

## Application of Problem-Based Learning in Business Mathematics

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### Info Artikel

#### Keywords:

Problem-Based Learning,  
Business Mathematics,  
Problem Solving,  
Mathematics Education,  
Financial Analysis

ISSN (print): 1978-6387

ISSN (online): 2623-050X

### Abstract

Problem-based learning (PBL) is an innovative approach that can improve students' problem-solving and critical thinking skills. In the context of Business Mathematics, PBL offers a way to connect mathematical theory with real-world applications relevant to the business world. This study aims to explore the application of problem-based learning in Business Mathematics courses and analyze its impact on students' conceptual understanding and problem-solving abilities. The results show that PBL can improve students' learning motivation and understanding of mathematical concepts often considered difficult, such as financial analysis, interest calculation, and optimization. This study also provides recommendations for the development of problem-based learning methods in Business Mathematics education.

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## Introduction

Effective learning is key to improving the quality of education, particularly in complex fields of study like business mathematics. In this context, problem-based learning (PBL) has become an increasingly popular approach in higher education institutions. This method prioritizes real-world problems as a stimulus to encourage students to develop critical thinking, analytical, and problem-solving skills, while also linking theoretical knowledge to real-world practice (Miller & Mendez, 2021).

In management study programs, business mathematics is often considered a challenging course for students. Many students struggle to grasp basic concepts and their applications in a business context (Putra et al., 2022). Therefore, implementing problem-based learning in this course is expected to improve students' understanding of the subject matter and motivate them to engage more actively in the learning process. By facing real-world problems—such as cost analysis, budget planning, or market demand forecasting—students can feel the relevance of this learning to the challenges they will face in the workplace (Novita & Rahayu, 2023).

Business Mathematics is a vital course in providing an understanding of mathematical concepts used in the business world, such as financial analysis, business statistics, and optimization theory. However, many students struggle to understand the application of mathematics in a business context due to the often theoretical and abstract approach to learning. One solution to this challenge is to implement problem-based learning (PBL). PBL allows students to learn by solving real-world problems relevant to their field of study, thereby increasing their engagement and understanding of the material.

Problem-Based Learning (PBL) is a learning approach that prioritizes solving real-world problems as a way to facilitate learning. In PBL, students are not only provided with theoretical knowledge but also faced with challenges that require the application of that knowledge to find solutions. This model has been proven effective in improving critical thinking, collaboration, and problem-solving skills across various disciplines (Hmelo-Silver, 2004).

Business Mathematics involves the use of mathematical concepts to solve problems in a business context, such as investment analysis, cost calculation, demand forecasting, and optimizing business decisions. However, this course is often considered difficult because the material taught seems abstract and far from concrete business realities. Therefore, the application of PBL can help students understand the relevance and application of mathematics in the real world (Dewi, 2020).

Although PBL has been widely adopted in various disciplines, challenges remain in its effective implementation, particularly in the context of higher education in Indonesia. This study aims to explore the impact of implementing problem-based learning on students' understanding of business mathematics concepts and to identify improvements in problem-solving skills and learning motivation. By integrating this method into the curriculum, it is hoped that students will acquire not only theoretical knowledge but also practical skills relevant to industry needs (Henderson & Adams, 2022).

Therefore, this research will make a significant contribution to the development of learning practices in Management study programs, while also enriching the literature on PBL and business mathematics. The results are expected to benefit not only lecturers and students but also educational institutions in improving the quality of teaching and making it more responsive to the needs of the workplace.

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This study aims to assess the effectiveness of implementing PBL in Business Mathematics courses and identify its impact on students' problem-solving abilities and conceptual understanding.

### **Research methods**

This research employed a qualitative approach with a case study design. Subjects were students of the Management study program, Faculty of Economics and Business, Ibn Khaldun

University, Bogor, who were taking the Business Mathematics course in the odd semester of the 2023/2024 academic year. PBL was implemented over 14 weeks, presenting real-world problems related to the application of mathematics in business analysis. Data were collected through observation, interviews, and analysis of student assignments.

## **Results**

### **Improved Conceptual Understanding**

The analysis showed that students who participated in problem-based learning (PBL) demonstrated significant improvement in their understanding of business mathematics concepts. Data from the final exam results analyzed showed that students' average scores increased significantly compared to the previous semester, where traditional learning methods were applied. This improvement was reflected not only in grades but also in students' ability to explain and demonstrate the concepts they had learned. They were able to construct logical arguments and utilize mathematical methods to solve real-world problems in a business context. This indicates that problem-based learning helps students understand the fundamentals of business mathematics theory more deeply.

### **Problem Solving Skills**

Students also reported feeling more confident in solving business problems involving mathematical calculations. They were able to relate the theories they learned to real-world applications, such as calculating production costs or predicting market demand. This improved their ability to make more informed business decisions.

Furthermore, students involved in problem-based learning reported significant improvements in their problem-solving skills. The study found that students felt more confident when faced with business problems that required mathematical calculations. With a PBL approach, students not only learn theory but are also expected to relate it to real-world applications in the business world, such as calculating production or marketing costs, and predicting market demand. Through relevant case studies and projects, they are given the opportunity to apply mathematical tools and techniques in complex situations, supporting them in making more informed business decisions. This suggests that with higher levels of confidence in problem-solving, students can develop diverse analytical skills that are crucial in their professional careers.

### **Motivation and Participation**

The implementation of PBL also increases student motivation to learn. By working on relevant and challenging problems, students feel more engaged in the learning process. They also participate more actively in group discussions and share ideas to solve the problems presented.

The implementation of problem-based learning also contributes to increased student motivation. Observations and data collected indicate that students experience increased engagement in the learning process when they are presented with relevant and challenging problems. They perceive the topics discussed as more interesting and applicable, thus increasing their motivation to actively participate in the learning process. Furthermore, students reported being more active in group discussions, sharing ideas, and supporting each other in solving assigned problems. This interaction not only boosts their confidence but also strengthens collaborative skills, which are essential for a business context. With a sense of

connectedness and support within the group, students can learn from one another, further enriching the learning process.

### **Conclusion**

Overall, this study illustrates the effectiveness of implementing problem-based learning in improving students' understanding of business mathematics concepts, as well as their problem-solving skills, motivation, and participation. By implementing this approach in the learning process, it is hoped that it will provide a more holistic and relevant learning experience for students in preparing them to face the challenges of the dynamic business world. Through PBL, students not only learn to solve business mathematics problems but also develop skills that are important for their future careers. As part of the ongoing development of this study program, it is hoped that this study can serve as a foundation for further research and innovation in learning methods that can improve the quality of education in the field of management.

### **Suggestion**

For further research, it is recommended to expand the research sample by involving more students from various study programs, as well as exploring the long-term impact of implementing PBL on students' professional abilities in the workplace.

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