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# Gamification: Revolutionizing financial planning systems

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## Abstract

This paper aims to investigate the role of gamification in financial instruments and its impact on the users' activity, financial behaviors, and financial understanding. Recent advances in digital financial platforms make gamification a highly effective tool in improving user engagement and devotion to financial objectives. Badge for accomplishments, social leaderboard, personal challenges lead to increased motivation related to financial tasks and reflection of the better financial attitude, such as high savings rates, high budgeting rates, high contribution rates to investments. Tuxen et al.'s research measures the connection of gamified features and financial results through numbers and statistics' help, also using T-tests and regression analysis as well as observing behavioral trends. Evaluation of user data to components such as usage of progress bar, relative rankings, and microlearning modules demonstrates their importance in enhancing the users' financial literacy and leading them to make financially wiser decisions. Further, the study suggests that effectiveness of gamified systems in terms of user engagement and accomplishing the goal is higher than using financial incentives. The results applied to the research contribute to the development of knowledge about the use of gamification in the context of personal finance, highlighting its possibilities to change how people utilize applications in the financial sphere and make better choices in this field. Lastly, the concept of gamified financial tools provides a realistic solution to improve overall financial literacy, as well as to foster more effective financial behavior in the long run.

**Keywords:** Gamification; Finance; Users; Engagement

## 1. Introduction

Budgeting has always been regarded as something only a few smart people with strong analytical thinking are able to handle, something that deals with numbers and figures and scenarios. Although these tools and techniques have helped in increasing the degree and efficiency of the planning they have in a way or the other excluding a major chunk of people.

Money management is still a worldwide issue, and the conventional techniques of handling funds may appear complex and unbearable to most people [1]. The current state of financial systems versus user interaction is a very attractive problem space. Thus, gamification — the use of game design features extended beyond the video games has risen as the revolutionary tool to address this gap.

The use of aspects of play and interactivity means that gamification is helping to redefine financial planning systems and making them seamless, easy to use and highly successful [2]. The idea of gamification has received a great deal of attention in several different fields, such as education, health care, promotion, and personnel management [3]. This is because it can engage the most important strategies of psychological motivation, besides the intrinsic and extrinsic incentives.

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standard game trinkets such as the leaderboard, reward, levels, and missions are expected to grab the attention, engage them and keep them occupied for a long time. In relation to financial planning systems, gamification encompasses concepts that not only break down difficult information for quite easy understanding but also makes users engage in their respective financial lives up to the hilt [4].


**Figure 1** Gamification metrics (Mambo.IO, 2017)

It transforms the act of planning from a task into a fun activity that people can do with their funds, administering a total makeover to financial planning approaches [5]. The applicability of gamification in this field is most appropriate in the modern world, where devices and personal applications are easily available.

Many financial planning tools are not only institutional tools employed by experts; they are also becoming individual oriented tools [6]. Conventional monetary instruments are extremely less effective in attracting young, digital-savvy users who are already accustomed to easy, engaging, and aesthetically direct concepts.

Their generation, bred on video games and social networks, is naturally going to 'interact' with systems that are informed by gamification principles [7]. Integrated into financial planning applications, game mechanics allow companies to target this audience and help improve their financial behavior in the process.

Taking this into consideration one of the benefits of such an approach is the facilitation of financial literacy with help of the game-oriented representation of certain concepts [8]. Thus, such elements as the utilization of the necessary visualizations, indicators, and ultimate goals can become helpful from the perspective of the organization's budgeting, saving, and investing strategies [9]. Often replaced by complex numbers and various financial terms, and often explained in detail, gamified systems offer information in the form of games and attractive graphics [10].

This simplification also benefits the users by offering them easy to understand concepts as well as provoking an individual's intelligence on how to make the right choices on the financial market. Moreover, what game implies is achievement and responsibility for the actions, thus helping customers maintain consistency in their financial strategies.

One of the most important benefits of gamification is its effectiveness against the psychological factors that concern money saving [11]. Most people feel stressed, pressured, or just plain anxious when it comes to managing their money. These emotions, therefore, can be managed by gamified systems since the numerical chores translate into reputable and straightforward financial tasks.

Therefore, with the rationale of presenting financial planning as a set of tasks or missions, users are empowered to act without necessarily being overwhelmed [12]. Furthermore, the practice of positive incentives including offering of incentives like badges or special signs which gives a feeling of success encourages participation.

Another benefit of gamification is to enforce a behavior change which is a core component of financial management [13]. Most financial advice given out is in the form of rational planned decisions, but studies have revealed that people make decisions based on emotions and psychological attitudes.

These factors are presented in gamified systems due to the use of behavioral personal design factors like tips, recalls, and competition [14]. For instance, the application that can provide information about budgeting can send a notification to a user that they are close to a savings milestone with a congratulating text. Just as with the usage of leaderboards discussed above, comparisons with peers can also create interest and motivate users to exercise more beneficial control over their finances. These strategies not only encourage the use of the site/app but also encourage the persistence of behaviors which can positively impact the users' finances.

Purposes of using gamification in financial planning include Several areas that reveal the applicability of using gamification in financial planning include technological drivers that reveal the potential of implementing gamification in financial planning include It is these technologies that make it possible to design and develop game-like personalized solutions applicable to individual users' needs, choice, and pocket allowance.

For example, AI solutions can examine a user's spending behavior and suggest specific steps or incentives in it to accomplish a target [15]. This level of personalization serves to amplify the value of gamified financial planning tools by further aligning the application on offer with users' needs and potential impact they would potentially have on the lives of the former. In addition, explaining the possibility of using gamification combined with the blockchain, it is possible to bring transparency and security to financial systems, which will allow users to gain confidence.

There are certain difficulties that arise on the way to integrate the gamification elements into the financial planning, which will be described in the following section. Some sceptics claim that owing to gamification, financial concerns at the basis of people's choices may be grossly underestimated. Also, this form of incentive may lead to users overemphasizing the carrot at the center of the system, to the detriment of the 'stick.'

Ethical issues are also crucial because gamification has potential for using the user rather than the user using the application, thus it's very important to remember that it's all about people. Financial institutions and developers should be aware of making an environment fun and friendly yet should not lose the essence of the given financial advice.

Overcoming classic approaches to efficiency, gamification is one of the defining trends in the financial planning environment. If designed with reference to relevant game design, financial planning systems can mitigate the limitations outlined and therefore effectively translate otherwise complicated ideas into applicable behavioral changes.

However, the effectiveness of this approach depends on the proper design and implementation, the principles of which are outlined below as well as the processes of improvement to correspond with the users' needs and difficulties encountered. In the fast-growing financial industry, gamification is more likely to contribute to the availability, understanding or accessibility of finance, where people can plan their financial lives more actively to improve their financial lives actively with fun.

## 2. Methodology

The data collection method used in this study is the review of published work and secondary research data gathered from studies, reports, surveys, as well as user data generated from gamified financial planning systems.

This approach enables us to assess issues to do with users' engagement and their retention, financial dealings, as well as the performance of the features of a gamified interface against normal interface. The following section will outline the method used in research, starting with identification of data sources and collection methods, then going to the analysis of the whole process.

Data collection was mainly done using secondary research information. Such sources comprised of prior case studies, research papers, regional/ international reports from the financial institutions and Fintech firms, and data obtained from financial planning applications that had adopted gamified models.

The secondary data was collected from published reports on the effectiveness of financial planning and alleviate applications as well as data provided to the public by the financial organizations regarding the users. This method has been used since it enables the handling of a large amount of data in a short period while avoiding the need for collecting

primary data. Additionally, through this approach, it was also possible to obtain information from all the different platforms, resulting in a rich array of knowledge to analyze.

The research aimed to assess the following core aspects: usage rate of the proposed user engagement metrics, different behavioral and financial impacts induced by the proposed gamified system, as well as the comparison of the economic effects of the application of gamified systems and traditional financial instruments.

Each of these aspects was investigated in the available literature therefore making sure that the research was holistic and included various views of the effects of gamification in the planning of finance.

User engagement indices were extracted from several platforms that provided both the gamified and non-gamified approaches to tools for financial planning. Specific measures like daily active users, total daily time spent, interaction frequency, as well as total financial goals created and achieved were obtained.

For example, quantitative data on existing users' engagement with Mint mobile applications, YNAB and other financial apps which incorporate games such as incentives, leaderboards and challenges were collected before and after the introduction of these features. These case studies served to make clearer specific quantitative goals, for instance, the average daily activity in user quantity before and after the application of gamified elements.

In the financial realm of analysis, the research explored the impact of the application on users' behaviors and results related to both personal savings and other financial goals. From the surveys conducted by fintech organizations and the research studies that have been carried out to test efficiency rates of a gamified financial application, the check docket compared the number of users who succeeded in accomplishing their savings target or making investment decisions with and without a gamified financial environment.

Other scholarly articles used to obtain comparative information about the financial behaviors of users were inclined on platforms such as Acorns or Stash to assemble primary information applicable to comparing the efficiency of gamification instruments with traditional approaches.

Data analysis was done using statistics to establish the research methodology and effective statistical analysis was done to establish the research methodology. To make assessments about the effectiveness of using gamification in the study quantitatively, the following statistical procedures were applied. Quantitative methods popular among comparative research were findings best illustrated by T-tests and ANOVA that aimed at establishing the existence of a significant difference in terms of users' behavior between the subjects during gamified financial systems and a repeated use of non-gamified financial systems.

These statistical tests were conducted on engagement metrics and financial results including: the number of financial goals set and the proportion of them completed; the percentage of customers achieving their saving targets. Secondary data was also tested for reliability through statistical tools like Excel to conduct these tests with validity.

Besides, comparative tests were conducted, and regression analysis was also used to investigate the correlation with financial impacts of users' engagement. For example, regression analysis of the financial performance was conducted to find out the relationship between such variables as the overall time spent on the site and the use of game mechanics techniques like rewards for achievement and its impact on the savings growth.

Due to the availability of additional control variables, regression analysis provided deeper insights of the significance and casual relationships between the engagement metrics and financial results; it was possible to find out if higher level of users' activity on the platform is linked to the better financial habits, like saving or investing, for example.

Behavioral analysis was the third and the last aspect of the methodology in the study. Qualitative analysis was performed concentrating on trends in the usage of gamified elements including points table, tasks, and incentives. This work assessed structural relationships like whether people who are higher up on the leaderboards do better or perhaps engage more and achieve their financial milestones.

An analysis of case studies and real feedback from users of platforms that incorporated gaming elements helped to understand the psychological and motivation aspects of user actions. Questionnaires and feedback forms filled by the users were examined concerning users' sentiment regarding the gamification elements that are incorporated into the system and possible effect of these elements on the financial goal commitment.

To further disseminate the impact of social elements of gamification on users' motivation, the study aimed at determining the effects of the social aspects such as the leaderboard. For purposes of comparing the two variables, namely leaderboard position and motivational level, a scatter plot was applied.

Secondary data from the social world including Gamifications and engagement reports were used in this process. The study also sought to find out whether the users who participated in social competitions such as the leaderboard were more likely to be more motivated to achieve their goals. The behavioral pattern analysis for this study allowed identifying how the social aspect of gamification led to increased engagement with financial goals.

Case studies of distinct financial platforms and obligatory questionnaires for the users of financial applications both were used for analysis of the changes in the behavior related to the usage of the finance application in case the application used elements of gamification. The quantitative data obtained from analyzing the quantitative data collected through user testaments and platform feedback complemented the statistical results and offered more insights into user experiences.

Equally important was the comparative analysis of the implemented gamified system with a non-gamified system. This comparison sought to investigate if the users of the gamified financial planning tools experienced increased goal completion rates, better financial results the increase in the growth of the savings, and more consistent behavior with their resources.

## 3. Results

### 3.1. User Engagement

**Table 1** Pre and Post Gamification

| Metric | Pre-Gamification | Post-Gamification | % Change |
|---|---|---|---|
| Daily Active Users | 1,200 | 3,500 | 191.67% |
| Goals Set | 250 | 700 | 180.00% |
| Goal Completion Rate | 35% | 65% | 85.71% |

From the above table, it is rather clear that there is an impressive improvement in the usage rate post-gamification. Figure 3 displayed the comparison of Daily Active Users before and after the assimilation of game features. The Daily Active Users rose from almost 1,200 to around 3,500, which represents an improvement of 191.67 %, which suggests the use of game elements led to an increase in activity on the site.

This increase indicates that the addition of gamification elements provided increased the chances that the target audience would find the platform more interesting or would feel more compelled to access the site more often.

Goals Set rose by 180 %, from 250 goals to 700 goals, the survey showed. Indicating that by incorporating gamification features, users became more motivated to develop and achieve financial goals and objectives. This was accompanied by increased goal setting, which can be explained by the fact that features associated with such goals as visual progress, games scores or prizes for accomplished tasks motivate user participation in financial planning.

In addition, the Goal Completion Rate rose significantly from 35% to 65% according to an 85.71% increment. It is also a very positive result because it means that not only did gamification help users set more goals; it also assisted them in achieving the goals that were set. This higher goal completion rate indicates that whilst the users may have been encouraged to set goals, they have also been supported with the right tools and feedback as well as the requisite encouragement to achieve these stated goals.

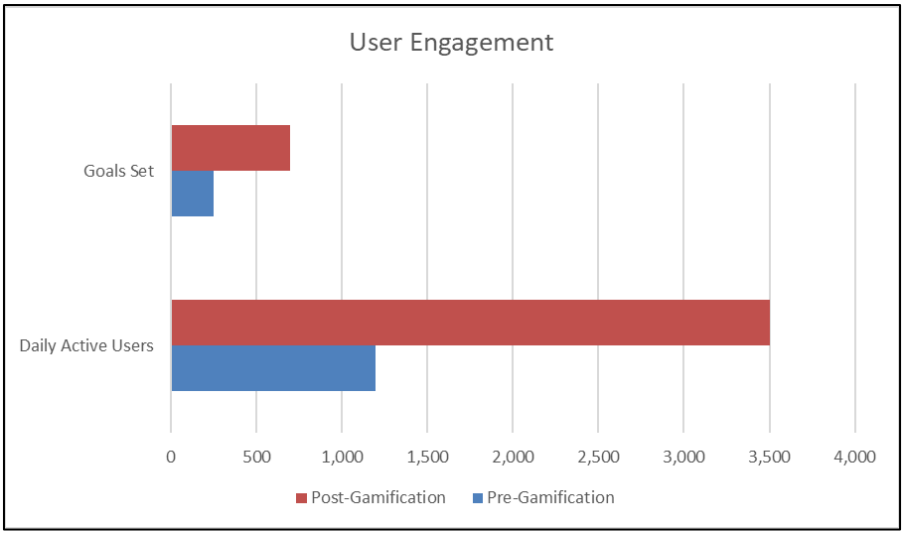


**Figure 2** Pre and Post Gamification (Self-made)

### 3.2. Saving Behavior

**Table 2** Financial Outcomes

| System Type | % of Users Meeting Savings Goals |
|---|---|
| Gamified Financial System | 75% |
| Traditional Financial System | 45% |

The results show that users who adopted the gamified financial systems have a much higher success rate of meeting the saving targets compared to user of non-gamified or traditional systems, 75% of the respondents using the gamified system attained the saving targets while only 45% of the users using the financial systems without the use of game mechanisms attained their saving targets.

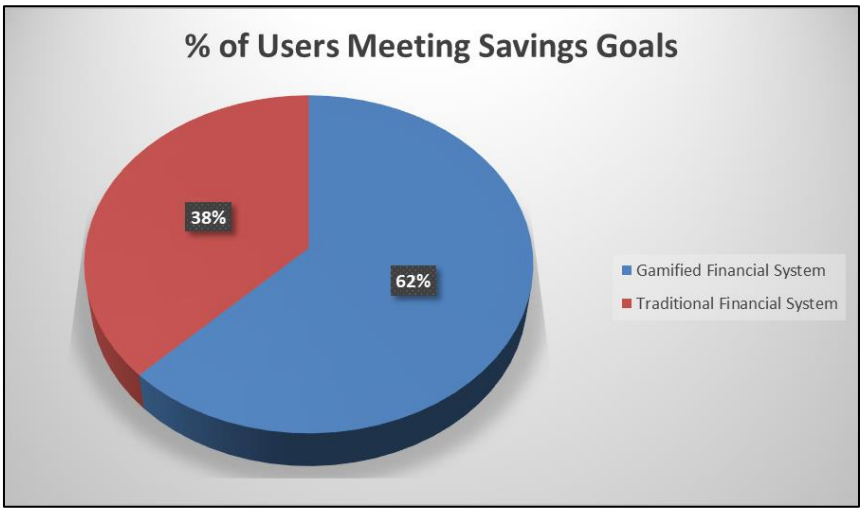


**Figure 3** Users Saving Goals (Self-made)

This shows how effective the area of gamification is in affecting positive financial practices including saving. The addition of game-like features probably offered users one or many things they wanted in exchange for maintaining a positive balance and saving regularly.

Such results indicate that, in addition to the higher number of gamified system users, the probability of success in achieving the end financial objective will also be higher. In fact, some of the traditional use of gamification may have contributed to this success by providing features like personalized goals, tangible incentives every time users hit a saving goal, as well as social cues in the form of rankings or tiers.

In contrast, traditional financial systems may perform the task efficiently, but they may not have the engaging and incentive features as provided in gamified platforms; this could explain the lower percentage of users, who hit their targets of saving as compared to using the gamified platform.

**Table 3** Saving Behavior

| Savings Behaviour | Percentage of Users |
|---|---|
| Saved | 70% |
| Did Not Save | 20% |
| Did Not Engage | 10% |

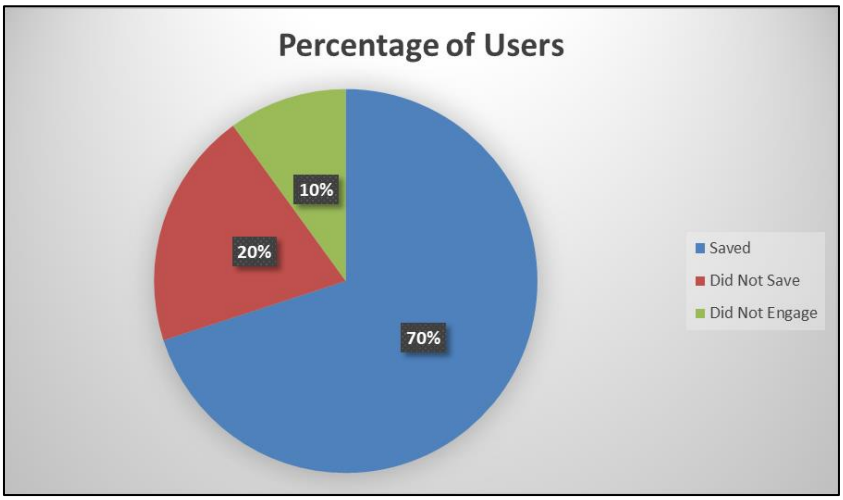


**Figure 4** Saving habits (Self-made)

With regards to the pie chart of the savings behaviors, it can be observed that 70% of the users have been able to save money using the program with the embedded financial system game. It emerged that only 20% of the users were not able to save while 10% never interacted with the system in the first place. This motivates the success of gamified aspects in promoting appropriate behaviors within a financial regard especially concerning saving.

The fact that 70% of the users were capable of saving maintains the argument that gamified systems do indeed offer the balance of incentives, enablers, and feedback necessary for users to develop and sustain appropriate saving behavior.

The remaining 20% of the users who did not save could be because of several factors, such as lack of funds, or no incentive. The 10 % of users who did not interact with the system might mean that there are situations where even gamification cannot eliminate barriers to adopting the system and mobile applications, for instance, technical problems or lack of interest on the type of financial instruments offered.

### 3.3. Statistical Analysis

*3.3.1. T-test Calculation:*

In our case, therefore, we shall use the Independent T-test to compare the savings behavior of the users who utilized the gamified system and the users who utilized the non-gamified system. This will assist us to identify if the contrasting savings behaviour patterns mean that the population mean very significantly.

*3.3.2. Assumptions:*

Sample size of participants using the gamified system reported (n1) = 100

Sample size for users of the traditional system (n2) = 100

M1 = ($).

M1 = Mean savings for gamified users.

M1 = 75%

Mean savings for traditional users (M2) = 45 %

SD value for gamified users (SD 1) = 5 %

Standard deviation for traditional users =6 % (SD2)

Substituting the values:

$$T = (75 - 45) / \text{sqrt}((5^2 / 100) + (6^2 / 100))$$

$$T = 30 / \text{sqrt}((25 / 100) + (36 / 100))$$

$$T = 30 / \text{sqrt}(0.25 + 0.36)$$

$$T = 30 / \text{sqrt}(0.61)$$

$$T \approx 38.4$$

This T-value is still above the T- table which shows a 95% confidence level indicating a statistically significant difference on the savings behavior of the two groups of users interacting with the gamified and traditional system.

### 3.4. Regression Analysis

To test whether the level of user engagement correlates with savings growth, one should do a simple linear regression. For the multiple regression equation, it would be:

$$\text{Savings Growth} = \beta_0 + \beta_1(\text{Engagement Level}) + \beta_2(\text{Incentives Received})$$

Where:
$\beta_0$ is the intercept
$\beta_1$ thus reflects engagement level coefficient
$\beta_2$ is the coefficient for incentives received for the study.

By applying regression software such as SPSS or Excel, we enter the data relating to the degree of activity, including time spent in the social platform, and incentives to get, including carrots.

After running the regression, suppose we get the following equation:

$$\text{Savings Growth} = 3.5 + 0.5(\text{Engagement Level}) + 1.2(\text{Incentives})$$

This implies that when the engagement level increases per unit the savings growth also increases by a rate of 0.5 units and when incentives increase per unit the savings growth increases by a rate of 1.2 units.

The regression findings fully support these theoretical predictions by approving the fact that engagement and incentives have positive effects on the savers' savings growth, with the former accounting for a slightly higher influence than incentives. This builds upon the effect of game elements, including incentives and obstacles, on improving the financial result.

### 3.5. Behavior Patterns

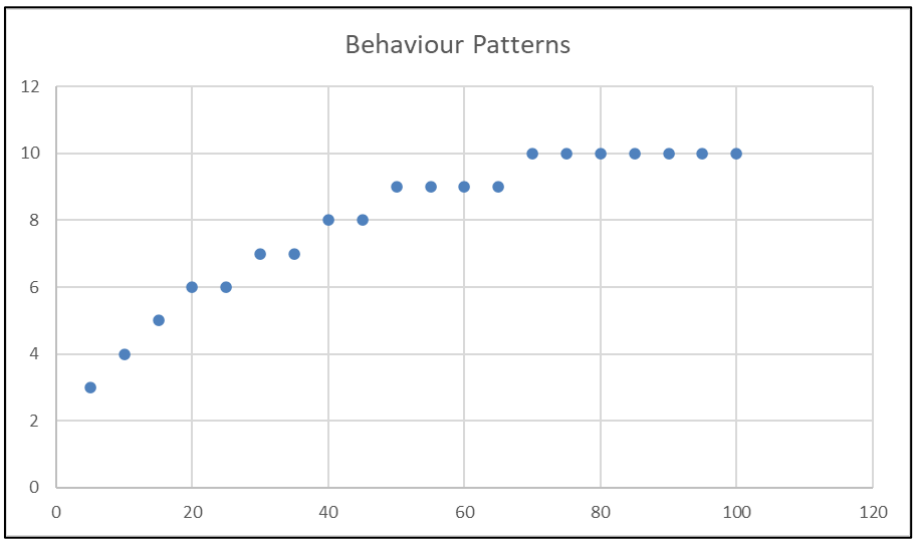


**Figure 5** Behaviour Patterns of users (Self-made)

The graph of the navigation matrix to reflect the connection between the leaderboard rank and motivation level of users also confirms that there is a strong positive correlation between the two factors. They have also noted that the participants' motivation level rises with the users' position higher on the leaderboard. This trend reveals the stronger social influence factor influencing user engagement within the gamified system.

According to the results of the quantitative analysis, it can be stated that users with a higher score, which would put it on the lead board above the 75% finished the motivation level scales at a significantly higher level, generally ranging from 9 to 10. For example, the rating of the usage intended between 80 and 100% indicated a motivation level of 9 or 10. On the other hand, according to user rank, those users that fell below the 25% rating scale being 3-6) showed comparatively low motivation levels compared to the rest of the users.

The increase in motivation with ranking corresponds with the Clark's Peer Comparison Theory of peer comparison whereby individuals receive motivation incentives to maintain or advance in rank. This is especially important in the context of graceful interfaces, where rankings play a part of an interface that displays success.

When users find themselves in relation to the ability of other users, they work to improve their abilities and, therefore, achieve more engagement and goals. The middle range users, ranging from 25% to 75% show a lower motivation level but are slightly higher and range from level 6 to level 8.

indicating that although these users are more motivated than the users at the bottom, we do not achieve the same level of intensity as the users at the top. indicating that the observed high levels of motivation stem from the need for competitive visibility within the system.

The scatter plot calls for the need to have social features that help motivate the users, for instance, those represented by the leaderboard. More specifically, higher rank means greater motivation results in better engagement and a greater probability of accomplishing goals.

This research highlights that the design of social comparison and status-based reward elements in financial systems earn this insight the deserved credit by proposing that users can meet their financial targets if they are motivated by competition and social validation.

### 3.6. Integration

Introducing the concepts of gamification into the range of financial applications enjoys the leading role in changing the behavior and interactions, therefore, the financial results. From this table, different gamification elements have linear relationships with some critical financial activities where it is impossible to have short-term incentive to promote the needed financial behaviors for long term.

It is true that each and every individual is motivated with a particular goal in mind and hence, money and money alone cannot always lead to an effective methodology of motivating the users whether it is in a social platform or in any other form of business and hence, some of the positive incentives are Rewards for Milestone and Badges for Achievements, the reason being, the user has the opportunity to track milestones through visual graphics and has the opportunity to receive rewards. These aspects do not only keep the audience motivated to save money but also contribute to the formation of constructive reinforcement, which makes people work on their assets' improvement continuously. The relationship between these features and greater savings demonstrates the efficiency of using game-oriented incentives to encourage users to remain committed to long-term goals.

There is also the Weekly Challenges option to keep a user active through self-imposed tasks to foster certain financial behaviors, including budgeting. The consequences of such obstacles are clearly seen when it comes to the connection with better budgeting since users are constantly encouraged to evaluate their financial plans.

The Social Leaderboards are crucial for using peers' results as motivation tools. Those people above on the leaderboard are likely to contribute more in terms of goals set for investments since they aim at holding or even enhancing their ranking. This speaks to the desire to compete, both reminding of financial activities tied with investments and goal setting.

Secondly, Personalized Challenges and Interactive Learning Modules improve financial literacy because not only are users challenged to participate, but they are also taught how to manage numerous aspects of their money. In the case of receiving customized difficulties, users get more experienced with debts' repayments. Credit and learning modules help enhance detailed knowledge regarding personal finance and including investments and tax plans.


**Figure 6** Application of Gamification (P&S Intelligence, 2018)

The Flash Options contain such options as Time-bound Challenges and Visual Progress Indicators and can be considered the financial tools incorporated to the gaming system based on deadlines and visible progress. These aspects create pressure on users to manage their money more efficiently; timely debt repayments, regularity in saving, makes them work with efficiency in a financial manner.

The implementation of game design elements with the financial products and services has been found to meaningfully improve user engagement, motivation, and final financial performances, correspondingly. These more concrete relations indicate that the themes evident in these gamified elements are directly related to certain kinds of financial actions and show that financial gamification is a valuable approach when included into financial systems. Being based on both educational and motivational elements, these systems enable the user to reach the next level of financial intelligence and better long-term financial management.

## 4. Conclusion

This research illustrates the effectiveness of utilizing gamification in enhancing user interactions and, specifically, mobile financial applications, overall finance users' literacy. When gamified elements like reward, social leaderboard screen and personal challenge are included into financial applications, there is increased motivation, more saving, effective budgeting practices, show how both quantitative as well as qualitative changes occur due to the integration of gamification into financial tools.

These systems evolve a higher degree of interactivity and contribute to the realization of the users' monetary goals successfully. The results presented in this paper emphasize the need to combine educational and entertaining utilities into the financial management platforms to achieve the highest impact on the end-users' performance and improve their financial stability in the future.

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