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The Use Virtual Trading Simulation in Teaching Stock Market: A Quasi-Experimental Method

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Abstract

This study explores the effectiveness of virtual stock trading simulations in enhancing financial literacy among high school students. A quasi-experimental design was used involving 61 students (29 male and 32 female) from SMAIT As-Syifa Boarding School Wanareja Subang. The students participated in virtual trading simulations via the Stockbit platform with financial literacy measured through pre- and post-tests. The results showed significant improvements in both groups with male students' post-test scores rising from 9.28 to 13.21 and female students' from 8.97 to 11.13. Paired t-tests confirmed that these gains were statistically significant ($p < 0.001$). While the findings indicate that virtual simulations are an effective tool for teaching stock market concepts, the limitations of this study, including the small sample size and specific educational setting, suggest the need for further research. Future studies should explore more diverse educational contexts and the long-term effects of such interventions. This study underscores the value of integrating technology into educational curricula to bridge the gap between theoretical knowledge and practical financial skills, highlighting the importance of educator training and support from policymakers to implement these simulations effectively.

Keywords: *virtual trading, financial literacy, stock market, high school students*

Introduction

The Financial Literacy Around The World Report based on The S&P Global FinLit Survey (2014) highlights that low-income countries generally have lower levels of financial literacy compared to wealthier countries (OJK, 2024). In Indonesia, the Financial Fitness Index is 37.72, significantly lower than Singapore's score of 61. This indicates that Indonesia has a long way to go to achieve better financial well-being. Moreover, only 3% of Indonesians have ventured into more complex investments like mutual funds, stocks, and time deposits etc. (OCBC NISP, 2021)

The same Financial Fitness Index survey reveals that individuals who associate wealth with material assets (e.g., luxury houses, cars) have a lower score of 36.98, whereas those who view wealth in terms of investments (e.g., stocks, bonds, mutual funds) score higher at 42.64, suggesting a healthier financial outlook. When asked where they learned about the idea of wealth as investment, 53% pointed to mass media, 47% to social media, 39% to friends, 29% to family, 14% to financial planners, and only 5% from teachers (OCBC NISP, 2021). This shows that financial literacy, especially concerning stocks, is still minimally taught in schools.

According to OJK (2024), the 2019 National Survey of Financial Literacy and Inclusion (SNLIK) shows that financial literacy levels vary by age group, with the highest literacy found in those aged 26-35, followed by those aged 18-25, 36-50, and over 50. The lowest financial literacy was seen in the 15-17 age group in both 2016 and 2019. The 2022 survey also shows a decline in financial literacy specifically in the capital market, dropping from 4.92% in 2019 to

4.11% in 2022, while other sectors like banking and insurance saw growth. This highlights the need for improving financial literacy, particularly among younger individuals (15-17 years old).

The novelty of this study lies in its focus on using virtual stock trading simulations at the high school level, a topic that has not been thoroughly explored in previous literature. Most prior studies target university students or adults, whereas this study fills that gap by engaging high school students through the Stockbit platform. Additionally, it introduces a gender-based analysis to compare learning outcomes between male and female students, a perspective rarely considered in virtual trading research.

Alsmadi et al., (2022) note that traditional education, focusing heavily on theoretical knowledge, is insufficient to raise students' financial literacy. Understanding and investing in securities are complex tasks requiring the application of financial theories. A simulation-based educational approach can stimulate students' intellectual abilities, making learning more engaging and providing practical experience in financial markets. Nugent & Stoyanov (2019) and Nugraheni et al., (2022) found that students who engaged in virtual trading simulations performed better academically, and learning became more interesting.

Recent studies have shown the value of using virtual trading simulations in financial education. Nugraheni et al., (2022) found that over 50% of students found virtual trading platforms useful and easy to use, which increased their engagement. Similarly, Murti et al., (2021) reported that virtual accounts helped novice investors better understand stock transactions. Rahayu et al., (2021), also successfully used interactive simulations to teach high school students about stock markets. However, Sitinjak (2015) pointed out that behavioral biases, such as the disposition effect, still influenced investors' decisions, even when simulations were used, indicating that addressing cognitive biases is a challenge.

This study seeks to answer whether virtual stock trading simulations can improve financial literacy among high school students, if combining simulations with basic investment education is more effective in improving learning outcomes, and how factors such as prior knowledge, technology use, and simulation guidance impact these outcomes. The study aims to increase financial literacy through virtual trading, develop an effective learning approach that combines simulations with investment education, and identify key factors that influence student learning in this context.

Another innovative aspect of this study is the use of real-time virtual trading alongside pre- and post-tests to directly measure the impact of the simulations on students' understanding of stock markets, investment strategies, and financial decision-making. This approach combines technology-based learning with empirical assessment, providing valuable insights into how experiential learning can enhance financial literacy at the high school level.

Method

This study used a quasi-experimental design with two experimental groups to examine the effectiveness of virtual stock trading simulations in improving financial literacy among high school students. Both male and female students from SMAIT As-Syifa Boarding School Wanareja Subang participated in these simulations using the Stockbit platform (https://stockbit.com). The teaching sessions totaled 180 minutes, divided into two 90-minute sessions per week. Stockbit is an online platform that enables users to simulate real-time stock trading, providing students with a hands-on, interactive learning experience that replicates real stock market conditions.

Pre-test and post-test assessments were used to measure students' financial literacy levels before and after the simulation sessions. A paired t-test was performed to compare the pre-test

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and post-test results for each group (male and female) to determine if there was a significant improvement in financial literacy after participating in the virtual stock trading simulation.

A control group was not included in this study due to the specific focus on comparing learning outcomes between male and female students. The primary goal was to explore potential gender-based differences in financial literacy improvements following the same intervention. While a control group could have provided an additional layer of comparison, the quasi-experimental design allowed us to directly assess the impact of the intervention on each gender group and identify variations in their learning outcomes. Future studies could expand on this research by incorporating a control group to further strengthen the validity of the findings and offer a broader comparison between students exposed to virtual simulations and those who are not.

Purposive sampling was used to select 61 eleventh-grade students (29 male and 32 female) enrolled in economics, ensuring that participants had a basic understanding of financial markets. Data collection was conducted through pre- and post-tests that assessed students' knowledge of stock markets, investment strategies, and financial decision-making. The results from the paired t-tests were analyzed to evaluate the effectiveness of the virtual trading simulations in enhancing financial literacy for both male and female students.

Results

This study aimed to assess the effectiveness of using a virtual trading simulation to enhance students' understanding of the stock market in both boys' and girls' classes. Based on analysis, a significant increase was observed in the average pre-test and post-test scores for both groups. In the boys' class, the mean pre-test score was 9.28 (SD = 2.52) with a sample size of 29 students, while the mean post-test score increased to 13.21 (SD = 1.64). This increase reflects a substantial improvement in students' understanding following the intervention.

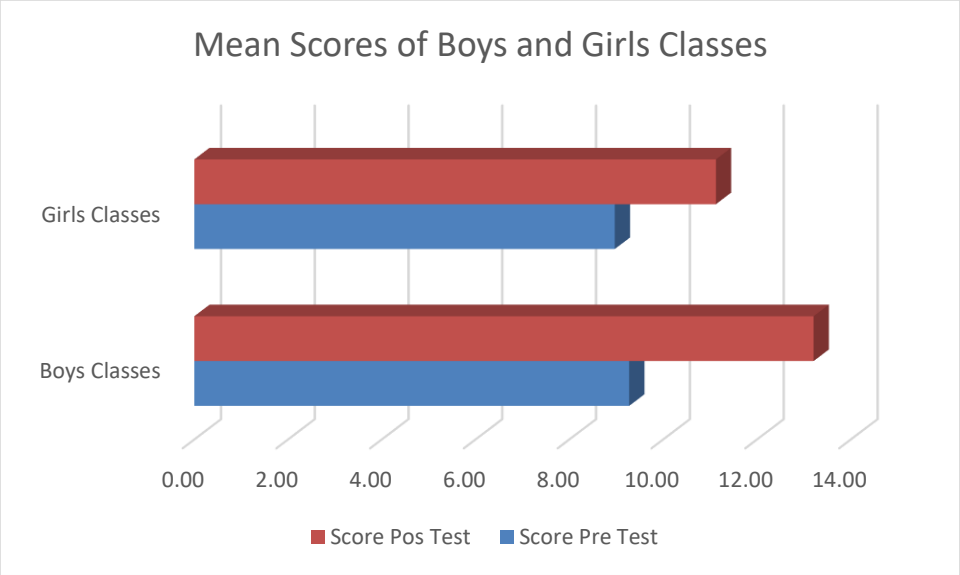


Figure 1. Mean Scores of Boys and Girls Classes

The paired t-test for the boys' class yielded a t-value of -10.687 with 28 degrees of freedom. The p-value (Sig. 2-tailed) was <0.001, indicating that the difference between pre-test and post-test scores is statistically significant. These results suggest that the virtual trading simulation effectively enhanced the boys' understanding of stock market concepts and dynamics.

In the girls' class, the mean pre-test score was 8.97 (SD = 2.39) with a sample size of 32 students, and the mean post-test score increased to 11.13 (SD = 1.45) after the intervention. The paired t-test resulted in a t-value of -7.883 with 31 degrees of freedom, and a p-value (Sig. 2-tailed) of <0.001. This demonstrates a statistically significant difference between the pre-test and post-test scores, indicating that the virtual trading simulation had a positive and significant impact on the girls' understanding of stock market concepts.

Overall, the results of this study confirm that the use of virtual trading simulations is an effective tool for improving students' knowledge of the stock market in both boys' and girls' classes. The large effect sizes, with Cohen's d values of -1.958 for the boys and -1.377 for the girls, further support the conclusion that the simulation had a significant impact. These findings provide a strong basis for the broader implementation of simulation-based approaches in education related to stock markets and investment strategies.

Discussion

This study aimed to assess the effectiveness of virtual trading simulations in enhancing students' understanding of stock markets in both boys' and girls' classes. The paired t-test results showed significant improvements in post-test scores for both groups, confirming that the simulations were successful. The substantial rise in average scores suggests that students gained a better grasp of financial concepts through this interactive learning method.

Compared to earlier research, such as Moffit et al., (2010) and Pichop (2024), this study emphasizes the benefits of integrating simulations into the curriculum to boost financial literacy and investment skills among business students. Similarly, Pierce (2022) suggests that stock-trading simulations can indirectly improve learning in other subjects, such as management and strategy, by encouraging students to analyze corporate managers' decision-making.

The study has practical and theoretical implications. Practically, it indicates that incorporating virtual trading simulations in school curricula can improve financial literacy, particularly in areas like stock market knowledge that are often overlooked. Theoretically, the research supports the idea that experiential learning tools are effective in bridging the gap between theory and practice in financial education.

Modern education must incorporate technology into its methods. As Jain & Aggarwal (2023) explain, virtual trading allows students to learn about investing without the risk of losing real money. It helps them refine their skills and strategies before entering the actual stock market. Additionally, (Harter & Harter, 2010) suggest that using technology in education enhances student performance in financial literacy assessments.

However, the study has some limitations. The sample size, though representative, was limited to a specific educational setting, which may affect the broader applicability of the findings. Furthermore, the study did not assess long-term retention of knowledge or consider external factors, such as socio-economic background, which could influence the results.

Future research should involve larger, more diverse groups and examine the long-term impact of such interventions on financial literacy. It would also be beneficial to investigate the effectiveness of virtual trading simulations in different educational contexts, including rural and suburban schools. This could provide insights into how varying socio-economic factors and access to technology influence the outcomes of such educational programs. Addressing these gaps will help ensure that the findings can be generalized to a wider range of educational settings, ultimately enhancing financial literacy for students across different demographics.

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Conclusion

This study demonstrates that virtual trading simulations can significantly enhance students' understanding of stock markets and financial concepts. These findings emphasize the importance of integrating such simulations into the educational curriculum to promote financial literacy among both male and female students.

To effectively implement this, educators can start by incorporating virtual trading simulations into economics courses at schools. By utilizing existing platforms like Stockbit, teachers can provide students with hands-on experiences that allow them to learn about investments and financial strategies in a safe environment.

Support from policymakers is also crucial. They should develop policies that encourage the use of technology in education, including providing funding and resources for teacher training in utilizing trading simulation tools. Furthermore, the integration of technology into school curricula should be backed by adequate infrastructure, especially in areas with limited internet access.

Specific actions that can be taken include organizing workshops for educators to share best practices and strategies for using trading simulations, as well as conducting follow-up studies that explore the long-term impacts of these simulations on students' financial literacy. Future research could also include studies on how various factors, such as students' socio-economic backgrounds and access to technology, influence the effectiveness of simulation-based financial literacy programs.

By taking these steps, we can further enhance financial understanding among the younger generation and equip them with the skills necessary to make informed financial decisions in the future.

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