution, the world is becoming increasingly complex and competitive, and financial knowledge is becoming a necessary skill, especially for young people in the future and for a country's economy and financial security [1]. This competence not only allows individuals to manage their economic resources effectively but also influences their ability to face future financial challenges. Globally, this skill is essential, particularly in an increasingly digitized context, where technologies such as FinTech (financial technology) and EdTech (educational technology) are promoted, providing improvements in education through new technologies to facilitate access and contribute to reducing inequality. Thus, offering opportunities to develop financial skills in an economic and social environment that is constantly changing [1].

In Peru, where much of the young population faces economic uncertainty, financial education is crucial. However, there is a lack of financial referents with solid knowledge; 41% of adults at the national level obtained a minimum level of financial education in a study of financial capabilities, while only 13% obtained a high level [2]. This is evidence of their limited ability to manage their financial resources effectively and make responsible financial decisions. However, there are global initiatives to promote financial education, such as the Organization for Economic Co-operation and Development (OECD) approach, which coordinates national strategies to strengthen financial learning worldwide [1].

This problem not only affects the financial well-being of young people but also generates a cycle of economic dependence and limits the economic development of a society. This is reflected in inappropriate financial behaviors, such as the imbalance between income and expenses; in 2022, 56% of adults reported that they went into debt to cover their expenses [2]. In contrast, when people have solid financial knowledge and skills, they can effectively manage their finances and thus generate greater stability and well-being in their families [3]. Therefore, it is crucial to have a high level of financial skills, since an insufficient level of financial knowledge leads to poor economic decisions and financial problems in the long term.

Therefore, it is essential to develop strategies that promote financial education attractively and effectively. The current teaching method emphasizes that students should have more freedom to learn technology, think, and make mistakes. In that sense, a mobile application turns out to be a suitable tool for the new generations, since the trend of using mobile applications is increasing. In addition, learning in financial management is not achieved only through reading and writing as the traditional teaching method, rather, students must acquire knowledge through scenario-based learning, which allows them to interpret and apply the acquired knowledge in real-life situations [1].

Finally, this research seeks to address the issue of insufficient financial literacy through the design of an interactive and gamified mobile learning application. The proposal is based on a survey that assesses the level of financial literacy of young people, the results of which showed a significant gap between the understanding of financial concepts for the management of their finances and the application of this knowledge in financial challenges. In response to this gap, we propose the design of a mobile application that incorporates playful elements and educational challenges that encourage practical and engaging learning.

The structure of this paper consists of eight sections: Section I corresponds to the introduction and Section II explains the related work. Details about the structure, tools, and design of the mobile application are proposed in Section III. Section IV presents the survey. Section V shows the results of the survey. Section VI shows the discussion and finally, Section VIII shows the conclusions.

II. RELATED WORKS

A. Interactive and Gamified Solutions

The study in [4] proposes the design of a support system with Artificial Intelligence (AI) to improve the quality of corporate financial decisions. On the other hand, a study [5] proposes a

mobile learning platform to develop entrepreneurial skills in students. Both studies consider that technology can optimize decision-making but differ in the way it is applied. On the other hand, studies [6], [7] and [8] focus on improving learning through gamification. Studies in [6] and [7] highlight the potential of games as educational tools, [6] promote financial literacy in students through economic games to teach basic financial concepts, while [7] promote the development of technical and soft skills through simulation business games. Taken together, these five papers highlight that the integration of AI, gamification, and mobile platforms not only improves learning but also optimizes financial decision-making. The key difference between them is how they are applied: [4] and [5] focused on business or entrepreneurial contexts, while [6], [7] and [8] explored learning through games and simulations.

B. Integration of AI-Assisted Coaches

All studies agree on the use of AI to personalize the user experience. However, the nature of customization varies depending on the field of application. The study in [9] is based on education, [10] health, [11] sports, and the study [12] focuses on opponent modeling and strategy optimization within a competitive environment. A common point of all studies is that AI is implemented to optimize decision-making in environments where the number of variables and uncertainty make it difficult for users to make the right decision. Concerning training and data collection methods, studies [9] and [10] are based on creating user-centric experiences. On the other hand, [11] and [12] face challenges related to the availability of high-quality data. In [11], the system had to deal with a shortage of data to train deep learning models, while [12] it stands out for the use of simulations and game data, which allowed AI to outperform previous systems, without the need for large amounts of real user data. Regarding the AI technologies used, each study adopts different technologies and approaches to implementing AI, reflecting the diversity in the way AI systems can be trained and executed. Studies [9] and [10] use AI in predictive models and heuristics, optimizing user behavior through algorithms that learn common patterns in large amounts of data. Instead, studies [11] and [12] rely on technologies such as deep learning and simulations, allowing systems to generate predictions and adapt to complex situations.

C. Importance of Financial Literacy in Education

Financial literacy emerges as a central theme in these studies, underscoring the relevance of developing healthy financial habits at different stages of life. In the study [13], they detailed an understanding of healthy financial habits in young adults, exploring the relationship between subjective financial literacy, financial engagement, and financial decision-making. On the other hand, [14] implements a more structured approach through the SaveWise program, which aims to increase the financial knowledge of adolescents, where literacy is measured more objectively, focusing on students' ability to apply financial concepts in real-life situations. Regarding the results, in [13], young adults who consider themselves financially literate show a trend towards healthy practices, such as saving regularly and investing in their future. In study [14] program participant's experienced significant improvements in their financial knowledge, which translated into increased savings intentions and a better understanding of money management.

D. Gamification and its Impact on Youth People Learning

The use of serious educational games and adaptive technologies is effective in developing specific skills and improving student engagement. The study in [15] shows that EEG (Entrepreneurial Education Game), by integrating adaptive algorithms to personalize the learning experience, resulted in greater student adaptability with 74% of participants reporting a positive learning experience. Similarly, the study [16] reveals that implementing a serious game in virtual reality improved players' mental calculation skills, although it also identified some challenges related to the use of technologies. On the other hand, studies [17], [18], and [19] show that gamification not only improves understanding of concepts, it also addresses specific skills, such as programming and AI safety. The study [18] proposed a smart tutoring system built into an educational game that provides personalized support, where students who used it got fewer errors. This study in [18] found that students who participated in the Shoot2Learn game showed a statistically significant improvement in their understanding of conditional structures, suggesting that educational games can motivate students and improve their academic performance. For its part, the study [19] evaluated a video game designed to improve AI safety education, where it found that 81% of users considered the game's learning functionalities effective.

III. PLATFORM DESIGN

The design of the proposed mobile application focuses on offering an attractive and accessible user experience, to improve the financial literacy of young people through active interaction with the financial coach and the use of gamification. This section describes the key components of the platform, design principles, and tools used for wireframe development and presents visual examples of the main screens.

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A. Overview of the Platform

The application is based on three key sections, which are designed to guide the user in their continuous learning process.

1) Initial assessment: When starting, the user selects the financial topic they want to learn or reinforce and their level of knowledge as shown in Fig. 1, and then performs the initial assessment Fig. 2, which consists of five questions. This flow is done to provide a personalized experience, which allows you to suggest the most appropriate level according to the user's performance and to provide an adaptive experience from the beginning of the application.

2) Gamified challenges: In this section, users face different financial challenges, which are designed to test their skills in topics such as saving, investing; and credits and debts Fig. 3. These gamified challenges integrate game mechanics such as rewards, difficulty levels, and short-term goals Fig. 4. In addition, there is interaction with the financial coach, who will

guide, provide personalized recommendations and suggestions based on areas for improvement during and after the game Fig. 3. Thus, this active interaction between the user and the coach makes the application interactive.
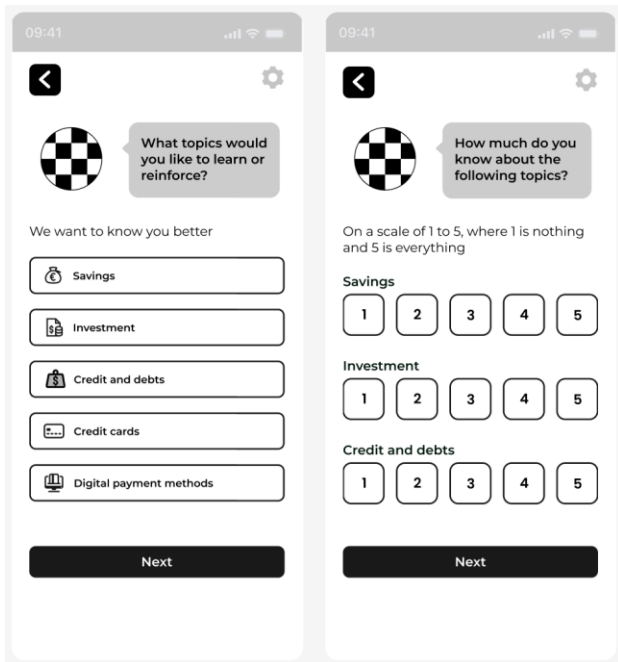

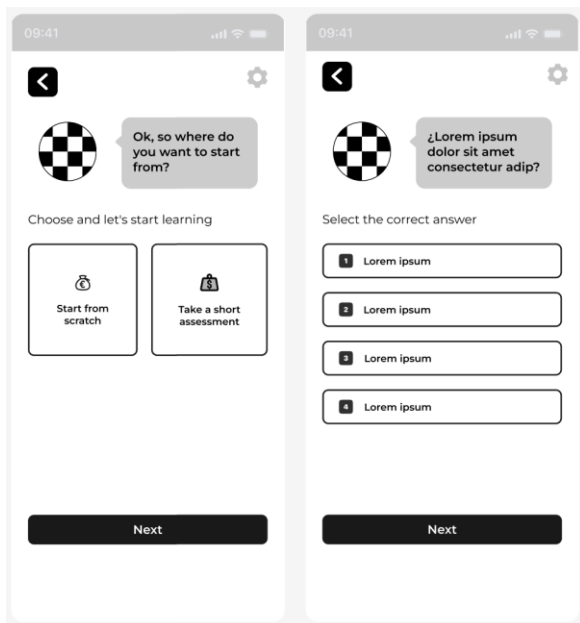Fig. 1.   Financial topic and scale of knowledge level.
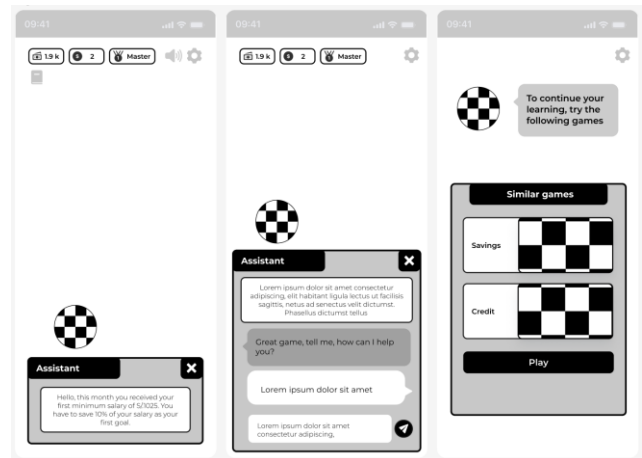

Fig. 2.   Initial evaluation.

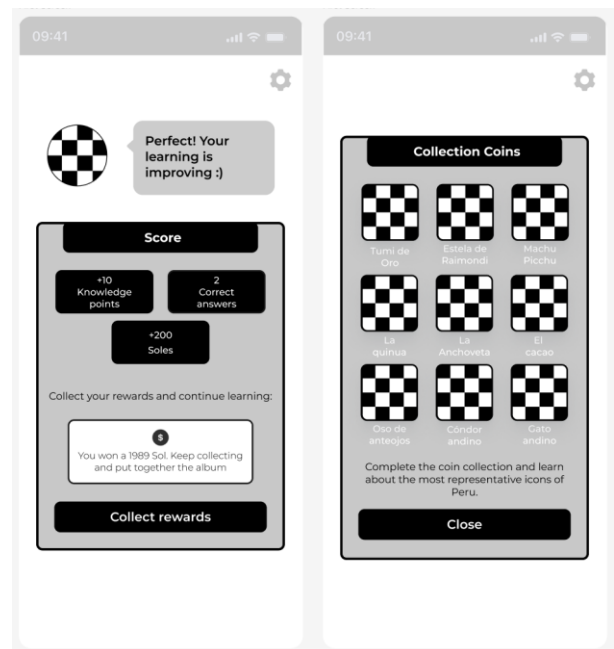Fig. 3.   Game scenarios and interaction with the virtual assistant.

Fig. 4.   Scoring and reward system.

3) Final evaluation: At the end of the challenges, users take a final assessment to measure their progress. Fig. 5 shows the design of the quizzes, the results, and the progress panel; and personalized recommendations based on user performance.
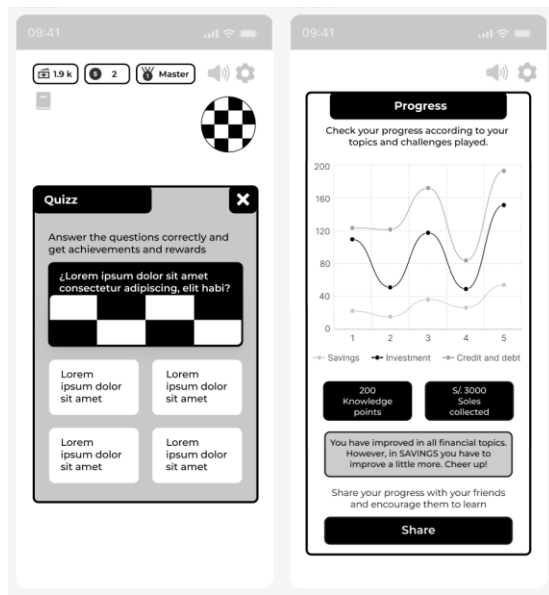
Fig. 5.   Assessment and recommendation system.

B. Design Principles

Concerning the design principles, User-Centered Design (UCD) was chosen, which focuses on guaranteeing the usability and accessibility of the game to ensure its effectiveness for users. This approach recognizes that everything is an interrelated system, where the set of components and the interaction of people must be considered. Thus, by observing how users interact and identifying problems, iterative tests are carried out to get closer to the final product [20]. Thus, the project focuses on satisfying the needs of the user, that the designs are interactive, and the final product is easy to use.

C. Design Tools

During the mobile app design and prototyping process, various tools were used for the design of different areas and functions of the platform. These include:

- Figma. It is a vector graphics and prototyping editor. The advantage of this tool is that it allows users to work collaboratively. This tool was used for the design of all the screens of the application and to define the flow that the user must follow in the prototype.

- Adobe Illustrator: It is a graphic design tool, which specializes in vector graphics. It was used for the creation of the logo and icons, which are minute details.

- Tiled Map Editor: It is a tool for the creation and editing of 2D maps, which is mainly used in games. The advantage of this tool is that it allows users to export in tile format, which makes it easy to integrate into Unity for the front-end development of the application. It was used to create scenarios for the games.

IV. METHODOLOGY

The design of the proposed mobile application is based on a study applied to university students, to evaluate the level of financial knowledge of young people. This section will detail the research approach, the instruments used for data collection, and how the results influenced the design decisions of the application.

A. Research Focus

This research is framed in a quantitative approach since it seeks to collect data numbers through a survey to assess the level of financial literacy among young people. This approach allows for obtaining objective information that facilitates the identification of gaps in financial knowledge and the foundation of the interactive and gamified learning proposal.

B. Population and Sample

The target population is university students from various undergraduate higher education institutions in Lima, Peru. Therefore, a sample of 150 university students was determined. This sample is composed of young people because they are in a transition stage towards financial independence, where the development of solid financial knowledge has a significant impact on their economic well-being.

C. Questionnaire

The questionnaire was designed in a semi-structured way, with a total of 50 questions. However, respondents only answer a subset of questions, as they must select their level of knowledge in areas such as saving, budgeting, investing, and personal finance. Based on the choice on a scale of 1-5, the level (basic, intermediate, advanced) is determined, and you are redirected to the financial challenges section associated with the selected level. These challenges are multiple-choice questions with a score of 20 points, which makes it easy to compare and analyze respondents' responses.

1) Data collection method: Data were collected through an online survey administered through Microsoft Forms. This survey was distributed to students through WhatsApp groups and the Viva Engage platform. The collection procedure was as follows:

- The survey was developed in Microsoft Forms and tested with a small group of students to ensure the clarity and relevance of the questions.

- Participation was promoted through a raffle published on the Viva Engage platform.

- Participants were informed about the purpose of the survey, the duration, and the confidentiality of their responses.

- Responses were collected over two weeks.

2) Structure of the questionnaire: The questionnaire is organized into six sections:

- Overview: Collects demographic data such as age, gender, career, college level, and the operating system (OS) of your mobile devices. Also, it informs the purpose of the questionnaire and the duration.

- Financial behavior: Analyzes the relationship between study and work, sources of income, and current practices of young people in terms of managing income, expenses, and savings.

- Financial Challenges: Inquire about the top financial challenges young people face and how often they experience difficulties managing their finances.

- Level of financial knowledge: Assesses the level of financial knowledge in key areas such as expenses, savings and investment, credits and debts; and personal finance. Respondents should rate their level of knowledge in each topic as basic (scale 1-2), intermediate (scale 3), or advanced (scale 4-5). This self-assessment allows students to be redirected to the financial challenges section according to the indicated level. These will facilitate a more detailed analysis of how their level of knowledge impacts their ability to face challenges.

- Preferences for educational tools: Inquire about preferences for educational tools to improve their financial literacy.

- Feedback and suggestions: Inquire about the difficulties experienced by respondents and suggestions for tools or features that should be added to a solution.

V. RESULTS

In this section, the results of the questionnaire of young undergraduate university students will be presented.

A. Profile of Participants

A summary of the profile of the respondents is provided in Fig. 6. 54% of those surveyed are men, while 46% are women. Regarding the study, it is evident that the students come from a variety of university students in Lima, with a higher percentage from the Peruvian University of Applied Sciences with 66%, due to the origin of the research. Likewise, students are distributed in different academic cycles, with higher percentages in cycles VI (17%), VII (14%) and VIII (18%). On the other hand, the distribution of the OS used by the respondents is shown, which is relevant for the development of the solution proposal, where a large percentage (74%) uses the Android OS, which suggests that the platform should prioritize the development in this technology, to guarantee the greatest possible accessibility.
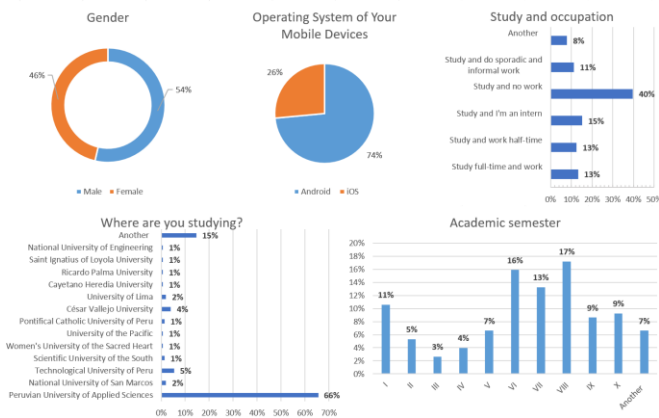

Fig. 6. Summary of the profile of respondents.

B. Financial Behavior

- Financial management: According to the results presented in Fig. 7, 44% of respondents do not keep formal control of their income and expenses, but do so mentally, which can generate uncertainty in their financial management. In contrast, only 8% use a financial management app, which allows them to have better control over their income and expenses. Likewise, 45% review their financial statements weekly, which reflects a positive financial habit. However, 11% of participants indicated that they rarely review their financial statements, which is worrying, as this lack of follow-up can lead to difficulties in managing their finances effectively.
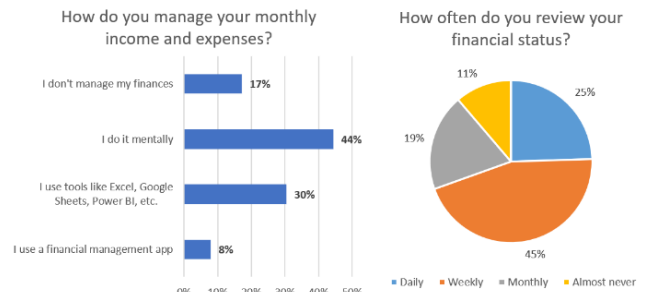

Fig. 7. Financial management.

- Expenses and savings: In Fig. 8, they indicate that 4% of respondents do not save anything, while 21% save less than 10% of their monthly income. 36% manage to save between 10% and 20%, and 23% save more than 20%. However, 16% do not know or have never calculated how much they save, which is worrying because they lack clear control over their savings capacity which could affect their financial stability. Regarding expenditure dedicated to entertainment and leisure, 40% allocate less than 10% of their income to this activity, while 35% allocate between 10% and 20%. Only 14% allocate more than 20% and 11% indicated that they do not know how much of their income they allocate to this activity. These data suggest that most students prioritize moderate spending on entertainment, although there is a large proportion who are not clear about their spending in this area.
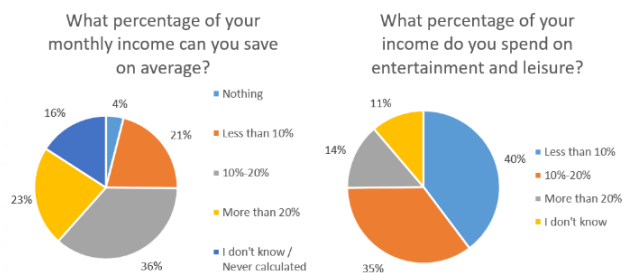

Fig. 8. Expenses and savings.

C. Financial Challenges

Regarding finance-related concerns, Fig. 9 shows that 30% of respondents expressed concern about not being able to

manage their finances efficiently. In addition, 20% worry about not being able to save enough, 20% do not understand how to invest, 17% are afraid of spending more than they earn and 13% accumulate debt. These results indicate that financial management is the main challenge for students, which could negatively impact their economic well-being.
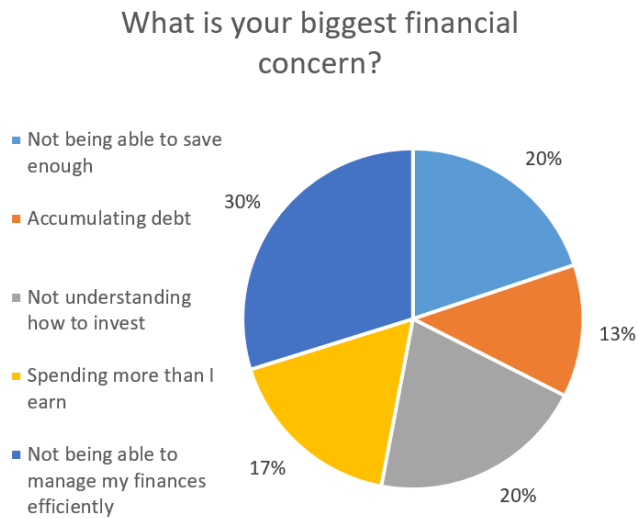

Fig. 9. Concern regarding finances.

D. Financial Literacy Level

In this section, we have worked with a multiple-choice question that uses a scale from 1 to 5, so that respondents can carry out a self-assessment of their level of financial knowledge. Scales 1 and 2 redirect them to basic financial challenges, scale 3 to intermediate-level challenges, and scale 4 and 5 to advanced-level challenges. A total of four questions are included, each corresponding to a specific topic, as shown in Table I.

TABLE I.   TOPICS QUESTIONS

ID	Theme	Questions
Q1	Budget expenses	How would you rate your knowledge on the topic of Budgeting your expenses?
Q2	Savings and investment	How would you rate your knowledge about Savings and Investment?
Q3	Credit Cards and Debt	How would you rate your knowledge about Credit Cards and Debt?
Q4	Personal Finance	How would you rate your knowledge about Personal Finance in general?

Fig. 10 shows the level of knowledge by subject. Regarding budgeting expenses, it is shown that 34% of those surveyed consider themselves at a basic level, 44% at an intermediate level, and only 22% at an advanced level. On the other hand, about savings and investment, 38% consider themselves at the basic level. Meanwhile, 42% are classified at an intermediate level and only 20% at an advanced level. In the case of credit cards and debts, a large percentage (35%) are classified at the basic level, 47% are classified at the intermediate level and only 18% at the advanced level. Finally, about personal finance, 35% consider themselves to be at the basic level, 48% intermediate level, and 17% advanced. These results show a high proportion

of young people with a level of financial knowledge at both the intermediate and basic levels, with a slight predominance at the intermediate level. However, a large percentage at the basic level is worrying, so it is necessary to strengthen knowledge and skills in these areas.
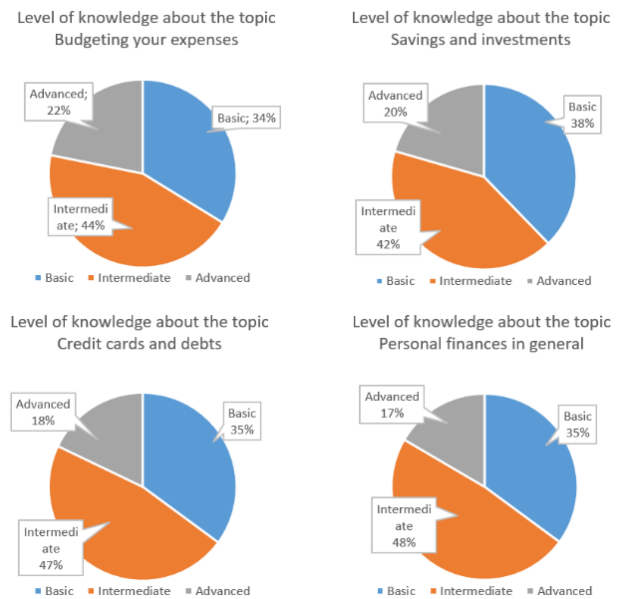

Fig. 10. Level of knowledge by topic.

E. Financial Challenges

Graphs were made to show the percentage of respondents who were correct in their answers about the financial issues defined. This allows the relationship between the level of knowledge selected and the results obtained in the financial challenges to be analyzed, reflecting how participants applied their knowledge. It should be noted that, in the graphs, the value "1" represents the correct answer, and the value "2" indicates the incorrect answer.

1) Budget expenses: Fig. 11 shows that, at the basic level, 63% of the participants were correct in their answers to the first question, while only 8% managed to get the second one right. At the intermediate level, 36% got question 1 right, but 67% got the second question right. At the advanced level, 88% were correct. This shows a clear correlation between financial knowledge and performance on challenges.
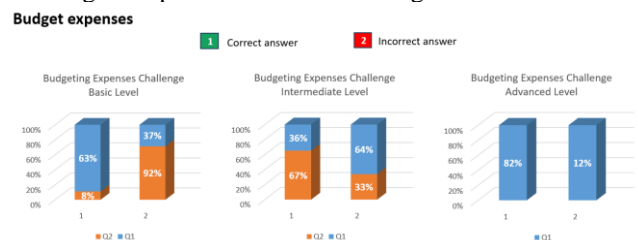

Fig. 11. Budget expenses.

2) Savings and investment: Fig. 12 At the basic level, both the first and second questions were corrected by 42% of the participants and 89% in the third. At the intermediate level,

48% got question 1 right and 44% got question 2 right. Finally, at the advanced level, 58% got the first question right and the second question was 71%.
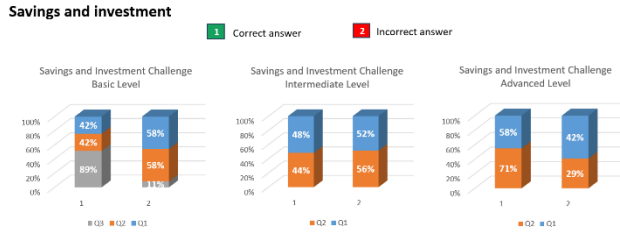

Fig. 12. Savings and investment.

3) Credit cards and Debt: In Fig. 13, 49% got the correct answer for the basic level right. At the intermediate level, 89% and 82% got questions 1 and 2 correctly respectively. In the case of the advanced level, 48% got question 1 right, while only 4% got the second one right.
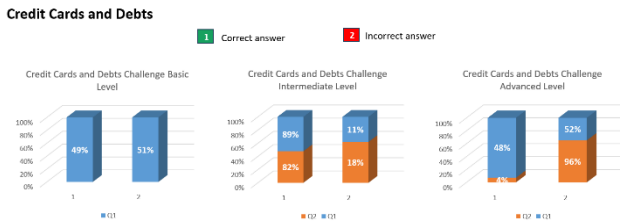

Fig. 13. Credit cards and debt.

4) Personal finance in general: In Fig. 14, 79% got the correct answer for the basic level, 90% for the intermediate level, and 64% for the advanced level.
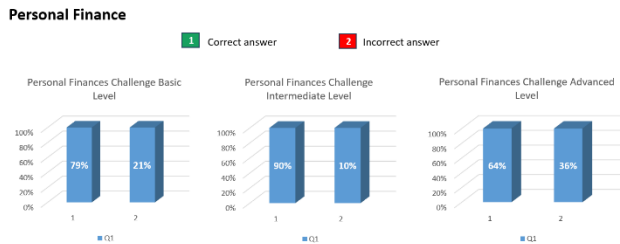

Fig. 14. Personal finance.

F. Financial Challenges Score

The scoring system for the financial challenges section consists of 20 points, regardless of the skill level selected. The rating scale used to evaluate performance is presented below (Table II). On the other hand, the average score obtained by the participants is 12.61 (Table II). This reveals a significant deficiency in the mastery of financial knowledge. Therefore, it is necessary to strengthen these areas to improve results.

TABLE II. RATING SCALE AND AVERAGE

Vigesimal qualification	[0-10]	[11-14]	[15-19]	[20]
Verbatim note	C: Fail	B: Regular	A: Expected Achievement	AD: Outstanding Achievement
Average Score	12.61			

5) Endnotes: In Fig. 15, only 5% of the respondents obtained an outstanding performance, while 32% failed.
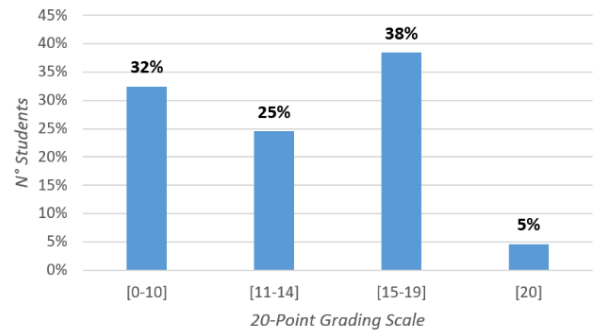

Fig. 15. Endnotes.

6) Notes per cycle: Fig. 16 shows a distribution of students in different academic cycles, revealing a remarkable trend: students in advanced cycles (VII-X) demonstrated a stronger understanding of financial concepts compared to those in initial cycles (I-III). This could be attributed to increased exposure to real economic situations as they progress in their career.
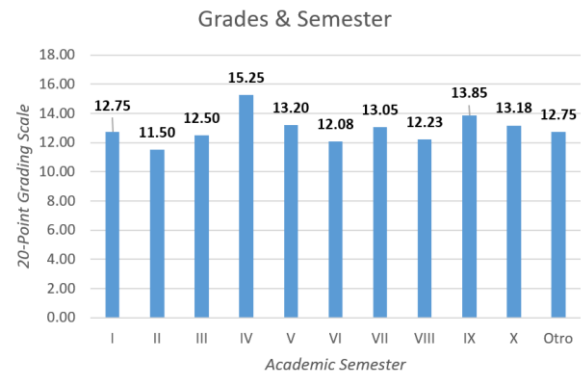

Fig. 16. Notes per cycle.

G. Tool Preferences

The survey results reveal that 81% of respondents prefer personalized advice to improve their financial knowledge. In terms of the learning format, interactive games were the most popular option with 52% of preferences. In addition, 81% showed interest in receiving personalized recommendations, which reinforces the idea of incorporating a system based on artificial intelligence for the financial coach, so that it offers suggestions adjusted to the individual needs and behaviors of users. (Fig. 17).
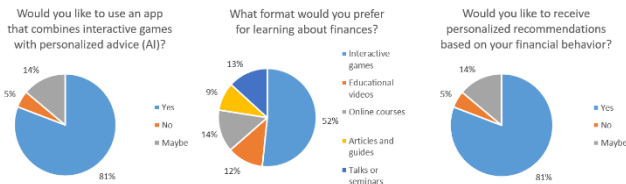
Fig. 17. Preferences.

VI. Discussion

The results obtained through the survey show the critical need to strengthen financial literacy among young university students. Most of the participants showed deficiencies in key concepts, particularly those found in the first cycles of university, while those in higher cycles showed a better understanding of financial topics (Fig. 16). This finding reinforces the importance of including financial training from the early stages of higher education to ensure that students acquire this knowledge before entering the labor market.

One of the most important findings was the preferred format for learning, where 52% opted for the interactive games option (Fig. 17). This suggests that young people value more dynamic learning methods, which validates the choice to propose a gamified solution. Since game-based learning can help increase students' engagement and enthusiasm for the topics, in addition, to achieving higher knowledge retention [17]. This result is related to [6], which found that promoting financial literacy through games increased interest and knowledge in financial topics.

In addition, 81% of respondents prefer to receive personalized recommendations based on their financial behaviors (Fig. 17). This leads to the integration of an AI-based recommendation system to offer suggestions based on users' needs and behaviors. This reflects a significant demand for solutions that teach financial concepts and provide recommendations. The study [8], which supplemented their serious game with an Intelligent Pedagogical Agent (IPA), which analyzed players' emotions and provided suggestions based on their progress in the game, thus succeeded in increasing students' competencies on Steam.

However, there were certain limitations throughout this research. First, the number of respondents, although the goal was to reach 385 participants, 150 were obtained. However, considering the focus of this study and the target population, this sample is still adequate to obtain representative results on the level of financial education. Secondly, the proposal has not been implemented or evaluated in a real environment, this limits the possibility of directly measuring the practical impact of the proposal on users' financial literacy. Finally, the proposal incorporates AI to personalize recommendations, but a detailed analysis of the ethical and privacy implications was not added, since the focus was on the evaluation of the level of financial literacy and the design of the proposal, however, it is relevant and should be considered in the implementation of this proposal.

Therefore, these results support the integration of a financial coach, designed to guide users based on their financial needs, with game-based learning to achieve a greater impact on the financial literacy of young people.

VII. Conclusion

This proposal for an interactive and gamified mobile application design is based on the results obtained in the survey of young people who prefer interactive games and personalized recommendations as learning formats. This preference highlights the importance of implementing teaching methods that promote continued interest in education.

On the other hand, it is important to note that the survey conducted not only made it possible to diagnose the financial capacity of young people but also served as the basis for the platform´s design. The data collected showed the need to strengthen financial literacy and the proposal seeks to respond to this need innovatively.

While this study does not include the practical implementation of the proposal, the design has the potential to contribute significantly to young people's financial literacy and have a positive impact on their ability to achieve financial independence.

Finally, this study presents an innovative solution based on interactive and gamified learning designed to reduce the financial literacy gap. It also promotes hands-on learning with a user-centered approach tailored to the user's preferences. Finally, it is suggested that future research work should focus on the implementation of this design proposal.

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