Gamified Learning About Cryptocurrency:

A Survey of Investors' Attitudes, Concerns, and Expectations towards Learning Cryptocurrency via Video Game-Based Approach

Summary of the Mitacs Accelerate Project

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Executive Summary

Cryptocurrency has brought about transformative changes in business practices, leading to a growing prevalence of cryptocurrency trading platforms. However, comprehending the intricacies of cryptocurrency, including mining and trading, can be daunting due to their inherent complexity. Engaging in cryptocurrency trading carries various risks, encompassing technical, legal, and market-related factors, which necessitate investors' comprehensive understanding.

Gamification has been actively applied for educational purposes to make learning more engaging, motivating, and fun and consequently achieve better learning outcomes. To support cryptocurrency investors' learning about cryptocurrency, thereby preparing them for successful crypto-trading, we developed a browser-based game that introduces cryptocurrency and related topics. Through an online survey, we assessed the effectiveness of this gamified learning approach, and we investigated investors' attitudes, concerns, and needs for learning about cryptocurrency.

Overall, participants in the study recognized the potential benefits of game-based learning in improving their understanding of cryptocurrency. Their familiarity with game design elements in educational contexts indicated their acceptance of gamification strategies for learning. Participants, even those with cryptocurrency trading experience, exhibited moderate confidence in their cryptocurrency and blockchain knowledge, highlighting the need for educational interventions to bridge the knowledge gap.

Results indicate that the game-based cryptocurrency learning approach has great educational value. Participants highly rated the game's enjoyment and playfulness but emphasized the importance of creating a more immersive and engaging experience to enhance its educational impact. The findings of this research indicate that the current learning game, with necessary improvements, has the great potential to effectively educate learners while offering an enjoyable and motivating learning experience.

Based on the research, we identified essential requirements for improving the current learning game for the future. We produced guidelines to support Steam Exchange Inc. in further developing and enhancing this gamified learning approach beyond the project's completion. We also hope that the insights we gained from this research will inform the future design of gamified learning platforms that can meet users' expectations and address their concerns.

Introduction

Cryptocurrency has emerged as a groundbreaking technology that has the potential to revolutionize global trade, payments, and investments. Bitcoin, introduced in 2009, paved the way for the rise of numerous other cryptocurrencies such as Ethereum and Dogecoin. The surge in popularity of cryptocurrency investments has been remarkable, with a significant rise in the number of active cryptocurrency wallet users worldwide. In 2017, the number stood at approximately 5.8 million users[1]. This exponential growth demonstrates the increasing global adoption and impact of cryptocurrency in the financial landscape.

While millions of individuals actively engage in cryptocurrency investments, there is a substantial population interested in this form of investment but still hesitant due to concerns regarding trust and a lack of confidence in their abilities to navigate the cryptocurrency landscape[2]. Many newcomers who have entered the cryptocurrency market without sufficient knowledge and security practices have experienced financial losses due to mismanagement and misconceptions about the technology[3], [4]. Novices, in particular, seek convenient and secure wallets but often encounter usability issues and inadequate support[3], [5], [6]. These challenges pose significant problems, leading to hesitancy among potential cryptocurrency adopters and substantial financial risks for inexperienced investors.

To address these issues, it is crucial to develop technology resources that cater to the specific needs and concerns of both novice and experienced cryptocurrency investors. Research in the field of education has demonstrated the positive impact of learning interventions on learning outcomes and engagement[7], [8]. Gamification, the integration of game design elements into non-game contexts, and game-based learning, which utilizes fully-featured games to teach practical subjects, have shown promise in educational settings[9]. However, research on implementing gamified and game-based learning interventions within the cryptocurrency domain has predominantly focused on academic education, neglecting the unique population of market investors who require a more profound understanding of cryptocurrency and related concepts (e.g., [10]).

In this research, we examine the efficacy of incorporating game elements and game-based learning interventions in cryptocurrency education. To gain a comprehensive understanding of market investors' viewpoints, we conducted an online survey with 13 investors from the Steam Exchange community, and 95 global investors and individuals who expressed desire in cryptocurrency investment but lack prior experience in this domain. The participants were given

the opportunity to engage with a browser-based game designed to introduce cryptocurrency and its associated concepts. Following their gameplay experience, participants were invited to complete a post-game questionnaire, providing valuable insights into their learning experience, suggestions for improving the educational value of the game in relation to cryptocurrency, and their attitudes towards gamified cryptocurrency learning. The survey was administered online in May and June 2023. This report details the survey findings.

Sample Distribution

We conducted an online survey from May to June 2023, with 9 market investors from the Steam Exchange community and 95 market investors and potential future investors globally.

The majority of participants were aged **between 18 and 29 years** (61%), followed by 26% in the 30-39 age range. A larger percentage of participants hailed from **Portugal** (15%), **Mexico** (13%), and the **United Kingdom** (12%). Other countries had a smaller number of participants, with France, Hungary, India, Norway, Spain, and the United States each accounting for 1%. The participants were highly educated, with more than half holding a bachelor's degree (35%) or a graduate degree (23%). Over half of the participants (63%) had an **annual income of $50,000 or less** (in USD). Approximately half of the participants were either **full-time employed** (41%) or part-time employed (17%), while 27% were students. Among the 104 participants, the technology affinity [11] score was moderately high (4.21 out of 6), indicating their tendency to actively engage in intensive technology interaction (see next page.)

The table presents the details of participants' demographic characteristics.

Demographic Characteristics of Participants (N=104)

Age	N (%)
18—29	63 (61%)
30—39	27 (26%)
40—49	9 (5%)
≥50	5 (5%)
Gender	**N (%)**
Female	45 (43%)
Male	55 (53%)
Non-binary/third gender	3 (3%)
Other	1 (1%)
Education	**N (%)**
High school or less	19 (18%)
Some college, associate or technical degree	25 (24%)
Bachelor's degree	36 (35%)
Graduate or professional degree	24 (23%)
Employment	**N (%)**
Full-time	43 (41%)
Part-time	18 (17%)
Student	28 (27%)
Retired	2 (2%)
Homemaker or looking for job	12 (12%)
Other	1 (1%)
Technology Affinity [11]	**N (%)**
Range (Minimum—Maximum)	1—6
Mean (Standard Deviation)	4.21 (0.69)
Cronbach's α	0.79

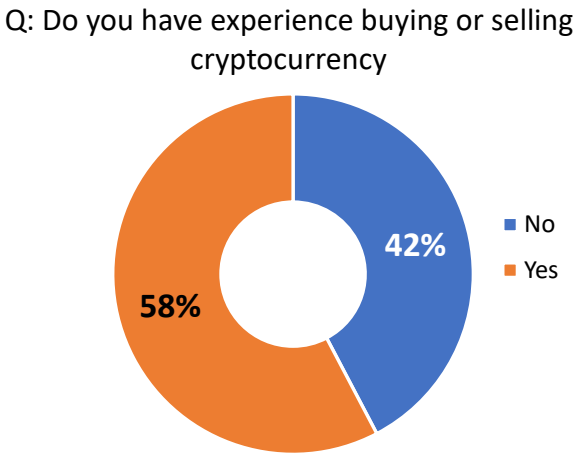
Country of Origin	N (%)
Belgium	2 (2%)
Canada	8 (8%)
Chile	4 (4%)
France	1 (1%)
Germany	3 (3%)
Greece	6 (6%)
Hungary	1 (1%)
India	1 (1%)
Ireland	2 (%)
Israel	11 (11%)
Mexico	14 (13%)
Netherlands	2 (2%)
Norway	1 (1%)
Philippines	2 (2%)
Poland	10 (10%)
Portugal	16 (15%)
South Africa	5 (5%)
Spain	1 (1%)
United Kingdom	12 (12%)
United States	1 (1%)
Household Income	**N (%)**
Less than $50,000	65 (63%)
$50,000—$200,000	30 (29%)
More than $200,000	1 (1%)
Prefer not to disclose	8 (8%)

Survey Results – Pre-game Questionnaire

Q1: Do you have experience buying or selling cryptocurrency?

(N=104)

More than half of participants were experienced cryptocurrency investors.

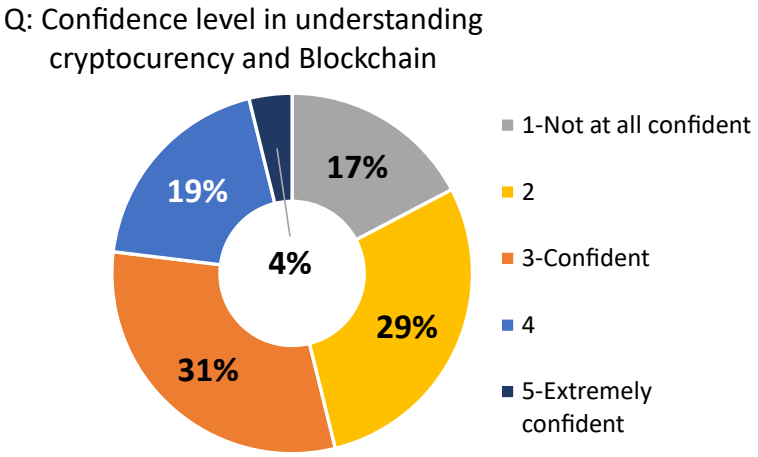


Among the participants, approximately 58% were experienced investors who had engaged in buying and selling cryptocurrencies. The remaining 42% consisted of individuals who expressed an interest in entering the cryptocurrency market in the future but had not yet gained any experience in this domain.

Q2: How confident are you with your current understanding of cryptocurrency and blockchain?

(N=104)

Most participants expressed a lower to moderate level of confidence in their current knowledge of cryptocurrency and Blockchain.

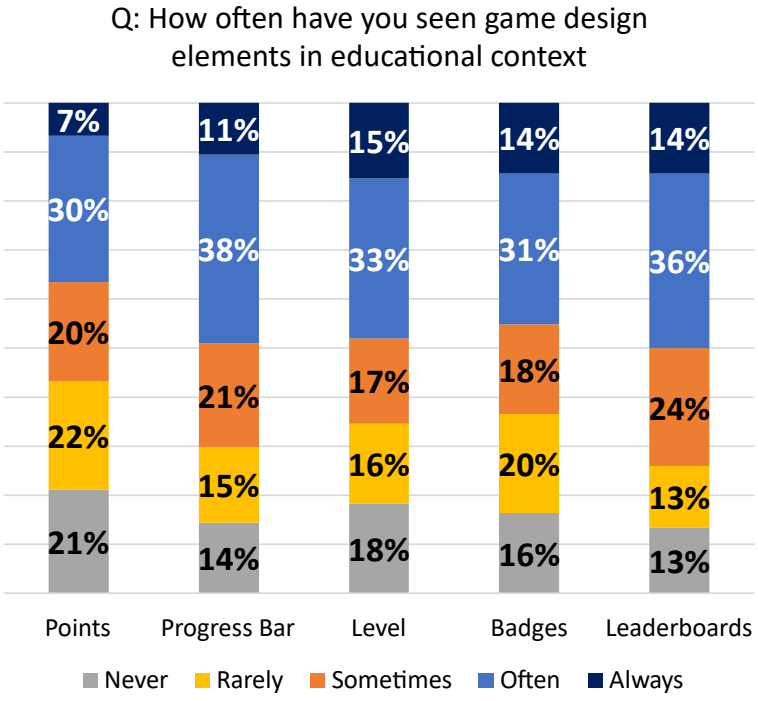


The majority of participants demonstrated a lower to moderate level of confidence in their knowledge and comprehension of cryptocurrency and blockchain subjects. Among the participants, 17% expressed being not at all confident in their understanding of these topics. When comparing experienced investors and non-investors, it was found that most non-investors (N=44) were either not at all confident (34%) or had a lower (39%) of confidence in their understanding of cryptocurrency and blockchain. On the other hand, most experienced investors (N=60) expressed a moderate (38%) to high (28%) level of confidence, with 7% of experienced investors exhibiting extreme confidence in their knowledge. The difference in confidence levels between non-investors and investors likely stems from investors' greater experience and familiarity with cryptocurrency trading, whereas non-investors may have limited exposure to these subjects.

Q3: How often have you seen game design elements in educational context

(N=104)

Participants displayed a relatively high level of familiarity with game design elements in educational context.

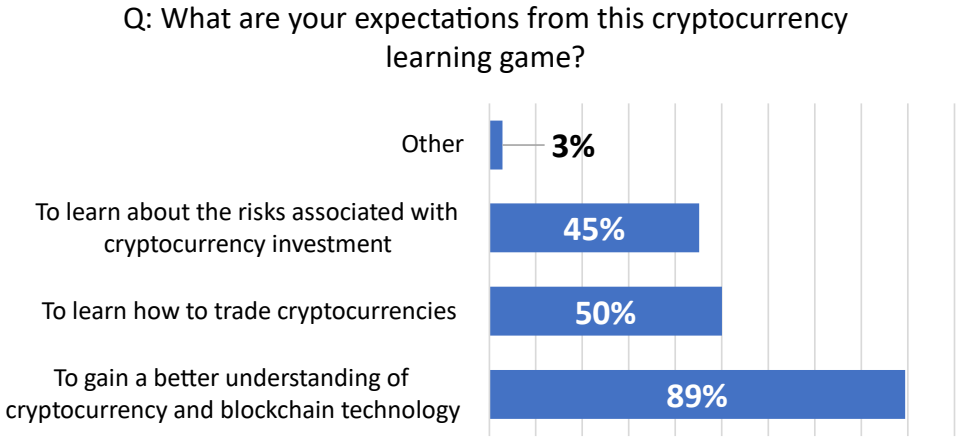


The participants' familiarity with each game design element was evenly distributed, with the majority indicating encountering these elements sometimes (17%~24%), often (30%~38%), or always (7%~15%) in educational contexts. This notable level of familiarity can likely be attributed to the extensive utilization of gamification and game-based learning approaches within educational settings. Over time, numerous educational platforms, software, and applications have integrated game design elements like rewards, challenges, leaderboards, and interactive gameplay to enhance the enjoyment and effectiveness of the learning experience.

Q4: What are your expectations from this cryptocurrency learning game?

(N=104)

A significant majority participants anticipated to improve understanding of cryptocurrency and blockchain through the learning game.

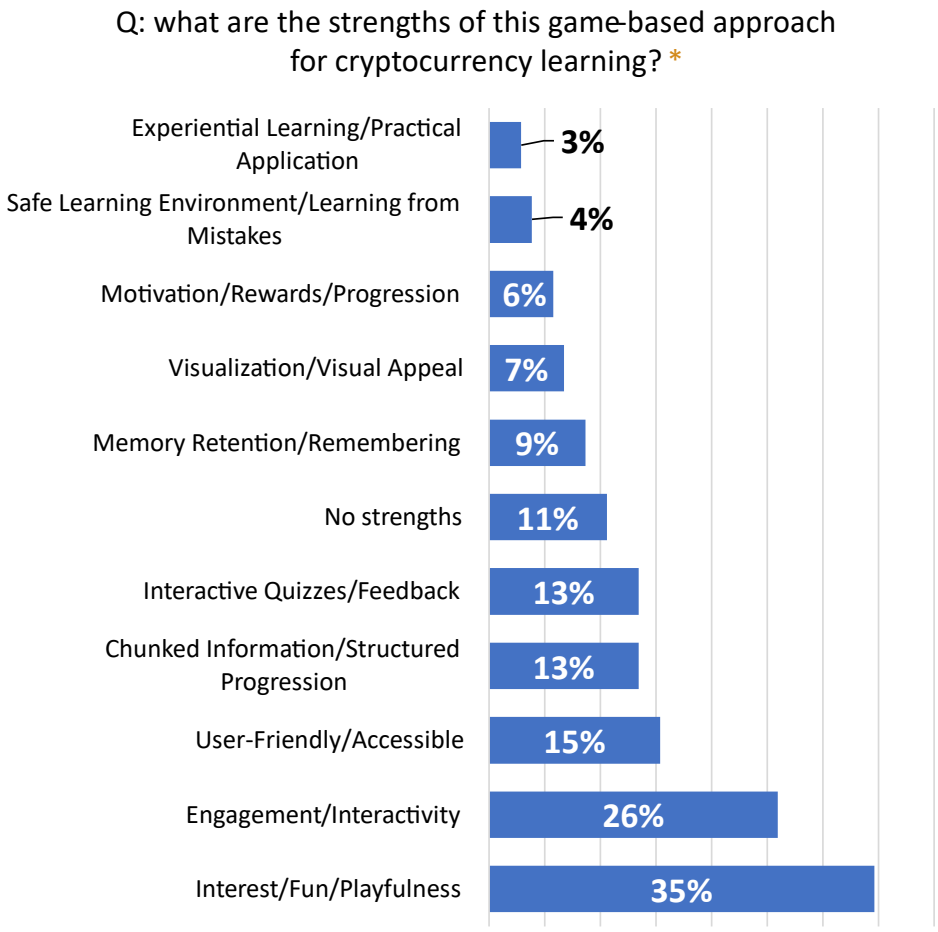


A significant majority of participants (89%) expressed their expectation of gaining a better understanding of cryptocurrency and blockchain technology through the learning game. Furthermore, 50% of participants expressed their desire to learn how to trade cryptocurrencies, while 45% indicated their interest in learning about the risks associated with cryptocurrency investment. A small percentage of participants (3%) mentioned additional expectations, including achieving financial freedom (1%), gaining insights into the future of crypto (1%), and developing the ability to educate others (1%) through the learning game. Notably, the differences in expectations between experienced investors and non-investors were not substantial, with slightly more non-investors (61 percent out of N=44) expressing their expectation to learn how to trade cryptocurrencies compared to experienced investors (42 percent out of N=60), demonstrating an expectation of experienced investors to optimize their trading strategies despite their prior experience in trading cryptocurrencies.

Survey Results – Post-game Questionnaire

Q5: In your view, what are the strengths of this game-based approach for cryptocurrency learning? (N=104)

Participants rated the game's enjoyment and playfulness as its greatest strength in teaching complex cryptocurrency concepts.



*Synthesized open-ended responses, total percentage >100%

"It was quite interesting and interactive. I love that I could learn actively unlike just reading a bunch of articles." —— Participant 18

Perceived strengths of the learning game

- **Interest/Fun/Playfulness**: 35% of participants highlighted the game's ability to make learning interesting, fun, and playful. They enjoyed the game-based approach, which made the learning process more enjoyable and captivating.
- **Engagement/Interactivity**: 26% of participants emphasized the game's engagement, interactivity, and interactive learning activities. They found the game more interesting, fun, and engaging compared to traditional methods of learning. The game-based approach helped them concentrate, retain knowledge, and actively participate in the learning process.
- **User-Friendly/Accessible**: 15% of participants featured the game's user-friendly nature, accessibility, and ease of understanding. They appreciated the game's intuitive interface, simple navigation, and the fact that it made cryptocurrency learning more accessible to different types of users.
- **Chunked Information/Structured Progress**: 13% of participants emphasized the game's structured progression and the way information was presented in manageable chunks. They found it easier to understand and digest knowledge when it was broken down into smaller portions.
- **Interactive Quizzes/Feedback**: 13% of participants featured the presence of interactive quizzes, feedback mechanisms, and the importance of validation in the learning process. They found the quizzes helpful in assessing their understanding, providing feedback, and reinforcing their knowledge.
- **No Strengths**: 11% of participants did not perceive any strength from the game, considering it unnecessary and overly time-consuming, perceiving no value in it compared to simply reading articles to acquire the same knowledge.
- **Memory Retention/Remembering**: 9% of participants emphasized the game's effectiveness in enhancing memory retention and helping them remember the learned information. They found that actively learning through the game, rather than passively reading text, made the information more memorable.
- **Visualization/Visual Appeal**: 7% of participants featured the game's visual elements and appeal. They appreciated the graphics, visuals, and decor of the game, which made the learning experience more enjoyable and captivating. Some participants suggested adding better graphics to make it more appealing.
- **Motivation/Rewards/Progression**: 6% of participants highlighted the motivational aspects of the game, such as rewards, progression, and a sense of achievement. They

found the game rewarding, as it indicated progress through levels or points, boosted confidence, and motivated them to learn more.

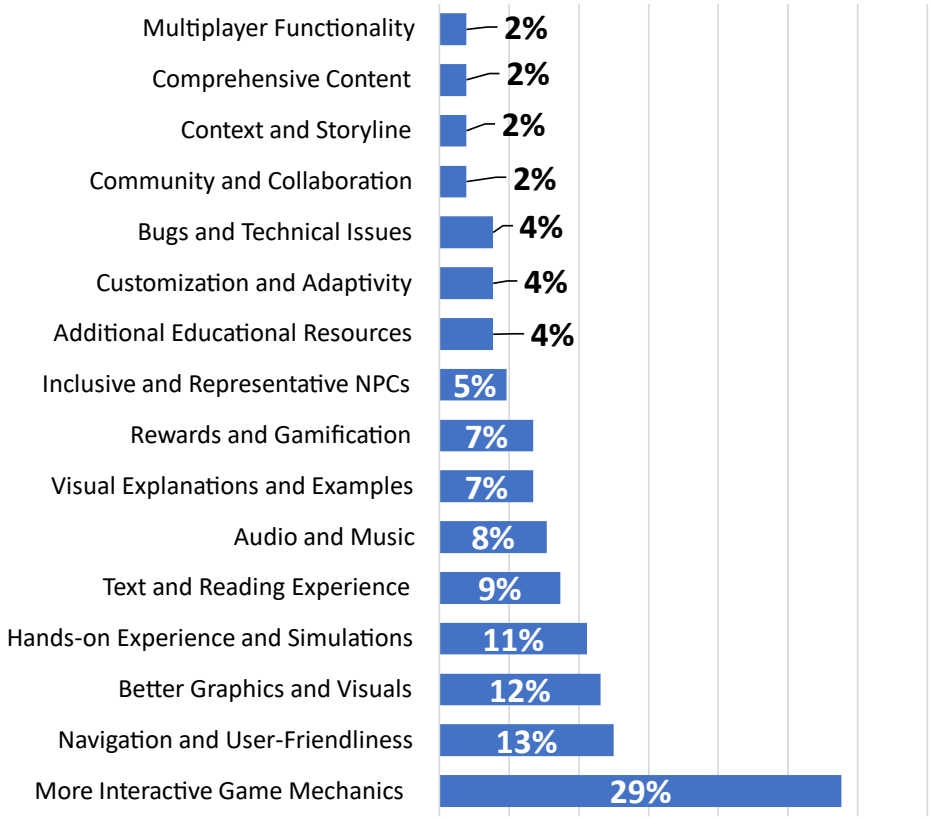
- **Safe Learning Environment/Learning from Mistakes**: 4% of participants emphasized the safe learning environment provided by the game, which allowed them to make mistakes and learn from them without real-world consequences. They found this aspect particularly beneficial in the context of cryptocurrency, where mistakes can have financial implications.
- **Experiential Learning/Practical Application**: 3% of participants featured the game's ability to provide experiential learning and practical application of cryptocurrency concepts. They appreciated the simulated environments, hands-on practice, and the opportunity to apply their knowledge in a risk-free setting.

Q6: In your view, how can this game-based approach be improved for cryptocurrency learning?

(N=104)

Participants expressed a strong desire for in-game challenges and puzzles that are more interactive and engaging.

Q: How can this game-based approach be improved for cryptocurrency learning? *



*Synthesized open-ended responses, total percentage >100%

"Incorporating minigames, offering interactive challenges and puzzles, and maybe small easter eggs into the learning experience to sharpen learners' minds." —— Participant 34

Improvement Suggestions

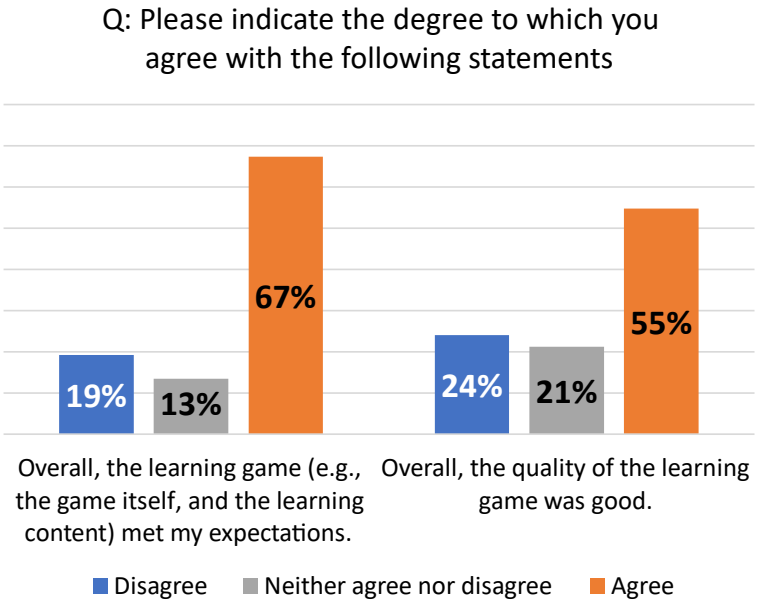
- **More Interactive Game Mechanics**: 29% of participants expressed the need for more interactivity, such as minigames, obstacles, or tasks to enhance engagement and appeal. Strategy-based games, interactive puzzles, quizzes, or collaborative challenges, that cater to different learning styles and preferences.
- **Navigation and User-Friendliness**: 13% of participants mentioned the need for improved controls, smoother navigation, clearer icons, and a more user-friendly interface to enhance the overall usability of the game.
- **Better Graphics and Visuals**: 12% of participants expressed the need for improved graphics, visuals, brighter colors, animations, and better design to enhance the overall aesthetics of the game.
- **Hands-on Experience and Simulations**: 11% of participants mentioned the desire for hands-on experiences, such as simulating cryptocurrency exchanges, trading challenges with "fake" coins, or other interactive elements related to the concepts being taught.
- **Text and Reading Experience**: 9% of participants expressed the need for larger and easier-to-read text, shorter dialogues, and less extensive information in speech bubbles to improve readability and attention retention.
- **Audio and Music**: 8% of participants mentioned the need for better music, sound effects, and possible voice acting to enhance the overall audio experience.
- **Visual Explanations and Examples**: 7% of participants expressed incorporating visuals, diagrams, animations, or simulations to visually explain complex concepts and make learning more effective.
- **Rewards and Gamification**: 7% of participants mentioned the implementation of a rewards system, points, badges, achievements, or prizes to motivate learning and enhance the gaming aspect.
- **Inclusive and Representative NPCs**: 5% of participants expressed the importance of diverse NPC characters representing various ethnicities for a more inclusive learning environment.
- **Additional Educational Resources**: 4% of participants mentioned integrating external educational resources, such as links to external tutorials, articles, or videos, to enhance the learning experience within the game.
- **Customization and Adaptivity**: 4% of participants expressed the need for customization options and adaptive gameplay that allow tailoring content, challenges, and feedback based on the learner's skill level, interests, and learning goals.

- **Bugs and Technical Issues**: 4% of participants mentioned the need for bug fixes and addressing technical issues to improve the overall user experience.
- **Community and Collaboration**: 2% of participants expressed the potential for integrating game features to foster community, discussions, and collaborative learning among learners to create a sense of belonging and facilitate knowledge sharing.
- **Context and Storyline**: 2% of participants mentioned adding context, storylines, quests, or a sense of progression (i.e., a progress bar) to make the game more interesting and meaningful.
- **Comprehensive Content**: 2% of participants expressed the importance of covering a wider range of cryptocurrency topics beyond basics, including blockchain, smart contracts, decentralized finance (DeFi), security best practices, and different types of cryptocurrencies.
- **Multiplayer Functionality**: 2% of participants mentioned the inclusion of multiplayer features, such as collaborative learning, virtual trading competitions, or team-based activities, to enhance social interaction and knowledge sharing.

Q7: Please indicate the degree to which you agree with the following statements. [12]

(N=104)

Most participants expressed satisfaction with the learning game and generally perceived it to be of high quality.

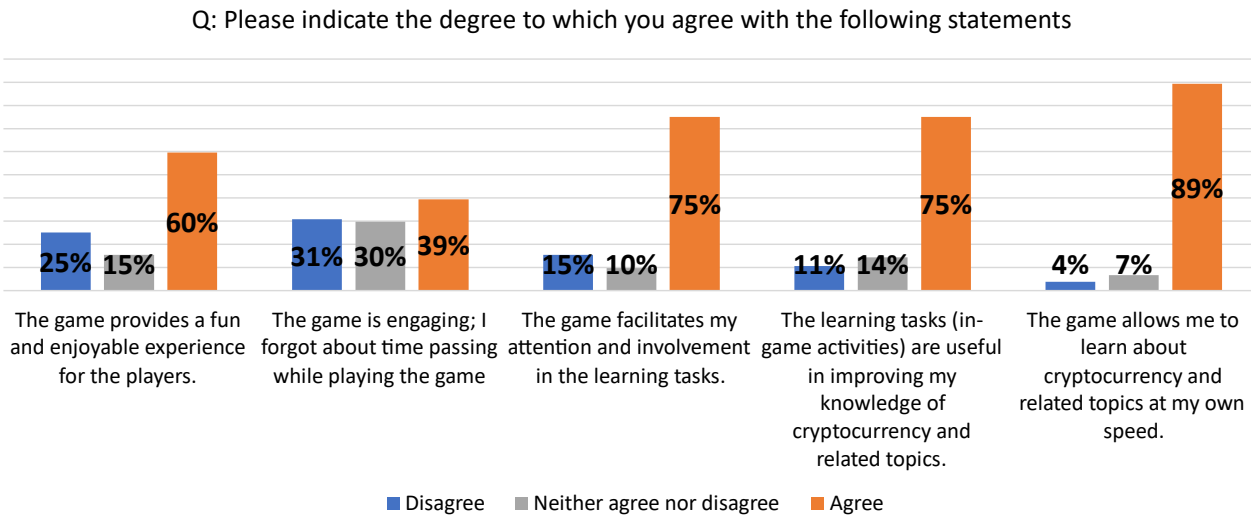


In spite of receiving several suggestions for improvement, most participants (67%) expressed satisfaction with the learning game, affirming that it successfully met their expectations in terms of both the game mechanics and educational content. Conversely, 19% of participants expressed dissatisfaction with the learning game, while 13% did not have a specific opinion. Additionally, 55% of participants rated the game's quality as good, contrasting with the 24% who disliked its quality. The remaining 21% did not express a clear opinion on the game quality. We did not identify any substantial differences between the opinions of experienced investors and non-investors.

Q8: Please indicate the degree to which you agree with the following statements. [12]

(N=104)

Participants found the learning experience enjoyable, attention-encouraging, and useful, with flexible pacing, but lacking full immersion and engagement.

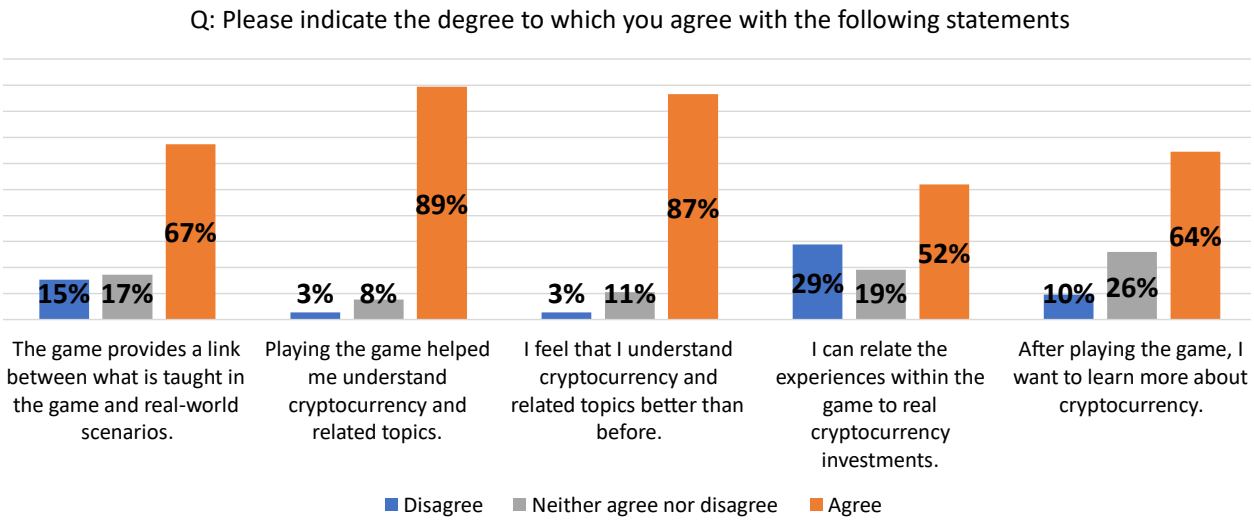


The feedback from participants indicates that a majority (60%) found the game to be enjoyable. Furthermore, a significant portion of participants (75%) felt that the game effectively captured their attention and engaged them in the tasks. In terms of learning outcomes, the majority (75%) perceived the learning tasks within the game as valuable in enhancing their understanding of cryptocurrency and related subjects. Additionally, a significant majority (89%) appreciated the game's flexibility, allowing them to learn at their own pace. However, it is worth noting that only 39% of participants found the game engaging enough to lose track of time, suggesting potential areas for improvement.

Q9: Please indicate the degree to which you agree with the following statements. [12]

(N=104)

Participants perceived high educational value and moderate knowledge transferability from the learning game, and increased motivation to learn about cryptocurrency in the future.



Participants generally found the educational value of the game to be high. More than half (67%) of the participants believed that the game effectively connected what was taught to real-world scenarios. Furthermore, the majority (89%) of the participants felt that playing the game helped them gain a better understanding of cryptocurrency-related topics, and 87% of the participants believed that their understanding of this subject improved through their gameplay experience. Regarding the transfer of knowledge from the game to real-world situations, participants perceived a moderate level of ability, with 52% indicating that they could relate their learning experience to real investments. Additionally, 64% of participants expressed that the game motivated their intrinsic desire to learn more about cryptocurrency in the future.

Implications and How to Improve Learning in the Future

The survey results revealed several key points relating to market investors' attitudes, concerns, and needs for learning about cryptocurrency, and paved a way for future design of cryptocurrency learning games that can meet users' expectations and address their concerns.

It is evident that participants, even those with cryptocurrency trading experience, reported a moderate level of confidence in their current knowledge of cryptocurrency and Blockchain (see Q2). This highlights the need for effective educational interventions to bridge the knowledge gap and enhance market investors' understanding. The participants' familiarity with game design elements in educational contexts (see Q3) indicates their acceptance and recognition of the effectiveness of such approaches in learning various topics, including cryptocurrency. This emphasizes the use of gamification strategies and game-based learning in designing educational programs and platforms to engage learners and enhance their knowledge acquisition. In addition, a significant majority of participants, including experienced market investors, anticipate improving their understanding of cryptocurrency and blockchain through the learning game (Q4). Despite their prior experience in trading cryptocurrencies, these participants recognize the potential benefits of game-based learning in optimizing their trading strategies and expanding their knowledge in this complex field. In summary, **participants perceive the game as a valuable learning experience for both beginners and experienced investors**.

When inquired about their opinion on the current version of the game, participants considered the game's enjoyment and playfulness as its greatest strength (see Q5). Additionally, they highlighted various other strengths such as engagement, interactivity, accessibility, structured progression, and feedback mechanisms. However, participants also provided suggestions for improvement (see Q6), such as the inclusion of interactive puzzles and trading simulators, enhanced graphics and soundtracks, visual explanations of the learning content, and multiplayer and collaborative features. These results imply that the current game, with improvements, has the potential to successfully educate learners while providing enjoyable and motivating learning experience. These findings suggest that **with the necessary improvements, the current game has the potential to effectively educate learners while offering an enjoyable and motivating learning experience**.

In general, participants were satisfied with the cryptocurrency learning game and recognized its educational value in effectively transferring knowledge to real-world situations. They found the game to be captivating and helpful in facilitating their learning. However, there was a consensus

that the game could be more immersive and engaging. Therefore, **future improvements aimed at creating a more immersive and engaging experience could enhance the educational impact and overall effectiveness of the game**.

During our year-long research project, we discovered additional implications beyond this game evaluation. First, it is crucial to **provide diverse accessible learning options** for individuals with varying preferences. While some may see game-based learning as a recreational activity for cryptocurrency education using gaming equipment, others who prefer learning on the go might opt for simpler designed options (e.g., a mobile app). Second, due to the rapidly evolving nature of the field of cryptocurrency, it is essential to **keep learning content up-to-date**. By integrating technologies like GPT-4, these technologies can offer a more dynamic and current learning experience. AI can analyze learners' performance, identify areas needing support, and provide personalized feedback and guidance. Notably, popular gamified learning apps like Duolingo[13] and Khan Academy[14] have already integrated GPT-4 to enhance the learning experience.

Furthermore, it is important to **address the potential impact of game enjoyment on individuals' perception of the seriousness of cryptocurrency investments**. The immersive nature of game-based learning may inadvertently downplay the seriousness of such investments, potentially leading to irresponsible decision-making and careless trading of cryptocurrencies. To mitigate this, game-based cryptocurrency learning platforms should strive to strike a balance between enjoyment and learning outcomes. One approach could involve effectively communicating the real-world risks associated with cryptocurrency investments to learners. By providing thorough information and promoting responsible decision-making, these platforms can ensure a comprehensive learning experience that educates individuals about the potential pitfalls of the market.

Lastly, **credibility should be a crucial consideration for cryptocurrency learning platforms, encompassing both the learning content and the platform itself**. The knowledge and expertise of the content creator should be ensured, as anything investors learned might potentially influence their future investment decisions, making it vital to ensure accurate and reliable information. Since the cryptocurrency market is prone to fraud and scams, investors prioritize scrutinizing the information they receive. To stand out among competitors, the platform must ensure credibility by obtaining verification from credible third-party organizations or referencing guidelines released by government agencies. Regarding improving the credibility of the platform itself, one way is to have a better-quality design. Research indicates that users' trust is influenced by the perceived quality of the product [15], associating reliability and trustworthiness with well-designed platforms. Conversely, users tend to be skeptical of

information presented on poorly designed or sketchy platforms. Therefore, enhancing the design aesthetics of the cryptocurrency learning platform can foster trust among learners and promote higher adoption rates.

We hope that the insights we gained from this research will inform the future design of cryptocurrency learning games that can meet market investors' expectations and address their concerns.

Acknowledgement

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