The Effectiveness of Using a Pocket Book of Mathematics Economics and Finance to Improve Students' Numeracy Skills

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ABSTRACT

This study aims to investigate how effectively a pocket book can be used as a teaching tool to improve students' numeracy skills in the Mathematics of Economics and Finance course. A quantitative method was used. A saturated sampling procedure was used to select 28 students. A correlation test and a comparative paired sample t-test were used to analyse the data. According to the findings, students' average pre-test score was 77.54, while their average post-test score increased to 93.39. The statistical tests revealed a significant difference in scores before and after the pocketbook was introduced, with a significance value (Sig. 2-tailed) of 0.000 (< 0.05). Furthermore, the use of pocketbooks and the development of students' numeracy skills were found to be moderately positively correlated, with a correlation coefficient of 0.455. It can therefore be concluded that the pocket book of Economic and Financial Mathematics is an effective teaching aid for improving students' numeracy skills.

Keywords: Pocketbook, Economic and Financial Mathematics, Numeracy Skills

INTRODUCTION

The Indonesian government organised a national exam in 2021 which for the first time included a minimum competency evaluation, to measure the level of literacy, numeracy and character skills resulting from educational the learning process in institutions (Rohim et al., 2021). Since then, numeracy has received much attention in educational circles and is now considered as one of the fundamental abilities that Indonesian students must have (Melissa & Kristanto, 2024). The ability to evaluate data, present it in some visual formats such as graphs, tables, or diagrams, and interpret the findings to make decisions and predictions is known as numeracy (Faisal & Adi, 2023). Numeracy is a basic skill that is very important for the application of financial mathematics. economic and Numeracy skills are very important for every community from various circles, one of which is students.

The ability to apply mathematical ideas to practical contexts and utilise mathematical reasoning to understand and explain events is known as numeracy (Maemanah & Saleh, 2022). As well as solving mathematical problems methodically, numerate people can apply mathematical ideas to real-world scenarios (Christina & Nindiasari, 2022). Given that students' ability to solve various

contextual problems in everyday life is still relatively low, improving their numeracy skills is crucial (Simanora & Akhiruddin, 2022). In order to master complex mathematical calculations, students must first grasp the fundamentals of mathematical knowledge. (Pakpahan et al., 2023). In an increasingly complex world, students need to understand mathematical concepts in order to grasp the various analyses and decisions within the scope of economics and finance. However, many students still struggle to understand the application of mathematical concepts in economics and finance.

Students' numeracy skills play an important role in the study of economic and financial mathematics, helping them to understand concepts in depth, explain the problemsolving process logically and communicate the results of analyses clearly. Mathematics learning is a process of achieving set learning objectives, and these objectives can optimally achieved by be applying appropriate mathematics learning management (Malikah et al., 2022). Mathematics is one of the disciplines taught in formal education and is important for achieving the country's educational goals and encouraging the growth of smart, creative and hardworking Indonesian people (Daimah & Suparni, 2023). Mathematics is essentially a basic science that can be applied in various fields and is often described as a science that is applied in everyday life, including in the economic field, such as matrix science (Permata et al., 2022). Meanwhile, economic and financial mathematics is part of applied mathematics which is rooted in pure mathematics as the parent of various branches of science, one of the basic concepts in economics is demand and supply (Kriswana et al., 2025).

Learning economic and financial mathematics at university level is often considered complicated and difficult to master. One of the challenges of learning mathematics is its role as a parent science and a reflection of 21st-century learning. This learning is expected to contribute to the comprehensive and sustainable development of human resources and character building in order to face global competition (Indrawati, 2023). The importance of mathematics as a basic science is evident from the high demand for mathematical skills, particularly in addressing the challenges of the 21st century (Putri et al., 2022).

Mathematics is often considered one of the biggest challenges in higher education, particularly for university students. The course requires logical and analytical skills, as well as the ability to understand and apply abstract and complex mathematical symbols and formulas (Asri et al., 2024). Many students struggle to understand how mathematical theories are applied in economics and finance due to their low numeracy skills. Therefore, a new, more practical approach is needed to help students overcome this challenge.

One step educators can take to improve students' numeracy skills is to prepare a pocket book to support the learning process. Designed as a compact and practical learning resource, a pocket book can effectively help students to understand economic and financial mathematical concepts. Its small size allows students to learn the material quickly and efficiently anytime, anywhere. The material in this pocket book is neatly structured so that students can easily follow the discussion, from basic concepts to more complex topics. In addition, the book contains reallife examples relevant to the worlds of economics and finance. This makes it easier for students to understand and apply mathematics in a more practical and contextual way in their studies.

Many economics and finance textbooks focus too much on theory and are too long, making it difficult for students to quickly grasp the core material. Concise pocketbooks can simplify complex learning materials by presenting mathematical concepts in a simpler, more accessible form. While pocketbooks have the potential to improve students' numeracy skills, research

examining their effectiveness in economic and financial mathematics education is lacking. In-depth research into how pocketbooks influence the understanding and application of mathematics in economics and finance is still very limited.

Most existing handbooks focus on basic mathematical theories without linking them to practical applications in economics and finance. Therefore, research examining the development of pocketbooks that simplify theory and relate it to relevant economic and financial situations and problems is needed. Textbooks on economic and financial mathematics are generally more theoretical and do not provide the practical solutions that students need to understand mathematical applications. A pocketbook focusing on direct application could provide students with more practical guidance on overcoming the numerical problems they encounter in their assignments and studies.

Previous research shows that using appropriate learning materials can increase student engagement and understanding of the subject. A practical, easy-to-carry pocket book can be an effective medium for improving students' numeracy skills because students can access and utilise it anytime, anywhere. Although pocket books have been widely used in other fields of education, research examining their effectiveness in improving numeracy skills in economics and finance is minimal. This indicates a gap in the literature that needs to be filled, enabling this research to contribute significantly the development to of pocketbook-based teaching materials in economic education.

The aim of this research is to develop an economic and financial mathematics handbook that can effectively and practically improve students' numeracy skills. By addressing the gaps in economic mathematics education, the research will produce teaching materials that simplify the subject and provide direct applications relevant to the economic and financial problems students face. Researchers are interested in conducting research on **THE**

EFFECTIVENESS OF USING A POCKET BOOK OF MATHEMATICS ECONOMICS AND FINANCE TO IMPROVE STUDENTS' NUMERACY SKILLS.

LITERATURE REVIEW

1. Pocketbook

Pocket books serve as one-way information delivery tools that can help students to develop their capacity for independent learning. These compact books contain useful information and are easy to carry around, enabling students to access content anytime and anywhere (Azhari & Oktavinora, 2024). Mathematics plays an important role in meeting practical needs and helping students solve everyday problems by enabling them to calculate, collect, process and present data. Learning mathematics can also increase students' knowledge because this discipline fosters structured thinking patterns that benefit them (Sari et al., 2023).

Based on the theoretical study of pocket books, it can be concluded that they are effective and practical tools for conveying information concisely and compactly. Their compact size makes them easy to carry and use in various situations. They play an important role in facilitating quick access to necessary information in contexts such as work and daily learning. life. With structured content focused on the core of the material, pocket books allow readers to acquire knowledge efficiently, bypassing the need for larger, more complex sources of information. Therefore, pocket books can be a very useful learning medium for improving understanding and skills. especially for those who need quick, practical references.

2. Economic Mathematics

Mathematics is a science that focuses on numbers and is closely related to economics because many economic processes involve calculations. Thanks to its ability to provide effective models and analyses to help us understand complex

economic and business phenomena, mathematics is a very important branch of science in economics and business (Latifah & Abdullah, 2023). Learning mathematics involves connecting existing knowledge knowledge; with new mathematical material is interrelated between units, so the ability to connect these is important for solving mathematical problems (Hidayati et al., 2022). Mathematics is a dynamic and flexible science. and as economic mathematics has developed in society, it has become useful not only for solving economic problems, but also for analysing social problems and needs (Agatha et al., 2024). Mastering mathematical economics can improve performance in economic subjects and build a solid foundation for a career in economics, finance or related fields (Sugianto, 2024).

theoretical study of mathematical A economics suggests that it is a valuable tool for analysing and solving economic problems. Using mathematical concepts such as calculus, algebra and statistics enables more precise and efficient decisionmaking in various economic sectors. These include the calculation of costs and revenues, market analysis, optimisation and other economic models that are useful for planning economic and business policies. Mathematical economics also helps to model the relationship between economic variables, thus providing a clearer picture of economic dynamics. Therefore, understanding and applying mathematical economics is crucial for data-driven, analytical economic decision-making and contribute to overall economic can efficiency and stability.

3. Financial Mathematics

Financial mathematics is used as a tool in various economic activities, including buving and processes, loans. selling interest instalments and calculations, among others (Nadeak et al., 2024). It is to solve financial problems. used particularly in banking, insurance and the corporate sector, and covers important

topics such interest calculation. as amortisation, the time value of money, profit and loss analysis and cash flow management (Setiawan & Mulindar, 2024). Based on the theoretical review of financial mathematics, it can be concluded that it plays a very important role in the management and analysis of financial matters in personal, corporate and financial market contexts. Using mathematical tools such as calculus, algebra and probability theory enables more accurate calculations to be made regarding the time value of money, risk and investment returns. These calculations are used to optimise financial decisions relating to asset pricing, portfolio management, retirement planning, and debt loan management. By applying and mathematics, individuals financial and companies can make more rational and efficient financial decisions, thereby promoting economic stability and growth. Therefore, a good understanding of financial mathematics is essential for data-driven, decision-making insightful in an increasingly complex financial world.

4. Numeracy Skills

Numeracy skills are the ability to understand. apply and construct mathematics in various contexts. This includes the capacity for logical reasoning, as well as utilising concepts, methods and facts to describe, explain or estimate phenomena or events (Maemanah & Saleh, 2022). Another way to define numeracy skills is the ability to evaluate data and use mathematical calculations in the real world to solve problems (Faisal & Adi, 2023). Understanding and drawing conclusions from mathematical problems in various contexts is also a form of numeracy. This includes the capacity for methodical reasoning, using concepts and procedures to explain or estimate phenomena or events, and interpreting analysis results to inform decision-making (Christina & Nindiasari, 2022). The ability to understand and apply mathematics to solve problems in different situations, as well as communicate

mathematical concepts to others, is also a form numeracy (Muhtarom of & Nizaruddin. 2022). There are three indicators of numeracy skills: 1) solving problems in various real-world situations involving different numbers and symbols related to basic arithmetic; 2) evaluating data presented in various formats; and 3) interpreting analysis findings to draw conclusions (Kurniawan et al., 2025).

Based on theoretical research into this subject, it can be concluded that numeracy is a fundamental talent that enables humans to overcome the difficulties of daily life. The ability to evaluate, understand, and solve problems using mathematical concepts in various situations is an aspect of Additionally, numeracy. systematic mathematical thinking, data interpretation and the ability to forecast and make decisions based on analytical findings are components of numeracy. Therefore, developing numeracy skills is important in equipping individuals, especially students, skills needed to face with the an increasingly complex and challenging world and contribute to the development of human resources in the era of globalisation.

MATERIALS & METHODS

This study takes a quantitative approach with a quasi-experimental design to determine the effectiveness of pocket books in improving numeracy skills in Economics and Finance Mathematics courses. Although this design includes a control group, it is not vet fully capable of controlling external factors that could affect the experiment's implementation (Sugiyono, 2022). The pretest-posttest design involves students taking a test before and after receiving the intervention of using a pocket book as a learning aid. The research instrument was a numeracy test prepared based on numeracy skill indicators. This test was administered before and after the intervention to measure changes in students' numeracy skills.

All students who took Mathematics of Economics and Finance courses during the second semester of the 2024/25 academic

the Economics Education year on programme at Universitas Nusantara PGRI Kediri formed the population for this study. The population is the group chosen by researchers for investigation and on which conclusions are drawn. It consists of objects with individuals or certain characteristics (Sugiyono, 2022). A sample is a subset of the population that represents its characteristics (Sugiyono, 2022). As the population is relatively small and all its members can be reached, a saturated sample was used, whereby all members of the population were used as research samples.

The data analysis technique used was a paired sample t-test, performed using SPSS software. This test aims to determine whether there is a significant difference between students' pre- and post-test scores after using pocket books as a learning resource. The significance level used is 0.05. If the significance value (Sig. 2-tailed) is less than 0.05, it can be concluded that using pocket books significantly improves students' numeracy skills.

RESULT

The following are the results of the data analysis on the effectiveness of using Mathematics of Economics and Finance pocketbooks to improve student numeracy skill.

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Tes	Pre-Test	Post-Test				
Lowest Score	70	75				
Highest Score	85	100				
Average	77,54	93,39				
Number of Student	28	28				

Table 1. Student Numeracy Results

The results showed an increase in academic achievement among students after they were given learning interventions. Based on the pre-test results, the lowest and highest scores obtained by students were 70 and 85 respectively, with an average of 77.54. After the intervention, the post-test results showed a significant increase, with the lowest score rising to 75 and the highest reaching 100. The average post-test score also increased

sharply, reaching 93.39. Twenty-eight students took part in both tests.

Paired Samples Statistics							
		Mean	Ν	Std. Deviation	Std. Error Mean		
Pair 1	Pre Test	77,54	28	3,666	,693		
	Post Test	93,39	28	5,846	1,105		

Table 2. Comparison of Pre-Test and Post-Test Results

The results showed a significant improvement in students' abilities after they were given treatment in the form of certain media or learning methods. The average pretest score was 77.54, while the posttest score increased to 93.39. This difference reflects an improvement in students' understanding of the provided material. A comparative analysis of the pre- and posttest results indicates that the intervention positively impacted the achievement of learning outcomes. The increase in scores indicates improvement in students' conceptual knowledge and application skills. Thus, these results support the assumption that this learning approach is effective in improving student learning outcomes.

Table 3. Correlation Level between Variables

Paired Samples Correlations						
		Ν	Correlation	Sig.		
Pair	Pre Test & Post	28	,455	,015		
1	Test					

The results of the statistical analysis show that there is a positive relationship between the studied variables, with a correlation coefficient of 0.455 (45.5%). This indicates that the relationship between the two variables is medium. This means that changes in one variable tend to be followed by unidirectional changes in the other, albeit not particularly strong ones. Therefore, it can be concluded that the independent variable significantly contributes to the dependent variable in the context of this study. Although the correlation is not high, the results still show that the intervention or treatment provided is relevant to improving the measured outcomes, such as numeracy, critical thinking and other learning outcomes. Strengthening the intervention and controlling for other influencing factors in future may increase the strength of the relationship.

Table 4.	Significance	Levels	of Pre-Test	t and Post-Test

Paired Samples Test									
Paired Differences						t	df	Sig. (2-	
		Mean	Std. Deviation	Std. Error	95% Confidence Interval				tailed)
			Deviation	Mean	Lower	Upper			
Pair	Pre Test -	-15,857	5,303	1,002	-17,914	-13,801	-15,821	27	,000
1	Post Test								

The results of data analysis using the comparative test show that the significance value (Sig. 2-tailed) is 0.000, which is clearly smaller than the significance level of 0.05. This finding indicates that there is a statistically significant difference between the data before and after the treatment or intervention. In other words, the

intervention applied in the study, such as the use of certain textbooks or learning media, has a real effect on improving the abilities under study, both in the aspects of numeracy, critical thinking, and other learning outcomes. These results support the hypothesis that the treatment has a

meaningful impact and can be accounted for statistically.

DISCUSSION

The increase in the mean score, from 77.54 significant to 93.39. indicates a improvement in students' understanding of the taught material. Additionally, the increase in both the lowest and highest scores indicates that the intervention impacted not only students with high abilities, but also those with lower initial abilities. This suggests that the pocket book learning intervention contributed positively improving learning outcomes. to Furthermore, the maximum score increasing to 100 indicates that students can achieve an optimal level of understanding of the material.

The research results in Table 2, which show an increase in the average score from 77.54 in the pretest to 93.39 in the posttest, indicate a significant difference in the use of certain media or learning methods after treatment. This suggests that students experience a real improvement in their understanding of the material when a more directed, interactive or approach-based learning process is implemented. This improvement demonstrates not only the effectiveness in quantitative terms, but also illustrates an improvement in the quality of the learning process, particularly with regard to understanding concepts and their application. This finding aligns with constructivist learning theory, which emphasises the importance of active student involvement in the learning process to enhance understanding and retention of material. The intervention can be considered capable of creating a learning environment that supports deep understanding and stimulates the development of higher-order thinking skills. Therefore, this learning approach is relevant and effective in higher education contexts, particularly in courses that require simultaneous mastery of concepts and applicative skills.

Table 3 shows the results of the statistical analysis, which indicate a positive

relationship between the studied variables, with a correlation coefficient of 0.455 (45.5%). This value falls within the medium correlation category, meaning that changes in one variable are followed bv unidirectional changes in the other. While this relationship is not classified as strong, it is sufficient to demonstrate a significant contribution of the independent variable to dependent variable. This finding the suggests that the intervention or treatment provided is relevant to improving measured outcomes, such as numeracy, critical thinking and other academic achievements. This moderate correlation can be used as a basis for refining the current approach, as well as for developing more effective learning strategies. In future, improving the design of the intervention and controlling other influential variables could strengthen the relationship between the two variables, producing more optimal and significant results.

Data analysis using the comparative test shows that the significance value (Sig. 2tailed) is 0.000, which is much smaller than the significance level of 0.05. This indicates a statistically significant difference between conditions before and after treatment or intervention. This suggests that the treatment used in the pocketbook study has a real influence on improving the measured This significant abilities. difference conclusion strengthens the that the intervention is effective in improving student learning outcomes in terms of numeracy, critical thinking and overall mastery of the material. Thus, these results support the research hypothesis and suggest that this approach to learning can be used as an alternative strategy to improve learning quality in higher education.

CONCLUSION

Based on the results of the study, it can be concluded that using the Economics and Finance Mathematics pocket book effectively improves students' numeracy skills. This is evidenced by the following findings:

- 1. A comparison of pre-test and post-test scores revealed a significant increase in the average student score, rising from 77.54 to 93.39. The highest score increased from 85 to 100 and the lowest from 70 to 75, reflecting an improvement in understanding across the board.
- 2. The correlation test results show a correlation coefficient of 0.455 (45.5%), which is in the moderate range. This indicates a significant positive correlation between using pocket books and improving students' numeracy skills. The more intensive and appropriate the use of pocket books, the greater the improvement in numeracy.
- 3. The results of the comparative test (Paired Samples t-test) show that the significance value (Sig. 2-tailed) = 0.000, which is smaller than the significance level of 0.05. This indicates that there is a significant difference in students' numeracy skills. This indicates a statistically significant difference between the students' numeracy skills before and after the intervention.

Thus, this study concludes that using pocket books as a learning resource significantly improves students' numeracy skills in Economics Finance Mathematics and courses. The positive impact of the intervention can be accounted for academically and statistically. Therefore, this approach deserves to be implemented more widely in higher education learning processes.

Declaration by Authors

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