



"Stock Rising": The Vocational School Gamification Experiment

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Abstract: "Stock Rising": The Vocational School Gamification Experiment

Purpose: This study aims to develop financial literacy learning media in the capital market in the form of a game as a simulation of investment practices for students.

Method: This study employs a research and development (R&D) methodology utilizing the ADDIE development model.

Results: The findings indicate that using Stock Rising as a learning medium effectively improves students' financial literacy, with the average score increasing from 53.60 to 79.10.

Novelty: This research model successfully created an engaging, educational, and practical game-based learning tool as a simulation of investment practices for students.

Contribution: This study shows that Stock Rising, as an investment simulation tool, can contribute as a practical learning medium in vocational institutions to educate students in the world of finance.

Kata kunci:

Literasi Keuangan;
Keuangan Sekolah Vokasi;
Simulasi investasi;
Stock Rising.

Abstrak: "Stok Rising": Eksperimen Game pada Sekolah Vokasi

Tujuan: Penelitian ini bertujuan untuk menghasilkan media pembelajaran literasi keuangan di pasar modal berupa permainan sebagai simulasi praktik investasi bagi mahasiswa.

Metode: Penelitian ini menggunakan metodologi penelitian dan pengembangan (R&D) dengan model pengembangan ADDIE.

Hasil: Penelitian ini memberikan bukti empiris bahwa Stock Rising sebagai media pembelajaran efektif dalam meningkatkan literasi keuangan. Hasil tes pengetahuan pasar modal sebelum dan setelah menggunakan Stock Rising menunjukkan rata-rata skor dari 53,60 menjadi 79,10.

Kebaruan: Model penelitian ini menciptakan inovasi pembelajaran berbasis permainan yang edukatif dan menyenangkan dengan menghadirkan simulasi praktik investasi bagi mahasiswa.

Kontribusi: Stock Rising sebagai alat simulasi investasi dapat berkontribusi sebagai media praktik belajar di instansi vokasi dalam mencerdaskan mahasiswa di dunia keuangan.



1. Introduction

The low level of financial literacy among vocational students cannot be separated from three main factors. First, many vocational students do not meet the legal age requirement to enter the financial world, such as banking, investment, and the stock market [1-2]. Second, limited funds are an obstacle to hands-on practice [3], as well as the mental accounting issues of Generation Z [4]. These conditions exacerbate students' difficulties in understanding and managing their finances effectively. In line with this, research [5] shows that financial knowledge has a significant positive influence on investment interest, so increasing knowledge through appropriate learning methods is very important. Third, there is a lack of specific practical subjects on financial management in the learning curriculum [6]. Therefore, a more efficient, enjoyable, and accessible approach to financial learning is needed, especially for vocational students who have age and financial limitations [7]. One approach that has proven to be effective is the use of interactive learning media [8]. In addition, found that students' interest in investing and financial literacy expanded following involvement in mentoring and socialization exercises in a number of investment education galleries, demonstrating that effective teaching strategies can truly make a difference [9-10].

Learning through game-based simulations can improve students' understanding of financial concepts more than simple learning methods [11]. In addition students are more enthusiastic and active when learning through games because the financial simulation learning process resembles the real world [12]. In Indonesia, several innovations have been developed to support game-based learning in vocational education. One of them is Monopoli Pajak (MOJAK), a web-responsive tax monopoly game. That the use of MOJAK in learning can increase tax awareness among the younger generation. In addition, [13] developed interactive multimedia learning based on

Lectora Inspire for bank reconciliation material at SMK Negeri 1 Boyolangu. This media received a very favourable rating from media experts (87.23%) and material experts (82%), as well as an excellent response from students (97.14%) [13-14].

Some Research developed an Android-based application called "Peta Akuntansi (TAKSI)" that focuses on the accounting cycle of service companies [15]. This research indicates that the use of the TAKSI application can significantly improve students' understanding of the accounting cycle. Therefore, the development of this digital-based learning media can be an effective tool in vocational learning, especially in the fields of economics and accounting. This study aims to develop a new method for teaching accounting vocational students by developing a game-based investment simulation in response to the limitations of investment learning media that are intriguing, applicable, and relevant to the capital market. This innovation was developed by PBL students at Batam State Polytechnic (Polibatam) through a practical medium called Stock Rising, a stock investment simulation game.

This study focuses on two main questions, on how was Stock Rising developed into an interactive stock market investment game and how can Stock Rising be used as an investment simulation tool to support learning in vocational schools. Additionally, to empirically address the question, testing is required to evaluate the media's effectiveness by comparing students' comprehension before and after utilizing Stock Rising. Therefore, this study also examines the difference in the financial literacy level of vocational students before and after being given simulation-based learning using the Stock Rising media.

2. Method

This study employs a Research and Development (R&D) methodology, utilizing the ADDIE development model established [14]. The research design consists of 5 stages, which are further detailed in the figure 1.

There were 50 participants in this study, all of whom were students at MHS Vocational School and agreed to participate in the entire series of activities from start to finish. Participants were selected based on the following criteria: 1) Students majoring in Accounting and Business 2) Have taken Economics, Finance, or Basic Accounting classes. These criteria were based on the

assumption that participants have basic knowledge and understanding of the capital market and investment training that will be followed 3) Have participated in at least one coaching and socialization session with the Investment Gallery Team and the Indonesia Stock Exchange.

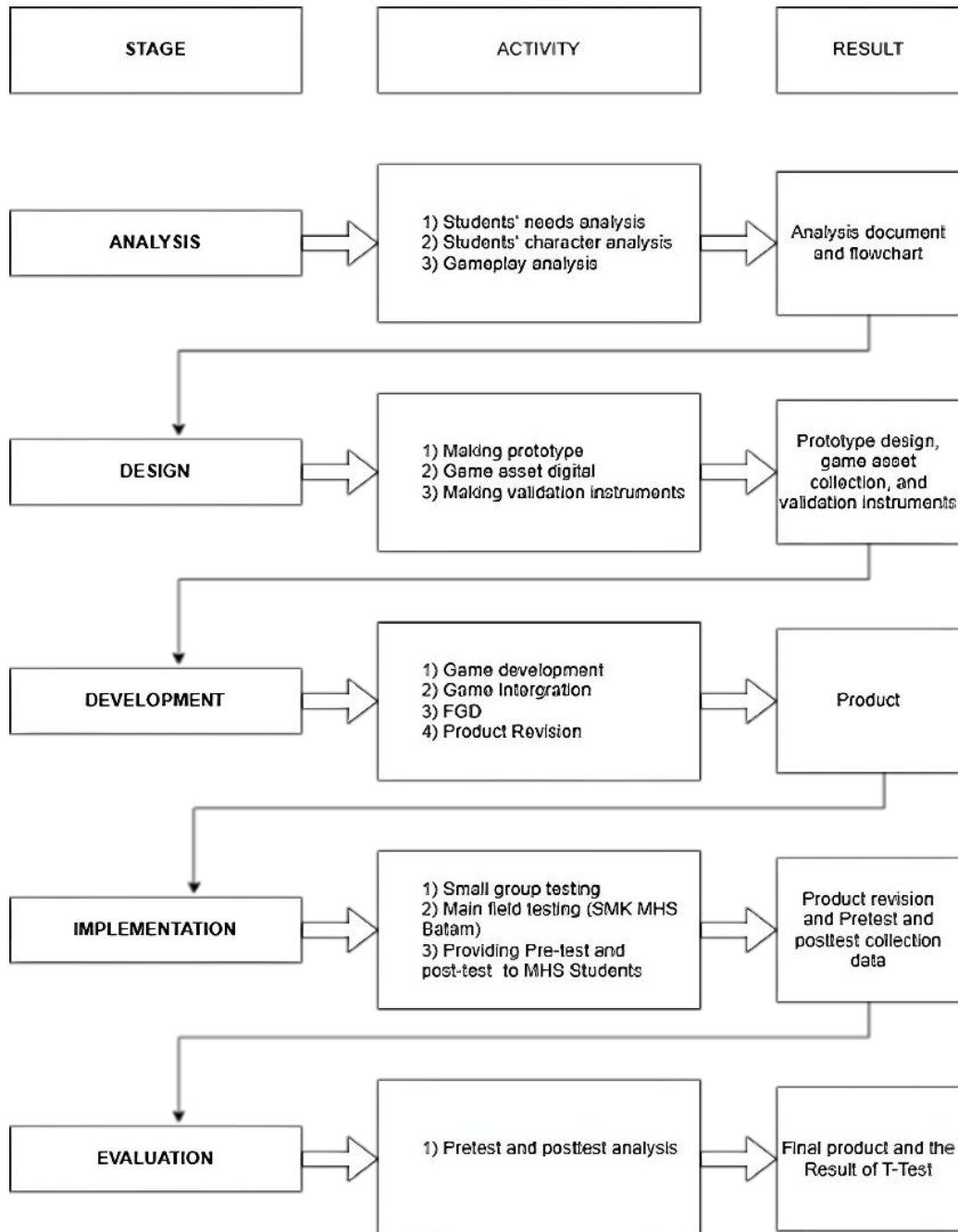


Figure 1. ADDIE Flow Chart Model

For the 50 students, an initial socialization was conducted, followed by a pre-test, then a trial run of the game and a final evaluation in the form of a post-test. During the trial run, the students were divided into groups of five. Each member of the group competed with one another to build the best investment portfolio. The victors from each group subsequently contended in the final round to ascertain the first, second, and third place winners.

The data collection techniques used were literature study, feasibility feedback, pre-test, and post-test. The main data used was secondary data in the form of a literature study on investment and capital market materials. The literature used was material on types of stocks, stock sectors, factors causing stock price fluctuations, stock calculations, and others. This study also collected data in the form of feasibility feedback from experts to test the feasibility of the game developed. This feasibility feedback was obtained from the results of FGDs with academics, stock exchanges, and securities. The feasibility feedback was assessed using a Likert scale has a range of 1 to 5, where 5 represents Strongly Agree (SS), 4 represents Agree (S), 3 represents Neutral, 2 represents Disagree (TS), and 1 represents Strongly Disagree (STS).

The calculation formula used is as follows [16]:

$$p = \frac{x}{x_i} \times 100\%$$

p = Percentage of validity

x = Assessment score for a single item

x_i = Optimal assessment score for a single item

A game is considered feasible if it obtains an average score above 81%. This is in accordance with the score interpretation standards as follows [17]:

Table 1. Score Interpretation Standards

Percentage (%)	Criteria
81-100	Excellent
61-80	Good
41-60	Sufficient
21-40	Poor
0-20	Not Very Good

After the game was validated and ready to play, the game was applied to the participants. To address the second question and evaluate the game's impact on students' financial literacy, a pretest was administered prior to implementation and a posttest subsequent to implementation. Both tests used the same 20 questions modified from research [18] covering capital market schemes and actors, investment activities, public companies, investment instruments, and the financial world.

The results were then compared using a t-test to prove the formulated hypothesis, whether there was indeed a change in students' financial literacy before and after being given the Stock Rising game. This approach to testing the difference in students' literacy levels has also been done by research on financial questions [19].

3. Results and Discussion

Education is one strategic sector that plays an important role in the social and economic development of a nation [20]. Beyond producing competent individuals, education drives transformation at the individual, social, and environmental levels [21]. Developed countries such as China, Japan, and Finland have prioritized education in their national development agendas, recognizing that the quality of education is directly proportional to economic growth, social welfare, and national stability [22-23].

Indonesia has similarly positioned education as a key pillar in achieving its Indonesia Emas 2045 vision, which aims to produce a productive, creative, and independent generation, partly through vocational education. Despite the rapid

In parallel with these findings, observations revealed that students were already highly familiar with using digital devices such as smartphones and computers as their primary tools for completing assignments, quizzes, and daily learning activities. This condition suggested that integrating digital-based learning media would be both relevant and effective, as it aligns with students' learning habits and technological readiness.

The team determined that a game-based learning approach would effectively bridge the gap between theoretical knowledge and practical experience. The game was designed to simulate capital market activities and introduce essential investment principles in an engaging and contextual way. The learning framework was structured based on real-world investment practices, including: (1) Corporate actions that can increase and decrease stock prices, such as: stock issuance, *buybacks*, economic recession, product expansion, foreign investment, and so on. (2) Common situations that occur during stock trading, such as *trade fees*, *insider trading*, *tender offers*, and so on. (3) The stock transaction process, starting from queuing to purchase shares until eventually deciding to sell or hold shares in accordance with the investment strategy.

Design Stage. At the design stage, the results of the previous analysis as the foundation for developing a structured and goal-oriented game concept. This stage emphasized the balance between educational value and entertainment (*playability*), while also taking into account the interests, learning styles, and characteristics of vocational students, who tend to be more engaged in

interactive, competitive, and experiential learning activities. The game mechanics were developed by adapting elements from several popular board games such as *Monopoly*, *Snakes and Ladders*, *Ludo*, and *Line Let's Get Rich*, but modified to represent the dynamics of stock investment in a simplified and contextual manner.

Based on figure 2, the results on design of the flow of the stock rising start from the bidding, sale, rumor, to resolution and dividend distribution phases. Each phase reflects processes in the real capital market, such as investment decision-making, the influence of market information, and evaluation of company performance, which are overall designed to enhance students' understanding of stock investment mechanisms in an interactive and structured manner. Players move around the board while making financial decisions that mirror real investment situations, such as buying or selling stocks, assessing potential risks, and adjusting strategies based on market fluctuations simulated through event cards.

Each component of the game was carefully designed to support the learning objectives of financial literacy, particularly in understanding risk management, investment strategies, and capital market dynamics. Visual elements such as the game board, company symbols, and event cards were presented using clear and accessible language to ensure comprehension among students. Furthermore, turn-based mechanics and interactive challenges were incorporated to promote collaboration, foster healthy competition, and enhance student engagement throughout the learning process.

Table 2. Validation Test Results

Test Subject	Validity Results	Qualification
Relevance of Material	85%	Very good
Game Design	89%	Very good
Language	92%	Very good
Total	87%	Very good

Development Stage. The development process involves refining elements within the game, such as the gameplay flow, interactive features, and the integration of educational content about investing. In addition, validation testing was conducted through Focus Group Discussions (FGD) with experts, consisting of 2 stock exchange members, 3 securities parties, and vocational accounting teachers. The FGD aimed to evaluate the suitability of the game with real investment practices and ensure that the game content was educational and relevant to financial market conditions.

During the discussion, several screenshots of the *Stock Rising* interface were presented to the experts, including the main game board, event cards, and stock transaction simulation screens. These visual representations allowed the experts to assess the clarity of the game's layout, the accuracy of financial concepts, and the appropriateness of terminology used within the interface. Their insights also provided valuable feedback regarding visual consistency, information readability, and the overall learning flow. Based on this input, several revisions were made to improve the interface design and ensure that the learning elements were presented in an engaging and pedagogically sound manner.



Figure 3. Interface game



Figure 4. Bidding Phase



Figure 5. Action Phase



Figure 6. Selling Phase



Figure 7. Resolution Phase



Figure 8. Leaderboard Phase

Following the expert discussion and revision process, each experts filled out a feasibility assessment sheet for the product developed during the design stage. The assessment results showed that the game was in the highly feasible category, with a score of 87%, as listed in Table 2. This score indicates that the main aspects of the *Stock Rising* game, such as content, visual appearance, and game mechanics, meet the feasibility criteria according to the standards used. Moreover, the experts' constructive feedback and recommendations became an essential basis for refining the final version of the product,

ensuring that *Stock Rising* would be both pedagogically effective and practically relevant before being implemented in classroom settings.

Implementation Stage. At this stage, the first trial process was conducted on the combined PBL group of this project to see the level of success of the final product. The aspects tested included understanding of the game instructions, ease of use, and the extent to which the *Stock Rising* game could enhance students' comprehension of capital market concepts. The *Stock Rising* game, which had been validated by experts, was then tested on the main subjects, specifically MHS vocational school students. At this juncture, the researchers executed trials involving 50 participants. Table 3 presents the demographic data of the study participants. The trial phase began with a pre-test to assess the participants' knowledge of the capital market. Next, the participants took part in coaching activities conducted through investment simulation practices using *Stock Rising*.

Table 3. Demographic Data

No	Category	Frequency	Percentage
1	Gender :		
	Male	12	24%
	Female	38	76%
	N	50	100%
2	Age :		
	16	9	18%
	17	29	58%
	18	12	24%
	N	50	100%
3	Class :		
	11	6	12%
	12	44	88%
	N	50	100%

Participants were divided into 10 groups, each consisting of 5 people. Each group member competed to build the best investment portfolio by applying the

knowledge they had acquired during the game. The *Stock Rising* game was designed to resemble real stock investment activities, so that participants could learn to understand market dynamics, analyze stocks, and make investment decisions directly through simulation.

After the gameplay session, one winner was selected from each group, and these winners then competed again to determine the 1st, 2nd, and 3rd place winners. At the end of the activity, participants completed a post-test to assess the improvement in their understanding and knowledge. The pre-test and post-test results were compared to evaluate the game's effectiveness in enhancing the financial literacy of MHS vocational school students.

During the implementation process, several practical challenges were encountered. The first challenge was the limited availability of devices and school facilities, as not all students owned personal laptops, while the number of computers in the laboratory was also limited. This situation required the implementation team to conduct the trials alternately and in groups. Interestingly, this group-based approach had a positive side effect, as it encouraged active collaboration, discussion, and peer learning among the students.

Another challenge involved differences in students' digital literacy levels. Some students, particularly those who were less familiar with computer-based educational games, initially felt hesitant and struggled to navigate the game interface. To address this issue, the research team conducted brief training and demonstration sessions prior to gameplay to ensure that all participants could adapt and understand the rules effectively. Overall, the challenges faced during implementation provided valuable insights for further development. The team gained useful feedback for improving system stability, optimizing trial efficiency, and refining the user interface to make it more accessible for beginner users.

Table 4. Result of Paired T-Test

No	Description	N	Average Score and Difference Test Results		Difference	Sig.
			Before	After		
1	Implementation of Stock Rising	50	58.40	74.00	-25.2	.000

Evaluation Stage. This stage was conducted to evaluate the extent to which the game achieved its learning objectives and to obtain input for further development. Following the comparison of pre-test and post-test results, evaluative data was acquired and displayed in Table 4. The Paired Sample Test results indicated a significant difference between the pre-test and post-test scores, with a significance value of 0.000 (< 0.05). The Paired Sample Test results demonstrated a significant difference between the pre-test and post-test scores, with a significance value of 0.000 (< 0.05). The average pre-test score of 53.60 increased to 79.10 on the post-test, showing an increase of 25.5 points. The findings demonstrate that utilizing Stock Rising as a medium for investment simulation-based learning effectively enhances the financial literacy of vocational students. This study positively influences the enhancement of students' financial literacy via an interactive and practical learning methodology.

This study successfully demonstrates how the development process of Stock Rising has resulted in an effective interactive game for simulating the stock market. The development process, which utilizes the ADDIE model, shows that Stock Rising not only meets the needs of MHS vocational school students in understanding investment theory but also provides them with the opportunity to directly experience the dynamics of the stock market through simulation.

The evaluation results indicate that the implementation of Stock Rising enhances students' learning experiences, which states that direct experience, reflection, and active experimentation are very important in

strengthening students' understanding of learning materials. In this case, students not only learn stock market theory, but they can also feel how the investment decisions they make have a direct impact on the results of the game. These findings also answer another research question, on how Stock Rising can function as a simulation tool that supports learning in vocational schools, as well as emphasizing the importance of learning media that connects theory with real-world experience.

Stock Rising promotes student engagement in the learning process by fostering a dynamic and interactive educational environment. This game not only teaches stock market theory in theory, but also invites students to be directly involved in making investment decisions. In line with the Game-Based Learning (GBL) approach, which utilizes students' active involvement in the game and success in game challenges contributes to an increase in material understanding and better mental model construction.

Through direct experience in this game, students can understand how each decision they make affects the outcome, giving them the opportunity to learn from their mistakes and try new strategies. In addition, this approach also supports the collaborative principle which states that the use of games encourages students to discuss, collaborate, and exchange ideas with each other, so that knowledge is built socially [28].

In this case, Stock Rising serves as a learning medium that is not only visually appealing and interactive but also effective in honing students' decision-making skills, just like an investor faced with stock market conditions that resemble real-life situations.

The study's results indicate a substantial disparity between students' pre-test and post-test scores after using Stock Rising in learning. These results were obtained through statistical analysis using a paired sample t-test, which showed a p-value < 0.05 , meaning that there was an increase in students' understanding of investment concepts.

This substantiates the hypothesis that game-based learning media can positively influence student learning outcomes. These findings further reinforce the view that educational games such as Stock Rising are not just entertainment but also effective learning tools, especially in the context of vocational education. In addition, these results make an important contribution to the literature on the effectiveness of game-based learning media, which can be used as a reference for further research in the development of interactive media for various fields of study. These findings also advance the fourth Sustainable Development Goal (SDG), which aims to ensure inclusive and quality education while promoting lifelong learning opportunities for all. By providing learning media that is engaging, contextual, and applicable, Stock Rising is an innovation that promotes financial literacy and strengthens the skills of vocational students.

4. Conclusions

This study developed Stock Rising, a web-based game that serves as a simulation medium for learning about the capital market. It is designed for vocational high school students who do not have direct access to the capital market. This game was effectively developed and tested on students at MHS Vocational High School utilizing the ADDIE model approach (analysis, design, development, implementation, and evaluation). The results of the study show that Stock Rising is able to improve financial literacy and students' understanding of basic investment concepts and capital market mechanisms among vocational high school students. The findings show that students become more actively involved, think

critically in decision-making, and are able to understand market dynamics contextually, in accordance with the principles of experience-based learning and game-based learning.

Through the development of the Stock Rising educational game, this research not only helps overcome the problem of limited investment learning media but also helps improve the financial literacy of vocational students. This game was created not only as entertainment for students but also as a learning tool that can help students understand complex investment concepts through an interactive and contextual approach. It is expected that Stock Rising can serve as an alternative educational resource that can help students gain a basic understanding of the capital market and develop the ability to make smart financial decisions from an early age.

This study possesses limitations. The implementation occurred solely in one vocational high school, thus the results cannot be generalized to other contexts with varying student demographics or institutional settings. Second, the game content remains limited to basic investment principles and does not yet include more advanced financial topics such as taxation, portfolio diversification, or technical analysis. Despite these limitations, Stock Rising demonstrates substantial potential for replication and further development. Its web-based structure and modular design allow for adaptation in other vocational schools, particularly those with business and management programs that face similar challenges, namely, limited access to market practice and a lack of interactive media for teaching financial literacy. The core mechanisms of game decision-making, resource allocation, and risk management are universal concepts that can be modified and applied to various financial education contexts. For instance, the game framework can be adapted into simulations of personal financial management, where players manage virtual income, savings, and investments according to financial goals, or into entrepreneurship simulations, where players act as business owners allocating capital to

multiple projects with varying levels of risk and potential return. Another adaptation could involve banking or credit management scenarios, allowing players to understand interest systems, loan management, and default risks. These modifications would maintain the experiential and decision-based learning principles while expanding the educational coverage beyond the capital market context.

Future research should not only focus on testing Stock Rising in different vocational schools but also on developing diversified content and gameplay mechanisms, turning *Stock Rising* into a *modular financial simulation framework* that can support various financial literacy topics. Further improvements may include refining the visual interface, incorporating adaptive difficulty levels, and adding automated feedback systems to enhance learning assessment and engagement. In the long term, the ongoing replication and advancement of Stock Rising are anticipated to facilitate the attainment of Sustainable Development Goal (SDG) 4, which aims to ensure inclusive, equitable, and quality education through accessible, interactive means, and contextually relevant financial learning experiences for vocational students in the digital era.

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