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Finllet: An AI-Driven Financial Learning and Market Simulation Framework

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Abstract

The rapid expansion of digital finance has made financial information and trading tools increasingly accessible, but a gap remains between theoretical financial knowledge and practical decision-making. Conventional financial education may provide conceptual understanding, while basic paper-trading simulators often provide limited execution realism and behavioural feedback. To address this gap, this paper presents Finllet, an integrated financial learning and market simulation framework combining structured learning micro-pathways, controlled market-event scenarios, a risk-free interactive trading simulator, a retrieval-augmented AI Mentor, and behavioural safeguards. The framework connects sequential financial lessons with simulated market actions and introduces volatility-dependent slippage and order latency to provide controlled execution friction. Its AI Mentor uses a curated financial knowledge base, hybrid retrieval, relevance filtering, and generative AI to provide contextual educational assistance while restricting unsupported financial claims and personalised investment recommendations. A rule-based behavioural engine monitors selected simulated trading patterns and can temporarily restrict trading when a critical risk threshold is reached. The prototype was evaluated through functional and scenario-based testing covering learning progression, state persistence, order execution, retrieval of financial concepts, behavioural-risk detection, temporary trading restrictions, and dashboard integration. The results demonstrate the technical feasibility of integrating these mechanisms within a unified educational prototype. However, the study does not claim causal improvements in financial literacy or real-world trading behaviour because no longitudinal human-participant study was conducted. Finllet therefore provides a technical foundation for future empirical investigation of integrated financial learning and simulation environments.

Keywords: Financial literacy, retrieval-augmented generation (RAG), market simulation, behavioural finance, FinTech.

1. Introduction

1.1 Background and Motivation

I notice that financial knowledge is more than remembering rules or definitions. It also means using that knowledge when making choices. For example, a learner might understand investment risk yet still feel uncertain when an asset price begins to fall. Knowing about diversification does not always help someone see when too much of their money is stuck in one place. The OECD's PISA 2022 financial literacy assessment also stresses applying knowledge in real life [1]. Helping learners move from knowing a concept to using it remains a challenge in financial education.

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1.2 Digital Financial Education and Technical Context

I see that digital platforms now give people access to financial information and trading tools. Interactive lessons and simulators let learners practice ideas instead of just listening to talks. Research shows that hands-on activities are valuable in education [2], but it also says that learning gains and behaviour changes must be measured separately [3]. AI can explain a topic when a learner asks for help. Sometimes the answers are wrong. Basic simulators may also omit trading details such as slippage and order delays. Bringing lessons, simulation, explanations and safeguards on one platform could help solve some of these problems.

1.3 Research Context and Problem

Financial lessons teach concepts, simulators let learners practice, and AI tools explain topics when questions arise. When these tools are spread across apps, learners find it harder to link lessons with their own decisions. Basic simulators may miss some trading conditions, and AI tools may give answers that do not fully solve the question. Patterns of trading such as repeated orders or large positions can be used as a chance to prompt reflection. Still, any safeguards should play a limited role and must not pretend to diagnose a person's real-world behaviour.

1.4 Objectives and Contributions

This study introduces Finllet, a prototype that merges learning with market simulation. The main aim is to build and test a system that offers step-by-step lessons, ready market scenarios, virtual trading, AI-based explanations and basic safeguards for simulated activity.

The principal contributions are:

- A framework that links financial lessons, market scenarios, virtual trading, AI support and dashboard summaries.
- A controlled simulator that handles market and limit orders, includes slippage tied to volatility, and adds an artificial order delay.
- An AI Mentor that draws from chosen information, uses various retrieval methods, and checks relevance before creating explanations.
- A rule-based risk engine, along with tests of module functions, saved progress, information retrieval, trading pauses and dashboard updates.

This study only checks whether the system works technically, not whether it improves learning. It does not claim that Finllet raises literacy or real-world trading behaviour. Those results would have to be tested with participants.

2. Review of Literature

2.1 Financial Literacy and Educational Outcomes

Studies on education examine whether teaching finance changes what people know and how they act. Kaiser and Menkhoff reviewed school-based experiments and found positive average effects on financial

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knowledge, while noting that behaviour must be examined separately [3]. Batty and colleagues studied My Classroom Economy, a programme that uses simulated decisions in elementary-school lessons [2]. Together these studies support the idea of mixing concepts with hands-on activities. They also show why finishing lessons should not be taken as proof that learning has improved.

2.2 Experiential Learning and Market Simulation

Experiential learning gives students a chance to use ideas, see the results of their choices, and explore risk without using money. Pierce discussed stock-trading simulations as a teaching tool [7], while Chamberland and colleagues studied the links between literacy, confidence in one's abilities and performance in a financial simulation game [6]. Simulators differ in how they mimic real markets. Real trading can involve price changes, delays and slippage. Finllet includes controlled price changes, slippage tied to volatility and an artificial order delay to show some of these issues. It does not aim to copy the real market.

2.3 Behavioural Finance and Retrieval-Augmented Assistance

Behavioural finance looks at how people's thoughts and feelings can influence money decisions. Barber and Odean discovered that investors who traded frequently earned lower returns than the market during the time they studied [4]. This shows that trading frequency is a topic for financial education, yet it does not prove that a specific safety measure will alter how learners act. Finllet applies a rule-based engine that examines chosen trading patterns, calculates risk scores and temporarily stops trading when a critical score is reached.

Generative AI can sometimes provide unsupported information. Lewis and colleagues created retrieval-augmented generation (RAG), a method that mixes searching for data with text creation so that answers can rely on supplied sources [5]. The quality of an answer depends on whether the retrieved data is relevant and used correctly. Finllet's AI Mentor uses a chosen financial knowledge base. It searches by phrase matching, aliases, token overlap and fuzzy matching, then applies a relevance threshold before producing an answer. The Mentor is designed to explain ideas for learning. It does not give personal investment advice or tell users what to buy or sell.

2.4 Summary of Existing Research

Research gives a foundation for the various parts of Finllet. Studies on education examine the gap between knowledge and behaviour. Experiential learning emphasises practice. Behavioural finance looks at trading patterns. Retrieval-augmented generation helps AI answers use retrieved data. These areas usually address parts of the problem. Finllet combines them into a prototype and checks if the main features work technically. Whether this combination improves knowledge, decisions or real-world behaviour still requires study.

3. Research Gap and Problem Statement

Financial lessons teach concepts while simulators give a place to practise them. These tools are usually separate. Some simple trading simulators lack realistic order conditions, which limits what learners can

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explore about market activity. General AI tools may also provide financial explanations when they lack reliable information to back their answers. Retrieval-augmented generation can help anchor answers in retrieved material [5]. Its results still rely on the quality and breadth of the information available.

The research gap this study tackles is the integration of step-by-step financial lessons, controlled market simulation, retrieval-based AI help and rule-based safeguards in a single working prototype. Earlier studies inform these areas while Finllet focuses on building and testing how they work together. This paper does not claim that every existing platform lacks similar features.

The study asks how a financial-learning prototype can merge lessons, virtual trading, AI explanations and behavioural safeguards, and how its main functions can be tested with repeatable functional and scenario-based tests. The evaluation focuses on whether the system works as designed, not on proving gains in knowledge or real-world decisions.

4. The Proposed Finllet Framework

4.1 Overview

Finllet combines lessons and simulated practice in one platform. The Learn module offers lessons in a fixed sequence while the News module displays prepared market-event scenarios rather than live news. The Simulator lets users trade with virtual money under controlled conditions. The AI Mentor supplies explanations using a chosen knowledge base and a generative model. The safeguards examine trading patterns and the Dashboard summarises learning progress and simulator activity. Table 1 describes each module and explains what it does not cover.

Table 1. Finllet modules, their roles and scope boundaries

Module	Role in the framework	Scope boundary
Learn	Gives five sequential lessons and records progress.	Completion tracking is not a measure of financial literacy.
News	Provides predefined market-event scenarios.	Events are not live market news.
Simulator	Supports trading with market/limit orders and execution friction.	Prices and execution conditions are simulated.
AI Mentor	Retrieves financial concepts and generates educational explanations.	Knowledge base is limited; not investment advice.
Risk engine	Scores selected patterns and temporarily freezes trading at a critical threshold.	Rules are heuristic and not a clinical or financial diagnosis.
Dashboard	Summarises learning and simulator state.	Summaries reflect application state, not validated learning gains.

4.2 Structured Learning and Market Scenarios

The Learn module contains five lessons that must be completed in order. A new lesson becomes available after the previous required lesson is finished. Progress is saved in the browser, allowing learners to continue later. Testing checks lesson completion, unlocking and saved progress. It does not measure how much a learner has learned. The News module uses prepared market events rather than live news. These

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repeatable scenarios make testing more consistent and let learners explore price changes in a controlled setting. They do not represent current events or all the details of real markets.

4.3 Interactive Trading Simulator

The Simulator starts with 100,000 units of virtual money and an asset price of 500 units. It supports market orders and limit orders. Users can select low volatility (0.0025), medium volatility (0.0075) or high volatility (0.015), which affects slippage. Artificial order delays range from 200 to 1,000 milliseconds. These settings show how execution conditions can affect trades, but they do not reproduce real market conditions.

4.4 AI Mentor and Behavioural Safeguards

The AI Mentor covers ten concepts stored in a selected JSON knowledge base. It uses phrase matching, aliases, token overlap and fuzzy similarity to find related information. A relevance threshold filters the results before they are sent to the generative model. The Mentor provides educational explanations only and does not give personal investment advice or buy-and-sell recommendations. Its coverage is limited to the information in the knowledge base, and generated answers may still contain errors.

A rule-based engine checks large positions, high exposure, rapid trading and repeated trading. It gives activity a risk score: Low (below 40), Medium (40–69), High (70–89) or Critical (90 and above). When the score reaches the critical level, trading is paused for 60 seconds. The pause remains in place after a page refresh and ends automatically when the time is over. These rules are safeguards for the learning simulator only. They have not been tested as a reliable measure of a person's actual financial risk.

Figure 1. Finllet's module-level architecture. Only the AI Mentor uses the FastAPI and Gemini backend. Learning progress and simulator state are saved in the browser.

5. System Design and Implementation

5.1 Architecture

The application is a modular web frontend with separate sections for Dashboard, Learn, News, Simulator, AI Mentor and Profile. Only the AI Mentor connects to a backend. This backend uses FastAPI, stores the selected financial knowledge base in JSON and calls a Gemini model to generate answers using retrieved information. Learning progress and simulator data are saved in the browser. The Dashboard reads the state provided by these modules and displays a summary. Table 2 explains the role of each component and the information it handles.

Table 2. Implementation responsibilities across Finllet components

Component	Implementation responsibility	Data or interaction
Web frontend	Presents module interfaces and accepts learner actions.	User actions, module state, displayed summaries.
Learn module	Controls lesson order and completion.	Lesson progress persisted in browser storage.

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Simulator module	Processes virtual orders and simulated execution friction.	Progress and simulator information read from app state.
AI Mentor frontend	Sends educational questions to the backend and displays replies.	Question and generated explanation.
FastAPI backend	Coordinates retrieval and response generation.	Request handling, retrieved context, response.
Financial knowledge base	Stores curated definitions and concept metadata.	Ten financial concepts in JSON.
Gemini model	Generates an explanation using retrieved context.	Context-grounded educational response.
Dashboard	Summarises current learning and simulator state.	Virtual capital, price, orders, positions, risk state.

5.2 Learning Persistence and Simulation Logic

Lesson completion and progress are saved in the browser. The next lesson stays locked until the required earlier lesson is completed. Functional tests confirmed that lessons unlock in the correct order and that progress remains saved after moving between pages or refreshing the page. Browser storage helps learners continue on the same browser, but it does not provide account-based syncing across different devices.

The simulator keeps track of virtual money, asset prices, positions, order history and risk-related information. Market orders use the current simulated price and apply the configured execution friction. Limit orders follow their limit conditions within the simulation. Slippage changes according to the selected volatility, and an artificial delay represents order latency. The simulator is limited to virtual trading and does not connect to a broker or carry out real transactions. Tests checked examples of market and limit orders, saved state, critical-risk restrictions and automatic removal of the trading pause.

5.3 AI Retrieval and Dashboard Integration

When a learner submits a question to the AI Mentor, the backend compares it with every concept in the knowledge base. It uses aliases, exact phrases, token overlap and fuzzy similarity for matching. The current system applies a relevance threshold of 4.0. It includes extra entries only if their score is at least 60% of the highest match. The selected information is then sent to the generative model with instructions to provide an educational explanation and avoid personal financial advice. If Gemini is unavailable, the system returns a fallback response. The quality of the result depends on the knowledge base, the matching rules and the generated answer.

The Dashboard reads the learning and simulator information provided by the other modules and displays a summary of progress and virtual trading activity. Integration tests found that the summary matched the module state in the workflows that were tested. Since the Dashboard depends on the information supplied by those modules, its values show the application's current state rather than independently measured learning outcomes.

6. Research Methodology

6.1 Research Design and Testing Environment

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This study uses a prototype-based technical evaluation. It checks whether the modules perform their planned functions and whether important workflows continue to work when the modules interact. The evaluation combines functional tests, scenario-based tests and integration checks. No experiment with human participants, long-term follow-up or measurement of changes in financial literacy was carried out.

The system was tested as a web-based prototype. The AI Mentor used a FastAPI backend, a selected JSON knowledge base and a Gemini generative model. The Learn and Simulator modules saved their state in the browser. Tests were carried out on the implemented modules and their configured settings. Hardware details, browser versions, package versions and the exact API model identifiers were not recorded in a systematic way during testing. These details should be added to the final paper if they are available.

6.2 Evaluation Criteria and Procedure

Table 3 shows the areas tested, the criteria used and the expected behaviour when each feature works as planned.

Table 3. Evaluation criteria and expected behaviour

Area	Evaluation criterion	Expected behaviour
Learning progression	Lesson unlocking and completion	Lessons unlock in the defined sequence and completion is recorded.
State persistence	Refresh/navigation checks	Saved learning and simulator state remains available in the tested browser context.
Order execution	Market and limit order scenarios	Orders follow the implemented simulated execution rules.
AI retrieval	Ten curated concepts and manually constructed paraphrases	Relevant concepts are retrieved for the tested prompts.
Risk detection	Configured risk-trigger scenarios	Specified trading patterns increase risk score and critical cases trigger restriction.
Trading restriction	Critical freeze and timed recovery	Trading is blocked for 60 seconds and automatically becomes available again.
Dashboard integration	Cross-module state display	Dashboard summaries reflect the state read from Learn and Simulator.

Testing was carried out in four main steps. First, the main functions of each module were tested with suitable inputs. Next, saved information was checked after navigation and page refresh wherever persistence was expected. Then, selected scenarios were used to test the simulator's risk rules and the AI Mentor's retrieval. Finally, the Dashboard was checked against the learning and simulator state shown by the application. The AI Mentor tests included all ten entries in the knowledge base along with paraphrased versions of questions. During testing, one question about diversification did not retrieve the expected result. This was fixed and tested again. Since the test questions were prepared manually and covered only a small area, the results should not be treated as a general accuracy score.

6.3 Scope of Evaluation

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The evaluation only checks whether selected features work as intended in the test environment. It does not show whether the system would be easy to use at a larger scale, work equally well for different learner groups, resist deliberately misleading prompts, answer every financial question correctly, or improve real-world financial decisions.

7. Results and Discussion

7.1 Learning and Simulator Results

The functional tests showed that lessons unlocked in the correct order, completion was recorded and progress remained available after the tested page changes and refreshes. This shows that the lesson progression feature worked technically. It does not show whether learners understood the concepts, remembered them or used them later.

In the tested market and limit-order scenarios, the simulator followed its programmed rules and saved its state through the tested navigation and refresh steps. When a critical-risk scenario was tested, trading was paused as expected and became available again after 60 seconds. These results show that the programmed process worked in the prototype. They do not show that the simulator behaves exactly like a real stock exchange, which was not its purpose.

7.2 AI Mentor and Dashboard Results

The final retrieval tests covered all ten financial concepts in the knowledge base and manually prepared paraphrases. During development, a question about diversification failed to retrieve the expected information. The issue was corrected and the tests were run again. The results show that hybrid retrieval can work with this limited knowledge base and the tested questions. No overall accuracy percentage is given because the test set was small, prepared by hand and not independently labelled.

Integration tests showed that the Dashboard displayed the learning and simulator state supplied by the relevant modules during the tested workflows. This suggests that the system can show summaries from different modules in one interface. However, the Dashboard depends on the data it receives, so its summaries should not be taken as proof that learning has improved.

7.3 Overall Discussion

Overall, the tests suggest that Finllet's main features can work together as an educational prototype. Learn manages the lesson order, the Simulator supports virtual trading with selected execution effects and risk restrictions, the AI Mentor finds financial concepts and creates explanations, and the Dashboard summarises the current state. The findings support technical feasibility under the conditions tested, but no wider claim can be made from them. The study does not show that Finllet improves financial literacy, decision-making or trading behaviour. Future research should test the system with learners, measure their understanding before and after use, and examine usability and long-term retention. The AI Mentor should also be tested with a larger set of questions reviewed independently before making claims about relevance, correctness or safety.

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8. Limitations

This study did not include human participants or a long-term evaluation. Therefore, it cannot show that Finllet improves financial knowledge, confidence, decision-making or behaviour. Completing a feature and saving progress are technical results, not measures of learning. The market scenarios are prepared in advance, and the simulator uses simplified price changes, slippage and delays. These settings make tests easier to repeat, but they cannot copy all parts of real markets. Liquidity changes, order-book activity, transaction costs, market impact and differences between brokers are not included in the model.

The knowledge base contains only ten selected financial concepts. The matching system may miss some valid ways of asking a question or may select information that is not a perfect match. Even when useful information is retrieved, the AI may still produce an incomplete or incorrect answer. Testing covered only the selected concepts and manually prepared questions, so it is not a complete safety check or a broad accuracy test. The risk engine also uses thresholds chosen for this prototype and has not been tested on a representative group or compared with an established behavioural-risk measure. A temporary pause in the simulator is a software safeguard; it does not prove that a person's trading behaviour has changed. The findings support only the technical feasibility of the tested workflows.

9. Conclusion and Future Work

This paper presented Finllet, a framework for financial learning and market simulation that combines step-by-step lessons, prepared market scenarios, virtual trading, a retrieval-based AI Mentor, behavioural safeguards and dashboard summaries. The prototype includes market and limit orders, adjustable volatility, slippage based on volatility, artificial order delays, retrieval from a selected financial knowledge base and a rule-based trading pause.

Functional and scenario-based tests covered lesson progress, saved state, simulated orders, retrieval of the ten financial concepts, critical-risk detection, the timed trading pause and dashboard integration. The results show that these features worked under the conditions tested. They do not prove that Finllet improves financial literacy or real-world trading behaviour.

Future work can focus on three areas. First, the financial knowledge base should be expanded, and retrieval and answer quality should be tested with a larger set of questions reviewed independently. Second, the simulator could include more execution conditions and a wider range of market scenarios. Third, and most importantly, the system should be tested with learners. Usability tests and a controlled study could measure changes in financial knowledge, decision-making, confidence and memory of the concepts. Longer-term research would be needed before drawing conclusions about changes in behaviour. Finllet provides a technical starting point for studying financial learning platforms that combine lessons and simulation. The next step is to test it systematically with learners and clear outcome measures.

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References

[1] OECD, PISA 2022 Results (Volume IV): How Financially Smart Are Students? Paris, France: OECD Publishing, 2024, doi: 10.1787/5a849c2a-en.

[2] M. Batty, J. M. Collins, C. O'Rourke, and E. Odders-White, "Experiential financial education: A field study of My Classroom Economy in elementary schools," Economics of Education Review, vol. 78, Art. no. 102014, 2020, doi: 10.1016/j.econedurev.2020.102014.

[3] T. Kaiser and L. Menkhoff, "Financial education in schools: A meta-analysis of experimental studies," Economics of Education Review, vol. 78, Art. no. 101930, 2020, doi: 10.1016/j.econedurev.2019.101930.

[4] B. M. Barber and T. Odean, "Trading is hazardous to your wealth: The common stock investment performance of individual investors," The Journal of Finance, vol. 55, no. 2, pp. 773–806, 2000, doi: 10.1111/0022-1082.00226.

[5] P. Lewis et al., "Retrieval-augmented generation for knowledge-intensive NLP tasks," in Advances in Neural Information Processing Systems, vol. 33, 2020, pp. 9459–9474. [Online]. Available: https://proceedings.neurips.cc/paper/2020/hash/6b493230205f780e1bc26945df7481e5-Abstract.html

[6] C. Chamberland, D. de Hemptinne, and S. Tremblay, "The relationship between financial literacy, self-efficacy, and performance in a financial simulation game," Acta Psychologica, vol. 266, Art. no. 106906, 2026, doi: 10.1016/j.actpsy.2026.106906.

[7] J. R. Pierce, "Stock-trading simulations as a resource for management instructors," Management Teaching Review, vol. 7, no. 3, pp. 276–287, 2022, doi: 10.1177/23792981211027263.

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