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Analysis of Carnegie Learning's MATHia Artificial Intelligence Implementation in Mathematics Learning: Perspectives of Prospective Mathematics Teachers and Implications for Schools in Indonesia

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Abstrak

Penelitian ini bertujuan untuk mengevaluasi penggunaan kecerdasan buatan MATHia dari Carnegie Learning dalam proses pembelajaran matematika dari perspektif calon guru matematika di Indonesia. Metode yang digunakan adalah pendekatan kuantitatif deskriptif dengan instrumen berupa kuesioner tertutup yang disebarakan melalui Google Forms kepada calon guru dan mahasiswa pendidikan matematika. Data diolah secara deskriptif untuk mengetahui perspektif responden terhadap efektivitas, tantangan, dan dampak penggunaan MATHia. Hasil penelitian menunjukkan bahwa sebagian besar responden memiliki pandangan yang baik terhadap MATHia, terutama dalam meningkatkan pemahaman konsep, efisiensi dalam mengajar, dan kemandirian belajar siswa. Skor rata-rata pernyataan berkisar antara 3,12 hingga 4,04. Hal ini menunjukkan bahwa sebagian besar responden melihat potensi besar teknologi ini dalam mendukung proses pembelajaran yang lebih mandiri dan efektif. Penelitian ini menyimpulkan bahwa keberhasilan integrasi MATHia dalam pendidikan matematika bergantung pada dukungan kebijakan, kesiapan guru, dan strategi implementasi yang jelas dan komprehensif. Temuan ini bermanfaat bagi guru, pembuat kebijakan, dan pengembang teknologi dalam meningkatkan penggunaan AI untuk meningkatkan kualitas pendidikan matematika di Indonesia.

Kata kunci: MATHia, kecerdasan buatan, pendidikan matematika, teknologi pendidikan, dan persepsi guru.

Abstract

This study aims to evaluate the use of Carnegie Learning's MATHia artificial intelligence in the mathematics learning process from the perspective of prospective mathematics teachers in Indonesia. The method used is a descriptive quantitative approach with an instrument in the form of a closed questionnaire distributed via Google Forms to prospective teachers and students studying mathematics education. The data was processed descriptively to determine the respondents' perspectives on the effectiveness, challenges, and impacts of using MATHia. The results showed that most respondents had a favorable view of MATHia, especially in improving conceptual understanding, efficiency in teaching, and student learning independence. The average score of the statements ranged from 3.12 to 4.04. This shows that most respondents see great potential of this technology in supporting a more independent and effective learning process. This study concludes that the success of MATHia integration in mathematics education depends on policy support, teacher readiness, and a clear and comprehensive implementation strategy. These findings benefit teachers, policymakers, and technology developers in increasing the use of AI to improve the quality of mathematics education in Indonesia.

Keywords: MATHia, artificial intelligence, mathematics education, educational technology, and teacher perception.

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INTRODUCTION

In today's digital landscape, the way mathematics is taught requires continuous adaptation—particularly through the thoughtful use of technology. Tools that support digital learning now play a key role in helping students access mathematical content more readily and apply what they learn with greater flexibility (Andrade, 2023). At the same time, collaborative digital learning environments are opening up new possibilities for reimagining how teaching and learning take place in modern classrooms. By leveraging educational technology, institutions can create collaborative learning environments, increase student engagement, and develop the skills needed to succeed in a digital society.

(Nair, 2023). However, although technological advances have provided various benefits, challenges in ensuring personalization of learning and monitoring student learning difficulties still need to be addressed.

AI is an adaptive solution that can improve the effectiveness of learning by adjusting materials to individual student needs, one of which is through MATHia from Carnegie Learning designed to support mathematics learning with a more responsive approach. From the perspective of prospective mathematics teachers, the application of this technology offers great potential in improving teaching effectiveness by enabling automatic monitoring of student learning progress and providing direct feedback that helps teachers identify student difficulties. Although this technology has great potential in learning, the pedagogical readiness of teachers and adequate training are still major obstacles in its implementation in the classroom. Meanwhile, in Indonesia, the implementation of MATHia also faces a number of challenges, such as uneven digital infrastructure, limited access to technological devices, and curriculum readiness that does not fully support the integration of AI in mathematics learning. However, with the support of appropriate education policies and the development of training programs for teachers, technology such as MATHia has the potential to be an innovative solution that can improve the quality of mathematics learning in Indonesia more inclusively and adaptively.

Educators today are increasingly confronted with the question of how to make learning more responsive to students' individual needs. Among the many technological developments being explored, artificial intelligence (AI) has emerged as a tool that might help address this challenge. Though still evolving, its potential to support more adaptive instructional models continues to spark discussion in both policy and practice. Even so, when we look at how AI is being applied in Indonesian classrooms, it becomes clear that there are still a number of practical hurdles ranging from infrastructure limitations to questions about teacher readiness that must be addressed before such tools can be fully effective. The successful integration of AI in mathematics education can not only increase student engagement and understanding through personalized learning experiences (A, 2023) but also has the potential to change the teaching approach as a whole. However, many educational institutions still experience limited infrastructure and a lack of curriculum that supports the optimal use of AI in learning (Maddukelleng et al., 2023). In addition to technical aspects, the readiness of prospective mathematics teachers is also a crucial factor in the implementation of AI because they need to understand and adapt this technology into effective teaching strategies.

Integrating AI into education requires not only mature pedagogical skills but also technical understanding that allows for optimal use of technology. Unfortunately, most educational institutions are not yet fully prepared to provide appropriate learning facilities and programs, so that the use of AI cannot be carried out widely and successfully. Therefore, this study aims to examine the views of prospective teachers on the use of MATHia, identify the barriers they face in adopting this technology, and explore the implications of implementing AI in mathematics learning for schools in Indonesia in order to understand how this technology can be implemented more strategically in the education ecosystem.

To understand how these challenges can be addressed, this study is expected to provide benefits to various parties involved in the world of education by highlighting the potential of AI in mathematics learning and the challenges in its implementation. This study not only helps prospective mathematics teachers understand the obstacles that may arise but also guides schools and policymakers in designing more effective and sustainable implementation strategies. In addition, this study offers insights for educational technology developers to adapt AI solutions to the needs and conditions of Indonesian education (A, 2023). In this case, technology developers can gain a deeper understanding of the specific requirements of Indonesian education, allowing them to design AI solutions that are more appropriate to address local challenges (Zhai et al., 2021).

While artificial intelligence continues to gain traction in education, its practical use still raises important questions—especially for future mathematics teachers who will be navigating these changes firsthand. Through this study, they can begin to explore how AI might fit into their future classrooms, while also becoming more aware of the potential obstacles they may face in the process. On a broader scale, such insights may help schools and policymakers think more critically about how to adapt AI to local contexts, balancing innovation with realistic educational goals. Not only

that, for developers of educational technology, this research can provide valuable perspectives on the needs and adaptation of technology in the context of Indonesian education, ensuring that the solutions developed are truly relevant to the conditions and challenges faced by schools and educators.

METHOD STUDY

This study aims to assess how Carnegie Learning's MATHia artificial intelligence technology is applied in the mathematics learning process, focusing on the views of prospective mathematics teachers. This study explores the effectiveness and impact of the technology on students' learning experiences. Prospective teachers noted that the use of AI creates a collaborative learning atmosphere where students can collaborate and support each other in solving problems (Nurfadilah et al., 2024). This study applies a descriptive quantitative approach, aiming to analyze prospective teachers' views on MATHia through a closed questionnaire. In addition, this study will also examine the effect of Carnegie Learning's MATHia implementation on students' learning processes and outcomes. With a quantitative approach, this study shows that AI technology can adjust the learning experience based on the needs of each student (Tulak et al., 2024).

The focus of this study is to understand how prospective mathematics teachers perceive the effectiveness and challenges of using MATHia and how this technology can influence curriculum development and learning strategies in Indonesian schools. The following are the steps for data collection: Sample Determination Selecting research samples, namely prospective mathematics teachers and students who have used MATHia Carnegie Learning. The questionnaire was distributed online via Google Forms within a period of one week. Analyzing the collected data using appropriate analysis methods, such as statistical analysis.

With the information that has been collected, this study aims to identify the positive and negative aspects of MATHia Carnegie Learning in the mathematics learning process from the perspective of prospective educators, assess how effective this technology is in improving student learning achievement, and investigate the impact of its implementation for schools in Indonesia. By understanding these elements, it is hoped that this study can provide useful suggestions for improving the quality of education and maximizing the use of AI technology in mathematics learning.

The tool used in this study is a questionnaire designed using Google Forms. The questionnaire was designed with reference to the indicators of the implementation of artificial intelligence technology in mathematics learning, especially related to the MATHia Carnegie Learning platform. The technique of analyzing data uses Descriptive Analysis to describe the characteristics of quantitative data, such as questionnaires, in order to understand the profile of respondents and their responses to MATHia Carnegie Learning.

RESULTS AND DISCUSSION

Based on the questionnaire data filled out by respondents via Google Forms, the average score for various statements regarding the application of MATHia Carnegie Learning technology in mathematics learning ranged from 3.56 to 3.88. The statement with the highest score was "MATHia is effective in providing a variety of practice questions to train students' mathematics skills." (average = 3.88), which shows that respondents are very aware of the importance of providing a variety of practice questions to train students' mathematics skills When implementing this technology. Meanwhile, the statement with the lowest score was "The impact of using the MATHia method on education" (average = 3.62), which shows doubt but is not dominant.

In general, the results of the study indicate that prospective mathematics teachers have quite positive perceptions of the use of MATHia in learning. The average score is above 3.75 for most statements, indicating that they tend to agree with the benefits of MATHia in improving understanding, learning independence, and teaching efficiency. However, some fairly high standard deviation scores (above 4.04), such as in statements regarding prospective teachers' doubts, indicate that there is variation in perception among respondents. This indicates the need for a differential approach in MATHia training and socialization.

In addition, high scores on statements related to training needs and technical support indicate that MATHia implementation requires readiness in terms of both human resources and technological

infrastructure. This needs to be a concern for policy makers and educational institutions so that the implementation of technologies such as MATHia can take place efficiently and sustainably.

Table 1. *Policy table for implementing the Mathia method in national education*

No	Statement	Score
1.	MATHia can be adapted to the mathematics curriculum implemented in Indonesia.	3,84
2.	The implementation of MATHia is in accordance with the national education goals to improve the quality of mathematics learning.	3,76
3.	MATHia can improve the quality of mathematics education in Indonesian schools that have not utilized technology optimally.	3,8
4.	The existing curriculum in Indonesia needs to be updated to be more in line with the use of technology such as MATHia.	3,56
5.	Students in Indonesia need to receive special training to be able to utilize MATHia effectively.	3,96
6.	The implementation of MATHia in Indonesia requires attention to the condition of the technology infrastructure in schools.	3,96
7.	The implementation of MATHia will help improve students' mathematics exam results in Indonesia.	3,48
8.	The Indonesian government needs to provide adequate policy support to support the implementation of technology such as MATHia in schools.	3,88
9.	Mathematics education in Indonesia can be more inclusive by using MATHia, considering that this platform can be	3,68

adapted to individual needs.

10. MATHia-based Learning in Indonesia can provide wider access to students in remote areas. 3,44

CONCLUSION

Based on the research results, the application of artificial intelligence (AI) through the MATHia platform from Carnegie Learning has great potential in improving the effectiveness of mathematics learning in Indonesia. Prospective mathematics teachers generally have a positive view of this technology, especially to improve student understanding and teaching efficiency. However, the success of MATHia integration still depends on the pedagogical readiness of teachers, technological infrastructure, and ongoing support for education policies.

Table 2.Data (average) research results

Data	average
the importance of implementing MATHia technology in mathematics learning	3,71
The need for preparedness of prospective mathematics teachers	3,75
The impact of using the MATHia method on education	3,62
Policy on implementing the MATHia method in national education	3,74
Risks and impacts of implementing MATHia	3,74

In line with this, the data in the table shows that the aspect of prospective teacher readiness received the highest score (3.75), indicating that the role of teachers is the main key to the success of MATHia implementation. In addition, aspects of education policy and the risks and impacts of its implementation also received great attention (each 3.74), reflecting the need for systemic support and comprehensive understanding before integration is carried out widely.

Although the aspect of the impact of using the MATHia method received the lowest score (3.62), the assessment was still relatively positive, indicating that respondents generally saw the benefits of using this technology, although there were still doubts or the need for further This study provides a real picture of how AI technology can be used in education. The results can be a reference for teachers, schools, governments, and educational technology developers to understand the benefits and challenges of using AI in mathematics education. The findings also emphasize the importance of a comprehensive approach so that educational technology such as MATHia can be optimally implemented in the Indonesian education ecosystem by considering teacher readiness, supporting policies, and evaluating risks and impacts.

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