White Paper
FINANCIAL LITERACY AND GAMIFICATION

Neuroprofiler

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According to an OECD study, the financial literacy of Europeans remains very low, preventing them from making sound financial decisions. The situation seems to be worsening, with the level of financial knowledge being even lower for the new generation. This lack of financial literacy seems to have more to do with the absence of training tools aligned to their expectations than with a lack of interest in the subject. In this white paper, we explore the relevance of gamification to improve financial learning for individuals.

I. A severe lack of financial literacy among European individuals

1) The Need for Financial Literacy

In a socially and environmentally uncertain world, understanding financial mechanisms is becoming a necessity to protect oneself from future hazards.

According to a study by Uniopss and Vyv published in March 2022, only 43% of French people are confident about the future of social protection in terms of unemployment insurance, 31% in terms of prevention of loss of autonomy and 29% in terms of retirement insurance.

Yet, they continue to invest very conservatively, even in times of new inflationary pressure.
How can this be explained?

According to an Allianz 2020 study, the main reason is lack of financial literacy. In their survey of 1,000 people in 10 European countries, the least educated people invest in more conservative products.

The OECD defines financial literacy as: "a combination of financial awareness, knowledge, skills, attitudes and behaviors necessary to make the right financial decisions and ultimately achieve individual financial well-being (...)".

Financial literacy therefore involves not only financial knowledge, but also the ability to use it to make good financial decisions.
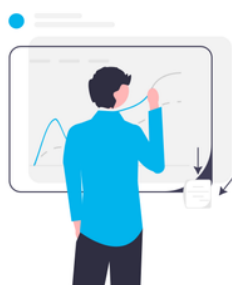
2) Lack of Financial Literacy Among European Individuals

According to an Allianz 2020 study, only 30% of Europeans are able to answer basic financial questions about inflation, diversification and interest. This lack of financial education affects women even more, with a 16% gap with men on this subject.

Results in line with a previous OECD study in 2012 that indicated that a significant proportion of individuals do not understand basic concepts like diversification.

However, Europeans are interested in financial topics and want to learn more. According to a study by the Banque de France, French Banking Supervisor in 2020, 52% of French people say they are interested in financial news and topics.
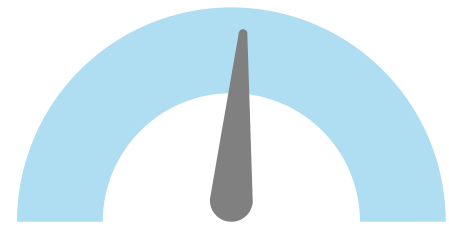
52% of French people say they are interested in financial news and topics.

How can we explain the paradox of a low level of financial literacy and yet the high level of interest of individuals in the subject?

A first hypothesis may be the overconfidence bias of individuals, who would overestimate their financial knowledge, when they have little of it. A thesis supported by the OECD study of 2012, which shows that respondents overestimate their rate of correct answers and prefer to answer false rather than to answer, "I don't know."

Another factor would be the lack of financial training tools adapted to the expectations of individuals, especially the younger ones.

## II. Investors' Expectations in Terms of Financial Literacy

1) A Growing Appetite for Investment

An AMF (Autorité des Marchés Financiers-French Financial Markets Supervisor) report in 2021 indicates that the number of retail investors in France has doubled since 2019. The proportion of transactions made by individuals had reached 7% of total transactions in mid-2020 compared to 2% in 2019. This share has returned to stabilize at 5% today.

This trend was helped by the Covid crisis. Individuals had more time to invest in a context where the markets were particularly volatile.

The rise of trading platforms with a more modern interface, such as Robin Hood in the United States, and the craze for cryptocurrency, also come to explain this explosion in the number of individual investors.

This enthusiasm was also noted by Neuroprofiler's 2022 study on the expectations of French Generation X and Y investors regarding financial literacy.
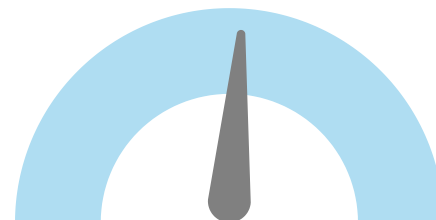
70% of respondents from generations X and Y want to invest, especially for their retirement.

The main motivation for investment that emerges from the study remains the search for profit.
However, only 40% of them claim to have taken a finance course.

Moreover, the main reason for not investing for the 30% who say they do not wish to invest is precisely the lack of financial literacy.

These various studies show that there is a real willingness to invest dynamically and to learn, but that financial literacy remains very limited in practice.

So, what do individuals expect in terms of financial literacy?

2) Investors' Expectations for Financial Literacy

In its survey, Neuroprofiler asked European Gen X and Y individuals about their expectations for financial literacy.

The following is a summary of the main findings of this study.

a) Features

The majority of respondents expect a financial literacy tool to be reliable and clear.

40% expect it to be fast, with the possibility of learning through simulations.

Finally, 20% want the tool to be intuitive, ethical and fun.

b) Format

As for the format, the majority of respondents prefer infographics and video, while articles or games are preferred.

The gamification of financial literacy is thus emerging as a major trend among this new generation of investors, who want to learn quickly and effortlessly.

Neuroprofiler conducted a second study on the expectations of Gen X, Y and Z investors regarding gamification.

For more than 70% of the respondents, gamification must allow them to have a user experience aligned with their values, while being a way to surpass themselves, even to take risks for 60% of them.

In short, new investors want to learn about reliable, ethical and intuitive digital applications that allow them to quickly master key financial concepts, via infographics, articles but also video and games.

The financial literacy tools currently available, however, seem inadequate to meet these expectations.

3) Unsuitable tools

Neuroprofiler's study on financial literacy also shows that the majority of respondents have already taken financial training, either on their own or during their academic career.

A majority of them have taken financial education on the internet through MOOCs or online courses.

Only 6% of respondents claim to have used a financial literacy application.

Yet 70% of them are dissatisfied with the financial literacy tools available to them.

To meet these new needs, financial literacy platforms are beginning to emerge.

Zogo, an American application inspired by Duolingo, proposes to train Gen Z in budget management and to pay them via vouchers according to their progress!

Invesmate, an application backed by Capital.com, offers a fun way to learn about trading.
With a real community spirit, it allows to follow, "like" and exchange with profiled users with "credibility" scores, in the same way as on social networks.

However, these applications remain rare and are often geared more towards budget education than investment education.

In addition to all these private initiatives, there are also the efforts of public entities. At international level, one could mention the joint initiative of OECD and European Commission regarding the launch of the "Financial Education framework for adults"

Invite friends and spread the learning
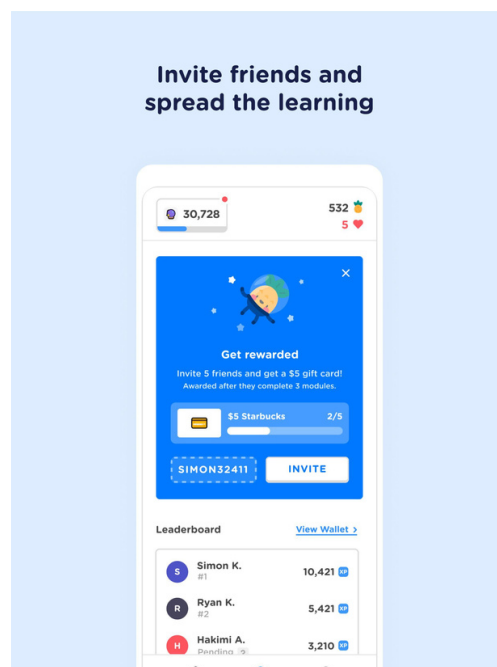
at national level, there are also many initiatives such as in France, the joint initiative "La Finance pour tous" (Finance for everyone) between AMF, Banque de France and Ministry of Finance. Overall, financial education is increasingly seen as a top priority for public authorities.

Nevertheless, despite the strong engagement of the teams involved in these topics as well as all the extensive and good material being produced, the expectations of younger generations on those topics seem to remain wide open

It is in this context that Neuroprofiler, with its experience in cognitive sciences, finance and gamification, has created an EDUprofiler, a playful financial literacy platform for individuals.

Rewards, challenges, puzzles, gamification is at the heart of the EDUprofiler's learning mechanisms.

The choice of gamification aims not only to motivate young investors to take an interest in finance, but also to enable better learning, in line with the theories neuro-educational.

We detail our academic choices in gamification in the next section.

III. The Eduprofiler Methodology for Responding to Expectations of European Individuals

1) Review of the Academic Literature on Different Gamification Methods and Pedagogical Sciences

The notion of learning through play is not new. It emerged in the academic literature in the 1980s with the work of Cotta (1980) and Malone (1981).

The term "gamification" was coined in 2002 by Nick Pelling, a game designer who was given the task of gamifying ATM interfaces.

For a decade, gamification attempts will multiply.
In 2005, the company Bunchball was created, a SaaS platform offering on-demand gamification services to promote customer and employee engagement and loyalty.

What Is Gamification?

Several definitions of gamification can be identified in the international literature.
Deterding et al. (2011) define it as "the use of game design elements in non-game contexts".
Gamification is for example used by companies to better train their new employees or to build customer loyalty. It allows to present the problems encountered under a lighter and interactive aspect.
Gamification has become popular in recent years in various sectors, particularly to meet the expectations of the new generations X, and especially Y and Z (born after 1997), who are very interested in this learning method.

For example, the company was hired in 2007 to develop a gamified sales platform for the American TV series "The Office".

Two years later, a website called "Chores Wars" encourages individuals to complete their household chores through gaming. This is the first time gamification has entered the American home.

In order to study this new sociological phenomenon more closely, academic studies on gamification began to multiply in the 2010s.

There is a wide variety of academic models that propose a list of levers to make an application gamified.

Starting from different approaches and experiments, these studies converge to a large extent on the same elements (collection, rarity, quest, trophy, social pressure, competition, avatar, surprise, freedom to act, teamwork).

Faced with this multiplicity of approaches, Neuroprofiler has chosen to base itself on one of the most recognized and studied in the academic world: the Octalysis model.

What constitutes academic research in gamification?

The specific study of the levers of gamification has developed since the 2010s (Di Tommasso, 2011; Marache-Francisco and Brangie, 2013; Robinson et al. 2013; Chou, 2013 ; AlMarshedi, 2015; Jimenez, 2013).

Some branches of study focus on the psychological mechanisms of gamification, others on its societal issues and the last ones on the levers of gamification to be deployed in the creation of learning applications.

It is this last dimension that Neuroprofiler has decided to explore.

2) The Octalysis Model and Gamification Levers

a) Description of the Octalysis Model

The Octalysis model, created by Yu-kai Chou, identifies the following 8 main gamification levers:

- **Vocation and sense of epic:** allows the user to feel privileged and unique.
- **Empowerment:** allows the user to feel autonomous and responsible for his journey. The user is the master of his game, which he can shape according to his values and vision. They are engaged in a creative process.
- **Social influence:** will promote mentoring, collaboration, but also competition.
- **Unpredictability:** consists in keeping the user's attention constant through new elements, suspense and unexpected events.
- **Prevention:** consists in playing with the loss aversion of the users.

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- **Rarity:** consists in valuing knowledge or an action by its rarity.
- **Possession:** increases user motivation through the possession of new objects or knowledge.
- **Accomplishment:** is based on the users' desire to excel and acquire new knowledge.

c) An Academically and Commercially Tested Model

The Octalysis model is referenced in over 1500 academic publications. The Octalysis matrix is mainly based on 3 scientific theories:

1. Intrinsic Motivation: the Theory of Self-Determination

This theory of human motivation focuses on how humans are intrinsically motivated, independent of external rewards.
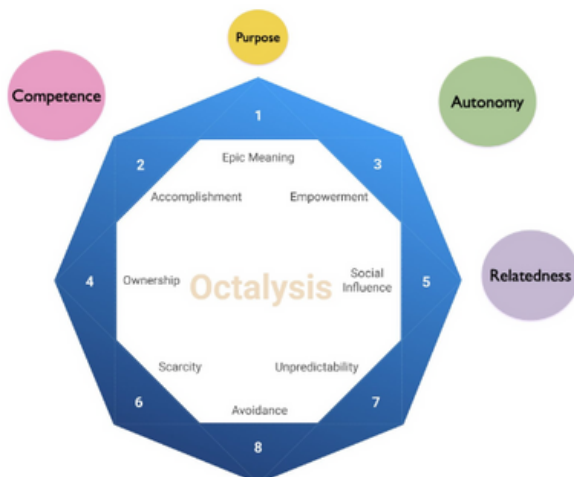
2. Extrinsic Motivation: Behavioral Economics

In addition to intrinsic motivations, the Octalysis model considers the research in behavioral economics of Kahneman and Dan Ariely on cognitive biases, and in particular loss aversion, the possession effect and the distortion of probabilities.
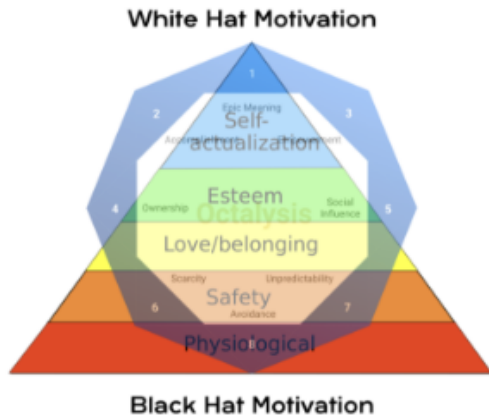
Octalysis covers all the major aspects of behavioral economics through the 8 fundamental motivations of Octalysis human motivation.

3. Maslow's Hierarchy of Needs

Finally, the last theory that inspires the Octalysis model is Maslow's famous 5-story pyramid, starting from basic physiological needs, to self-actualization needs.

The theory states that a lower level must be satisfied before moving on to a higher level, although some overlap is possible.

White Hat Motivation

Self-actualization

Esteem

Love/belonging

Safety

Physiological

Black Hat Motivation

After training with fun materials, the customer can start investing. The use of gamification has helped the app move to a 60% conversion rate.

The Octalysis model is superimposed on these S levels, with levers 6, 7 and 8 of the model corresponding to the primary needs for survival and security. Levers 1 to S, on the other hand, respond to the needs of the upper floors of the pyramid.

d) Examples of Applications of the Octalysis Method

Beyond the academic framework, the Octalysis model has been applied to the creation of numerous game applications.

For example, it has been successfully applied to the Trade Samurai trading application that allows users to trade on the FOREX (currency) market. Plunged into the world of Japanese warriors, users must defeat the armies of Fear and Greed that want to corrupt the stock market.

Convinced by the academic soundness of the Octalysis model and by the success of its commercial applications, Neuroprofiler has built its EDUprofiler on this model.

3) Presentation of the EDUprofiler

a) Content and Format of the EDUprofiler

As previously mentioned, the infographics were widely acclaimed by the respondents.

Each lesson on financial products begins with a fun and educational infographic that allows investors to familiarize themselves with the asset class.

With the help of diagrams and keywords, the user can browse the infographic and already understand the main mechanisms, advantages and disadvantages of a financial product.

To go further, the investor can then browse through a succession of short articles, always in a fun format.

If the client prefers an even more gamified approach, we offer a learning-by-doing course, during which the client is trained through a series of small interactive games.

At the end of the lesson, the client can validate his knowledge with a quiz. The latter has the advantage of being compliant with MiFID II regulations and allows the client to unlock new investment opportunities.

b) Gamification in the EDUprofiler EDUprofiler Uses the Gamification Levers of the Octalysis Model:

1. Vocation and Sense of Epic:

In response to the enthusiasm of the new generation of investors for sustainable investment, EDUprofiler immerses the user in the world of the Canadian rainforest from the very first screens. The lessons follow one another, forming a path through vegetation that becomes more and more lush as they progress and validate their lessons.

Through the different lessons, the user understands what concrete impact he can have with his investment.

2. Empowerment:

The investor is in total autonomy and completely free on the platform. He can choose the financial products he wants to learn about, and stop at any time. Each module lasts from 5 to 10 minutes, with the possibility of an accelerated learning mode for users in a hurry.

3. Social influence:

The platform offers three different levels of difficulty for the lessons and validation quizzes. The investor can see his level and compare himself to other users in terms of knowledge and investments.

4. Unpredictability:

The learning pace is occasionally broken by messages from an avatar who reassures the user about his progress or shares anecdotes about the financial markets.

5. Prevention:

The user is constantly reassured of his or her progress and level of financial literacy compared to other investors.

6. Rarity:

Levels 2 and 3 of the lessons and quizzes are only available to experts. Some modules are available on a temporary basis.
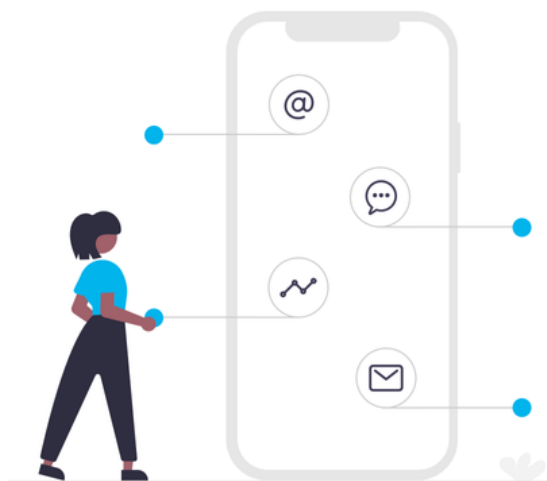
7. Possession:

During his forest trail, the user accumulates seeds and breadsticks, which he can then convert via his financial institution into donations to associations of his choice.

8. Accomplishment:

Each "Seed" obtained is a proof of the investor's improvement. A progress bar allows him to follow his progress on the platform.
After completing a lesson, the user can download a certificate proving his or her mastery of a financial product, and giving him or her the authorization to invest in it.
The user can set goals for himself on the platform and impose challenges, such as validating modules in a minimum of time, to encourage him in his training.
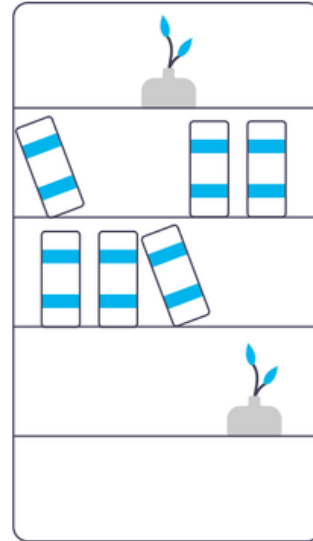
CONCLUSION

The objective of the EDUprofiler is to make individuals want to invest more and better, by allowing them to understand the mechanisms of financial products in a simple, fun and interactive way.
At Neuroprofiler, we hope that the EDU profiler solution will contribute to overcome the paradox set at the beginning of this White Paper of low financial education combined with high interest in financial matters

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