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Integration of Mathematics Learning in Improving Problem-Solving Skills for Tourism Vocational School Students in the Hospitality Industry

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Abstract

Vocational education, especially in Vocational High Schools (SMK), plays a crucial role in preparing the younger generation to enter the workforce, especially in the growing hospitality industry sector. Problem-solving skills are one of the skills that are urgently needed, considering the contribution of the tourism and hospitality sector to Indonesia's Gross Domestic Product (GDP). The integration of mathematics learning in the vocational education curriculum is considered one of the effective ways to improve these skills. Mathematics not only serves as a calculation tool, but also as a basis for analysis and proper decision-making in hospitality contexts, such as financial management and profitability analysis. In addition to equipping students with technical skills, this integration also enhances critical and creative thinking skills, which are indispensable in facing complex challenges in the world of work. Students trained in mathematics can quickly calculate maximum capacity and plan effective marketing strategies. Thus, contextual

mathematics learning is very important in shaping the competence of vocational school students in the hospitality sector.

Keywords: Mathematics Learning-1; Problem-Breaking-2; Hospitality-3

INTRODUCTION

Vocational education, especially in Vocational High Schools (SMK), plays an important role in preparing the younger generation to enter the world of work, especially in the hotel industry sector which continues to grow. In this context, problem-solving skills are one of the skills that are needed. According to the Central Statistics Agency (2022), the tourism and hospitality sector in Indonesia contributes around 4.5% to the Gross Domestic Product (GDP), so it is important for vocational school students to have relevant and applicable skills. One way to improve problem-solving skills is through the integration of mathematics learning in the vocational education curriculum. Mathematics, as a fundamental discipline, not only serves as a computational tool, but also as a basis for analysis and proper decision-making in the context of hospitality (Setiawi, Agustina Purnami, 2024).

In the hospitality industry, vocational school students are faced with a variety of situations that require quick and effective problem solving. For example, in financial management, students need to understand basic concepts such as budgeting, cost calculation, and profitability analysis. According to research conducted by Prabowo and Setiawan (2023), students who engage in integrated mathematics learning with hospitality case studies show significant improvements in analytical and problem-solving skills. This shows that contextual mathematics learning can improve the skills needed in the field.

Furthermore, the integration of mathematics learning in the context of hospitality not only equips students with technical skills, but also improves critical and creative thinking skills (Setiawi, A. P., Edwin, E., & True, S. D. I, 2025). These skills are essential in facing the complex challenges of the workforce. For example, in a situation where there is a surge in demand for hotel rooms, students trained in mathematics can quickly calculate maximum capacity and plan effective marketing strategies. Thus, relevant mathematics learning is very important in shaping the competencies of vocational school students in the hospitality sector.

METHODS

This study uses a literature review approach that involves the analysis and synthesis of various studies and relevant journal articles. The main sources of information come from research publications, journal articles, books, and related academic reports published between 2021 and 2025. This approach was chosen to provide a comprehensive understanding of the topic of integrating mathematics learning in improving problem-solving skills for vocational school students in the hospitality industry.

In the process of collecting data, researchers conducted literature searches in various academic databases such as Google Scholar, JSTOR, and ProQuest. The keywords used include "integration of mathematics learning", "problem-solving skills", "vocational school students", and "hospitality industry". The search results show that there are a number of studies that address the relationship between math learning and problem-solving skills, but few focus on the specific context of the hospitality industry.

After collecting the data, the researchers conducted an analysis to identify trends, outcomes, and potential improvements in integrated mathematics learning.

Previous research, such as those conducted by Rahman and Sari (2022), showed that students who get math learning integrated with field practice have a better understanding of mathematical concepts and their applications in real-world situations. This is the basis for this study to delve deeper into the specific benefits of such integration in the context of hospitality.

RESULTS

The integration of mathematics learning in vocational education, especially in vocational schools, has great potential to improve students' problem-solving skills, especially in the context of the hospitality industry. Project-based learning approaches, such as designing budgets for hotel events, have proven to be effective in improving students' understanding of mathematical concepts and their ability to apply them in the real world. Research shows that 70% of students who engage in project-based learning feel more confident in applying math skills in the workplace. However, challenges such as teachers' lack of confidence in teaching mathematics contextual and students' negative views of mathematics need to be overcome through teacher training and the preparation of interesting materials (Seth, AP, Suparta, IN, & Suharta, IGP, 2020). Collaboration between schools, teachers, and industry is essential to ensure effective integration of math learning, so that vocational school students can significantly improve their problem-solving abilities.

Problem-solving skills are essential in the hospitality industry, where workers are often faced with dynamic and unpredictable situations. Vocational school students who are trained through real-world context-based math learning, such as reservation management and data analysis, will be better prepared to face challenges in the field. Research shows that workers with good problem-solving skills can handle crises effectively, improving guest

satisfaction and hotel reputation. To develop these abilities, students need practice and experience through simulations and case studies. Thus, the integration of mathematics learning relevant to the needs of the hospitality industry, as well as collaboration between educational institutions and industry, can prepare vocational school students for success in the world of work.

Integration of Mathematics Learning in Improving Problem-Solving Skills

The integration of mathematics learning in vocational education, especially in vocational schools, has great potential to improve students' problem-solving skills, especially in the context of the hospitality industry. Here is the table mathematics learning that integrates with problem-solving skills at SMK Luhur Tambolaka

Table 1. Mathematics Learning-Problem-Solving Skills

NO	Aspects	Description
1	**Effective Approach**	Project-based learning, where students are given assignments related to real-life situations in the hospitality industry.
2	**Application Examples**	Students design budgets for events in hotels, calculate costs, estimate expenses, and determine selling prices.
3	**Benefits of Project Learning**	- Improve understanding of mathematical concepts (addition, subtraction, percentage).- Improve

		problem-solving skills (Rahman & Iskandar, 2023).
4	**Statistics**	70% of students who take part in project-based learning feel more confident in applying math skills in the workplace (Sari, 2022).
5	**Additional Skills**	Project-based learning helps students work in teams, which is an essential skill in the world of work.
6	**Challenge**	- Teachers lack confidence in teaching mathematics contextually.- Students have a negative view of mathematics.
7	**Solution**	- Provide adequate training for teachers.- Develop learning materials that are interesting and relevant for students (Nugroho, 2024).
8	**Conclusion**	Effective integration of mathematics learning requires appropriate methods, support for teachers, and collaboration between schools, teachers, and industry to improve the problem-solving abilities of vocational school students.

Integration of Math Learning in the Hospitality Industry

The integration of mathematics learning in the context of hospitality is essential because many

operational aspects require mathematical skills, such as data analysis, budget management, and price calculation. Here is a table of math learning in the hospitality industry:

Table 2. Math Learning – Hospitality Industry

NO	Aspects	Description
1	**Application Examples**	- Hotel reservation management: calculate room rates, manage discounts, and calculate taxes.- Analyze booking data and market trends for strategic decision-making.
2	**Relevance of the Vocational Curriculum**	The vocational curriculum needs to include mathematical materials that are relevant to the needs of the hospitality industry.
3	**Challenge**	- Students often feel that math is irrelevant to a career in hospitality, so they are less motivated to learn.
4	**Solution**	- Showing concrete examples of the application of mathematics in hospitality.- Research shows that students are more motivated when given real examples (Prabowo, 2024).
6	**Conclusion**	The integration of mathematics learning in hospitality must be done with a contextual and relevant approach. Collaboration between educational institutions and industry is needed to prepare

		vocational school students for the world of work.

Integration of Problem-Solving Capabilities in the Hospitality Industry

The integration of problem-solving capabilities is urgently needed in the hospitality industry due to the dynamic and often unpredictable work environment. Here is a table of problem-solving capabilities in the hospitality industry:

Table 3: Problem-Solving Capabilities - Hospitality Industry

NO	Aspects	Description
1	**Example Situation**	- Guest reservation issues, such as overbooking.- Solution: offer room upgrades or find alternative accommodations.
2	**Benefit**	- Workers with good problem-solving skills can handle crises effectively, improving the hotel's reputation (Setiawan, 2023).- 80% of hotel managers cite these skills as the key to operational success (Ministry of Tourism and Creative Economy, 2022).
3	**Vocational Education**	Vocational education needs to focus on developing practical skills, not just theory, to prepare students for challenges in the field.

4	**Challenge**	Students need enough practice and experience to develop problem-solving skills.
6	**Solution**	- Creating a supportive learning environment.- Using simulations and case studies in learning (Yulianto, 2024).
7	**Conclusion**	The development of problem-solving skills must be an integral part of the vocational school curriculum. Effective integration of mathematics learning can prepare students to face challenges in the world of work.

DISCUSSION

The integration of mathematics learning in vocational education, especially in vocational schools, has a significant impact in improving students' problem-solving skills, especially in the hospitality industry. Project-based approaches, such as designing budgets for hotel events, not only reinforce an understanding of mathematical concepts but also train students in applying those skills in the real world. However, challenges such as teachers' lack of confidence in teaching mathematics contextually and students' negative views of mathematics need to be overcome through teacher training and the preparation of interesting and relevant materials.

Collaboration between schools, teachers, and industry is key to ensuring effective integration of mathematics learning (Setiawi, A. P., 2024). By involving industry in the learning process, students can understand the relevance of mathematics in hospitality contexts, such

as reservation management, data analysis, and budget management. This not only increases students' motivation to learn but also prepares them to face challenges in the world of work, where problem-solving skills are needed in dynamic and unexpected situations.

The development of problem-solving skills through simulations and case studies in mathematics learning is also an important aspect. Students who are trained in dealing with real-life situations, such as overbooking or operational crises, will be better prepared to improve guest satisfaction and the hotel's reputation. Thus, the integration of mathematics learning relevant to industry needs, supported by collaboration between educational institutions and industry, can prepare vocational school students for success in the world of work and contribute significantly to the hospitality industry.

CONCLUSION

The integration of mathematics learning in vocational education, especially in vocational schools, has a crucial role in improving students' problem-solving skills, especially in the hospitality industry. Project-based approaches, such as designing budgets for hotel events or reservation management, have proven to be effective in improving understanding of mathematical concepts and their application in the real world. Collaboration between schools, teachers, and industry is key to ensuring that mathematics learning is not only theoretical but also applicable, so that vocational school students can develop the skills needed in the world of work.

Problem-solving abilities developed through real-world context-based math learning are essential in the hospitality industry, where dynamic and unexpected situations are frequent (Setiawi, A. P., Mau, S. D. I., & Sabawaly, D. R., 2024). Students who are trained through simulations and case studies will be better prepared to

face challenges such as overbooking or operational crises, which can ultimately improve guest satisfaction and hotel reputation. Thus, the integration of mathematics learning relevant to industry needs, supported by collaboration between educational institutions and industry, not only prepares vocational students for success in the world of work but also contributes to the development of a more competitive and sustainable hospitality sector.

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