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Exploring Mathematics Teachers' Perspectives on ChatGPT for Perzonalized Learning and Technology Dependence

Nurmia[a,1*], Suri Aksuri [a,2], Sanrawati [a,3], Anisa [a,4], Nurhalisa [a,5], Nabila Apriani Maulidiah Putri [a,6], Aprisal [a,7].

[a] Faculty of Teacher Training and Education, University of West Sulawesi, Majene, Indonesia.
[1] mmianurr@gmail.com *; [2] suriaksuri3@gmail.com; [3] sandrawati7@gmail.com; [4] anisaaca0305@gmail.com; [5] halisanur26102005@gmail.com; [6] nabilatinambung26@gmail.com; [7] aprisal@unsulbar.ac.id
* Corresponding Author

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ABSTRACT

The development of artificial intelligence, particularly ChatGPT, has begun to influence mathematics learning in classrooms. This technology is not only used as a learning support tool but also affects how teachers teach and how students understand mathematical concepts. This study aims to analyze the effectiveness of ChatGPT in mathematics learning, its benefits and challenges, and the potential for technology dependence based on mathematics teachers' perspectives. This study employed a Systematic Literature Review (SLR) approach. The data analysis technique used the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) method through the stages of identification, screening, eligibility, and article inclusion. Articles were collected from ScienceDirect, Google Scholar, Semantic Scholar, Publish or Perish, and ResearchGate. Based on the selection process, 27 articles were analyzed thematically according to the research focus. The findings indicate that mathematics teachers perceive ChatGPT as effective in supporting more flexible, interactive, and adaptive learning based on students' needs. ChatGPT also supports personalized learning through adjusted explanations and learning pace. However, its use also presents challenges related to information accuracy, teachers' readiness, and supervision of AI use. In addition, the ease of obtaining instant answers may increase technology dependence and reduce students' engagement in mathematical thinking during the learning process.

KEYWORDS

ChatGPT
Mathematics Learning
Teachers' Perspectives
ChatGPT Effectiveness
Technology Dependence

1. Introduction

Artificial Intelligence (AI) technology has developed rapidly in recent years and has begun to influence various aspects of education. The use of AI in education is no longer limited to providing information, but also supports more adaptive, interactive, and student-centered learning processes (Kharis & Zili, 2024; Beege et al., 2024). Furthermore, AI has started to influence how teachers and students interact during learning activities, particularly in accessing information and delivering instructional content (Al-Mutawah, 2026). In this context, AI is no longer viewed merely as a supplementary tool, but as part of the ongoing transformation of modern learning systems (Beege et al., 2024). Therefore, the development of AI in education requires further investigation, especially regarding how it is integrated into classroom learning.

One form of AI that is currently widely used in education is ChatGPT. This technology is capable of generating text-based responses quickly and in a relatively accessible manner, making it frequently utilized as a learning support tool (Kharis & Zili, 2024). In practice, ChatGPT is used to explain learning materials, answer questions, provide feedback, and support students' independent learning outside the classroom (Beege et al., 2024). In mathematics education, the integration of ChatGPT has increasingly attracted attention because mathematics learning requires not only procedural skills but also conceptual understanding and higher-order thinking skills (Fadila et al., 2025). Several studies indicate that ChatGPT can support student engagement and strengthen students' understanding of

mathematical concepts when appropriately integrated into learning activities.

Several studies have reported empirical findings regarding the effectiveness of ChatGPT in mathematics learning. Fadila et al. (2025) found that students who used ChatGPT in solving Higher Order Thinking Skills (HOTS) mathematics problems achieved significantly better learning outcomes than those who learned conventionally, with an average score of 35.52 compared to 10.34 in the control group. Gouia-Zarrad and Gunn (2024) also reported that 72% of students experienced improved understanding in mathematics learning, while 70% stated that the technology helped them solve learning problems more effectively. These findings demonstrate that ChatGPT holds considerable potential for improving the quality of mathematics education when used appropriately.

In addition to supporting conceptual understanding, ChatGPT is also associated with personalized learning. AI-based personalized learning enables learning materials, feedback, and instructional processes to be adjusted according to students' abilities, needs, and learning pace (Fortuna et al., 2025). Through this flexibility, students may experience learning that is more adaptive and responsive to their individual characteristics. However, the effectiveness of personalized learning supported by AI is strongly influenced by teachers' readiness and their ability to integrate technology appropriately into mathematics instruction (Al-Mutawah, 2026). This indicates that the relationship between the use of ChatGPT, personalized learning, and learning effectiveness cannot be separated from teachers' perspectives and roles in managing the learning process.

On the other hand, the use of ChatGPT in mathematics learning also raises several concerns. The convenience of obtaining instant answers may encourage students to rely excessively on technology without fully engaging in mathematical reasoning processes (Firdaus et al., 2025). Such conditions potentially affect students' critical thinking skills, creativity, and learning independence when AI use is not balanced with appropriate instructional guidance. In addition, concerns have emerged regarding the accuracy of AI-generated information and the potential misuse of AI in academic tasks (Kharis & Zili, 2024). These issues indicate that the use of ChatGPT in mathematics learning must be viewed from a balanced perspective that considers both its benefits and risks.

Given these conditions, the role of mathematics teachers becomes increasingly important in the integration of AI into learning. Teachers are no longer positioned solely as knowledge transmitters, but also as facilitators who provide scaffolding, monitor students' reasoning processes, and ensure that the use of AI continues to support students' critical engagement in mathematical problem-solving. Teachers also play an essential role in directing the ethical use of AI in learning activities, including maintaining academic integrity and encouraging responsible technology use. In this regard, teachers' perceptions, technological readiness, and understanding of AI significantly influence how ChatGPT is integrated into mathematics learning (Al-Mutawah, 2026; Egara & Mosimege, 2024; Beege et al., 2024).

Several previous studies have examined the use of ChatGPT in mathematics education from different perspectives. Some studies focused on students' learning outcomes and conceptual understanding (Fadila et al., 2025), while others emphasized personalized learning opportunities supported by AI (Fortuna et al., 2025). Other studies highlighted the potential for technology dependency resulting from excessive reliance on AI (Firdaus et al., 2025). However, these aspects are still commonly discussed separately, and studies that comprehensively connect the effectiveness of ChatGPT, the benefits and challenges of its implementation, and the potential for technology dependency based on mathematics teachers' perspectives remain limited.

Based on these considerations, there is still a research gap regarding how mathematics teachers perceive the effectiveness, benefits, challenges, and potential for technology dependency associated with the use of ChatGPT in mathematics learning. In fact, teachers' perspectives are crucial in determining how AI technology is implemented to support meaningful and concept-oriented learning processes. Therefore, this study aims to examine the use of ChatGPT in mathematics learning from the perspective of mathematics teachers through a Systematic Literature Review (SLR) approach. Specifically, this study seeks to answer the following research questions:(1) How effective is the use of ChatGPT in mathematics learning according to mathematics teachers' perspectives? (2) What are the benefits and challenges of using ChatGPT in mathematics learning according to mathematics teachers'

perspectives? (3) What is the potential for technology dependency arising from the use of ChatGPT in mathematics learning according to mathematics teachers' perspectives?

2. Method

This study employed a Systematic Literature Review (SLR) approach to examine various studies related to the use of ChatGPT in mathematics learning. The review focused on mathematics teachers' perspectives on the use of ChatGPT, the effectiveness of ChatGPT in mathematics learning, the benefits and challenges of personalized learning, and the potential for technology dependence arising from the use of ChatGPT in mathematics learning. The review process followed the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) framework, which includes the stages of identification, screening, eligibility, and article inclusion.

Articles were collected from several academic databases, namely ScienceDirect, Google Scholar, Semantic Scholar, Publish or Perish, and ResearchGate, using keywords related to teachers' perspectives on ChatGPT, artificial intelligence, and mathematics learning. During the identification stage, a total of 105 articles were found and subsequently underwent duplicate removal, screening based on titles and abstracts, and full-text review according to the predetermined inclusion and exclusion criteria. The article selection process based on the PRISMA framework is presented in Figure 1.

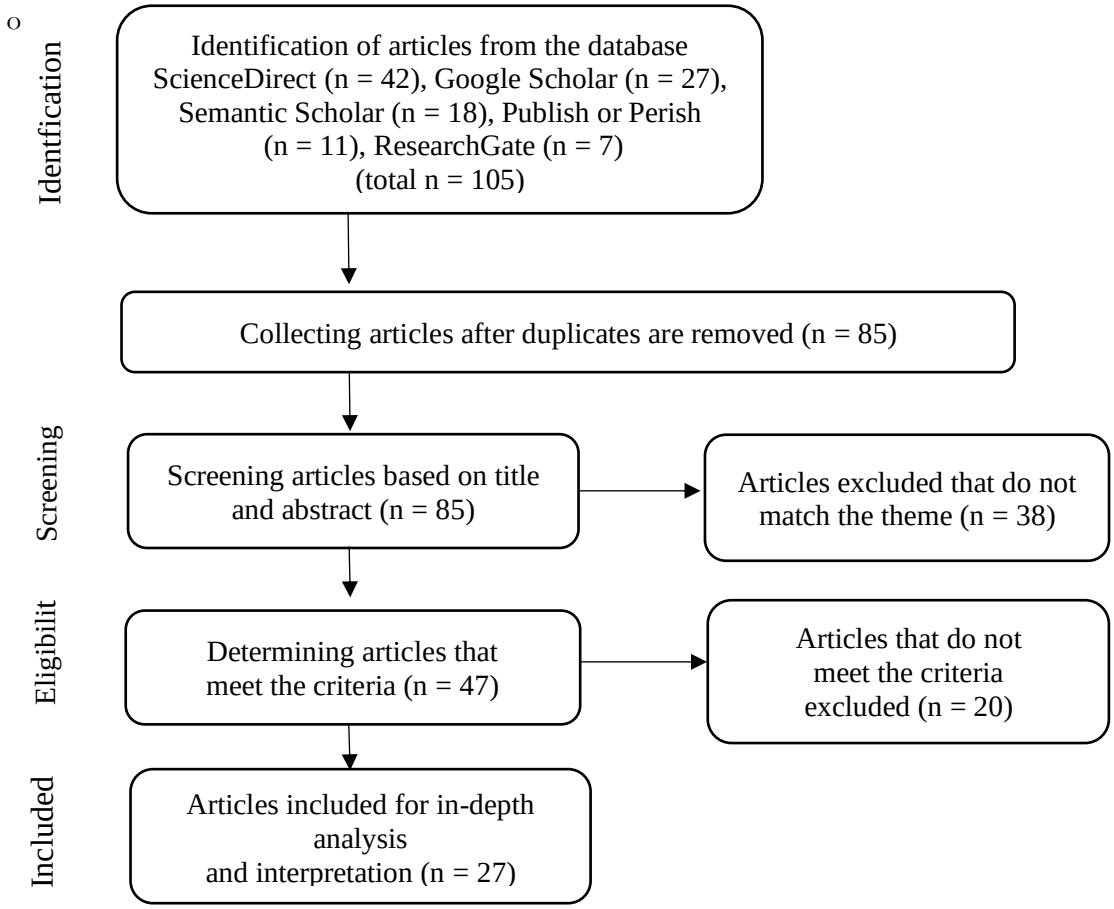

Fig 1. PRISMA flow diagram of article selection

The articles analyzed in this study were published between 2018 and 2026 to describe the development of artificial intelligence in mathematics education. The inclusion criteria in this study included articles discussing the use of ChatGPT or artificial intelligence in mathematics learning, mathematics teachers' perspectives, the effectiveness of ChatGPT use, the benefits and challenges of

ChatGPT, and the potential for technology dependence in mathematics learning. In addition, the selected articles had to be available in full-text form and published in accredited national or international journals. Meanwhile, articles that were not relevant to the focus of the study, unavailable in full-text form, or not classified as scientific publications were excluded from the review process. The distribution of articles based on the databases is presented in Table 1.

Table 1. Distribution of Articles by Database

No.	Database	Number of Articles
1	ScienceDirect	12
2	Google Scholar	6
3	Semantic Scholar	4
4	Publish or Perish	3
5	ResearchGate	2

Based on the selection process, 27 articles were selected as the data sources in this study. The data analysis process employed a thematic analysis approach by grouping the research findings into three main themes based on the research questions. The analysis was conducted through the processes of reading, comparing, and categorizing the findings from each article according to the predetermined themes. To maintain the consistency and credibility of the analysis, each article was re-examined through repeated reading and comparison of findings across themes before the interpretation process was conducted. This process aimed to ensure that the data categorization was carried out consistently in accordance with the focus of the study. The results of the analysis were then used to structure the discussion more systematically based on the predetermined themes.

3. Result and Discussion

An analysis of 27 articles indicates that the use of ChatGPT in mathematics education is not only growing rapidly but also yielding diverse findings. Several studies highlight how this technology is utilized to enhance conceptual understanding, while others emphasize the role of teachers and the potential risks arising from its use. To provide a more structured overview, all articles analyzed in this study were mapped based on their relevance to the research questions: the teachers' perspective, effectiveness in supporting personalized learning, benefits and cahallanges and the potential for technology dependency. This mapping is presented in Table 2.

Table 2. Mapping of Articles Based on Research Questions

No	Article	Research Questions		
		1	2	3
1	Supriyono et al. (2024)	✓	✓	✓
2	Wibowo et al. (2025)	✓	✓	
3	Rakhmawati et al. (2025)	✓	✓	✓
4	Kharis & Zili (2024)	✓	✓	
5	Putra et al. (2021)	✓		
6	Firdaus et al. (2025)			✓
7	Khusna & Fadli (2025)		✓	✓
8	Husriani et al. (2026)	✓	✓	
9	Fadila et al. (2025)	✓		
10	Rizaldi et al. (2024)	✓		
11	Funny et al. (2024)		✓	✓
12	Beege et al. (2024)	✓	✓	
13	Al-Mutawah (2026)	✓	✓	
14	Egara & Mosimege (2024)	✓	✓	✓
15	Li (2024)	✓	✓	✓

No	Article	Research Questions		
		1	2	3
16	Tripathi et al. (2025)	✓	✓	✓
17	Mohamed et al. (2022)	✓	✓	
18	Almarashdi et al. (2024)	✓	✓	
19	Getenet (2024)	✓		✓
20	Gouia-Zarrad & Gunn (2024)	✓	✓	✓
21	Rucker & Becker-Genschow (2025)	✓	✓	
22	Fortuna et al. (2025)	✓	✓	
23	Heung & Chiu (2025)	✓	✓	
24	Youssef et al. (2024)	✓	✓	
25	Mazi (2025)	✓	✓	
26	Rasool et al. (2025)	✓	✓	✓
27	Prilop et al. (2025)	✓	✓	✓

Table 2 shows how each article is categorized based on its relevance to the research questions used in this study. From this mapping, it is evident that some articles focus solely on a single aspect, while others address two to three research questions simultaneously. This indicates that in some studies, discussions regarding the use of ChatGPT are not always strictly separated but rather overlap across the aspects being examined. This mapping helps highlight initial trends regarding how the focus of studies in the literature is distributed, without overlooking the interconnections among the topics discussed.

3.1. Mathematics Teachers' Perspectives on the Effectiviness of Using ChatGPT in Mathematics Learning

An analysis of the reviewed articles shows that, according to teachers, the effectiveness of using ChatGPT in mathematics learning is not only assessed through students' learning outcomes but also through how the learning process takes place. Teachers perceive that the use of ChatGPT can help create learning that is more flexible, interactive, and responsive to students' needs. Some studies place greater emphasis on improvements in conceptual understanding, while others focus on changes in students' engagement and learning experiences. These different emphases indicate that the effectiveness of ChatGPT needs to be understood from multiple complementary perspectives rather than being measured through a single learning indicator alone.

Several studies indicate that differences in learning outcomes before and after the use of ChatGPT are quite evident in mathematics learning (Wibowo et al., 2025; Rakhmawati et al., 2025). In addition, ChatGPT helps students understand learning materials through simpler and more interactive explanations (Gouia-Zarrad & Gunn, 2024). Findings from the literature also suggest that the use of AI in mathematics learning tends to contribute positively to students' understanding, although the level of effectiveness is not always consistent across different learning contexts (Supriyono et al., 2024). In terms of thinking skills, several studies report improvements in higher-order thinking skills and critical thinking following the use of ChatGPT (Fadila et al., 2025; Rizaldi et al., 2024). In some cases, students were not only able to solve problems but also began to demonstrate the ability to analyze and evaluate generated solutions (Youssef et al., 2024). These findings indicate that, according to mathematics teachers, ChatGPT can serve as more than merely a supporting tool in mathematics learning.

From the perspective of the learning process, teachers also perceive that the use of ChatGPT makes learning more flexible and adaptive. Students can receive feedback more quickly, while teachers are assisted in preparing learning materials more efficiently (Kharis & Zili, 2024). In addition, several studies indicate that the use of AI is associated with increased student motivation and engagement in learning (Husriani et al., 2026; Almarashdi et al., 2024). A meta-analysis conducted by Heung and Chiu (2025) also demonstrates that AI-based technology contributes positively to student engagement in learning. According to teachers, the effectiveness of ChatGPT is also reflected in its ability to support more personalized and adaptive learning. Learning materials, exercises, and feedback can be adjusted to

students' needs and levels of understanding, making the learning process more flexible and student-centered (Fortuna et al., 2025; Rasool et al., 2025). Teachers perceive that this flexibility provides opportunities for students to learn according to their own pace and abilities, particularly in understanding abstract mathematical concepts. In addition, ChatGPT can respond more directly to students' needs, making learning process more interactive and less rigid (Rücker & Becker-Genschow, 2025). Other findings also indicate that the use of ChatGPT can increase student engagement while supporting more personalized learning (Almarashdi et al., 2024). In this context, according to teachers, ChatGPT can help create more student-centered learning when appropriately integrated into the learning process.

Nevertheless, according to teachers, the effectiveness of using ChatGPT in mathematics learning does not always show consistent results across all learning contexts. Several studies indicate that improvements in learning outcomes are not always significant when the use of ChatGPT is not accompanied by appropriate learning strategies (Rücker & Becker-Genschow, 2025). However, when used appropriately, ChatGPT can enhance students' engagement and learning experiences (Youssef et al., 2024). These findings are reinforced by Heung and Chiu (2025), who reported increased student engagement both cognitively and emotionally in ChatGPT-based learning. Furthermore, Al-Mutawah (2026) and Mohamed et al. (2022) argue that the use of AI creates opportunities for more adaptive and interactive learning. Therefore, according to teachers, the effectiveness of ChatGPT is strongly influenced by how the technology is integrated into learning, including instructional strategies, teacher guidance, and appropriate classroom management during the learning process.

Overall, teachers perceive that the effectiveness of ChatGPT in mathematics learning depends not only on the sophistication of the technology itself but also on teachers' readiness to manage its use in the classroom. ChatGPT offers various advantages in providing explanations, feedback, and more adaptive learning support. However, these benefits will not be fully optimized without appropriate implementation and guidance. Therefore, from teachers' perspectives, ChatGPT is more appropriately positioned as a supporting tool that strengthens the mathematics learning process rather than replacing the teacher's role in guiding and developing students' mathematical reasoning.

3.2. Mathematics Teachers' Perspectives on the Benefits and Challenges of Using ChatGPT in Mathematics Learning

Based on the analysis of the reviewed articles, mathematics teachers perceive that the use of ChatGPT in mathematics learning provides various benefits as well as challenges within the learning process. According to teachers, the use of ChatGPT is not merely related to the application of technology itself, but also to how the technology can support learning processes that are more flexible, interactive, and responsive to students' needs. Various studies indicate that teachers' perspectives on the use of ChatGPT in mathematics learning are not uniform, but are influenced by teachers' experiences, readiness, competencies, and the context of technology use in learning.

Most studies indicate that teachers tend to have positive perspectives toward the use of ChatGPT in mathematics learning. Teachers perceive that the use of ChatGPT can help create learning that is more flexible, interactive, and responsive to students' needs. In addition to assisting teachers in preparing learning materials, ChatGPT is also considered capable of providing explanations and feedback more quickly to students (Kharis & Zili, 2024). This finding is consistent with Egara and Mosimege (2024), who reported that the integration of ChatGPT can increase student engagement in mathematics learning, particularly when students encounter complex mathematical concepts. In this context, teachers perceive that the use of ChatGPT can help create learning experiences that are more active and student-centered.

Furthermore, teachers also perceive that ChatGPT has the potential to support personalized learning in mathematics learning. Learning materials, exercises, and feedback can be adjusted to students' needs and levels of understanding, allowing the learning process to become more adaptive and flexible (Fortuna et al., 2025; Rasool et al., 2025). In mathematics learning, this condition is considered important because students often have different levels of understanding of abstract concepts. Li (2024) also highlights that AI technology opens opportunities for personalized

learning through the adjustment of learning materials according to students' needs and characteristics. Similarly, Prilop et al. (2025) state that the use of AI can enrich teaching strategies and encourage the development of more adaptive pedagogical approaches. In addition, ChatGPT can respond more directly to students' needs, making learning feel more interactive and less rigid (Rücker & Becker-Genschow, 2025). Other findings also indicate that the use of ChatGPT can increase student engagement while supporting more personalized learning (Almarashdi et al., 2024). From teachers' perspectives, these findings suggest that ChatGPT does not merely function as a technological tool, but can also support mathematics learning that is more aligned with students' learning needs.

Nevertheless, teachers also perceive that the use of ChatGPT in mathematics learning still faces several challenges in practice. Several studies indicate that the use of AI in classrooms remains relatively limited due to teachers' low levels of understanding and readiness in integrating technology into learning (Egara & Mosimege, 2024; Beege et al., 2024). Beege et al. (2024) also highlight the existence of a gap between the potential of AI and its actual implementation in classroom learning. This condition indicates that technological development has not been fully accompanied by implementation readiness at the practical level. In this context, teachers who possess better technological literacy and pedagogical readiness tend to find it easier to utilize ChatGPT in mathematics learning (Putra et al., 2021; Li, 2024). On the other hand, limited technological understanding and lack of experience in using AI remain obstacles to the optimal utilization of ChatGPT (Al-Mutawah, 2026).

In addition to teachers' readiness, other challenges also emerge in managing the learning process in classrooms. According to teachers, the use of ChatGPT still requires proper supervision and guidance to ensure that the technology genuinely supports students' learning processes. In practice, AI-based personalized learning is not always easy to implement because teachers still encounter difficulties in monitoring students' individual learning progress when AI use becomes intensive (Tripathi et al., 2025). Furthermore, concerns regarding the accuracy of AI-generated responses, the possibility of misinformation, and the use of technology without verification also remain important issues in mathematics learning (Mazi, 2025). These conditions indicate that the use of ChatGPT cannot be separated from teachers' roles in managing learning, including determining learning strategies and ensuring that learning processes remain meaningful.

Overall, teachers perceive that ChatGPT has considerable benefits in supporting mathematics learning, particularly in creating learning that is more flexible, interactive, adaptive, and supportive of personalized learning. However, these benefits cannot be fully achieved without teachers' readiness, adequate technological literacy, and appropriate learning management that aligns with the context of mathematics learning. Therefore, from teachers' perspectives, the successful use of ChatGPT in mathematics learning depends not only on the sophistication of the technology itself, but also on teachers' ability to integrate and manage the technology appropriately within the learning process.

3.3. Mathematics Teachers' Perspectives on the Potential for Technology Dependence from the Use of ChatGPT in Mathematics Learning

The discussion regarding the potential for technology dependence arising from the use of ChatGPT in mathematics learning stems from the convenience and flexibility offered by the technology in the learning process. According to teachers, ChatGPT's ability to provide rapid responses, present simpler explanations, and assist students in completing various academic tasks has led to its increasingly intensive use in mathematics learning. In the context of personalized learning, this flexibility enables students to obtain explanations and exercises that are more aligned with their needs and levels of understanding. However, teachers believe that such convenience should be used carefully so that it does not shift the focus of mathematics learning away from conceptual understanding and mathematical thinking processes (Mohamed et al., 2022; Li, 2024; Rasool et al., 2025).

Several studies indicate that excessive use of ChatGPT may affect students' critical thinking and reasoning abilities in mathematics learning (Firdaus et al., 2025). At the same time, student engagement in problem-solving processes may decline when students focus more on obtaining instant answers rather than understanding solution procedures comprehensively (Getenet et al., 2024; Egara & Mosimege, 2024). In practice, students often accept final answers directly without exploring the solution process, as reported by Tarnizi (2024) and Funny et al. (2024). Khusna and Fadli (2025) also highlighted that the convenience provided by AI may influence students' independent learning motivation. From teachers' perspectives, this condition demonstrates that the use of ChatGPT is not only related to ease of access to information, but also influences students' learning habits and engagement in mathematical thinking processes.

In addition to its impact on students, teachers also believe that the use of AI affects the role of teachers in mathematics learning. Teachers no longer function solely as information providers, but also as facilitators who guide the appropriate use of technology in the learning process. This shift requires teachers to adapt, both in designing learning strategies and in determining suitable evaluation methods (Tripathi et al., 2025; Prilop et al., 2025). In this context, strengthening AI literacy and understanding digital ethics become increasingly important to ensure that technology use continues to support personalized learning without reducing the quality of students' mathematical thinking processes.

From a technological perspective, the limitations of ChatGPT also remain a concern among teachers. Gouia-Zarrad and Gunn (2024) emphasized that AI does not always generate accurate responses, particularly when it is used without verification processes. This condition may reinforce students' dependence on technology because users tend to accept answers directly without further evaluation. Egara and Mosimege (2024) also showed that dependence on AI may contribute to a decline in students' reasoning and independent problem-solving abilities. According to teachers, these findings indicate that the use of ChatGPT still requires proper guidance, supervision, and management so that the technology does not replace students' mathematical thinking processes.

Nevertheless, teachers do not entirely perceive ChatGPT as a source of problems in mathematics learning. Several studies indicate that this technology can still support student engagement when it is used purposefully and under teacher supervision (Youssef et al., 2024; Heung & Chiu, 2025). However, according to teachers, these benefits can only be achieved when the use of ChatGPT is balanced with appropriate learning strategies that encourage students to remain actively involved in understanding concepts and solving mathematical problems independently.

Upon closer examination, the potential for technology dependence does not merely lie in the presence of the technology itself, but also in the changes in learning habits that accompany its use. When students become accustomed to obtaining instant answers, the thinking process that should constitute the core of mathematics learning may gradually diminish. In mathematics learning, this condition is particularly important because conceptual understanding depends not only on final answers, but also on the reasoning processes carried out by students. Therefore, according to teachers, ChatGPT should be positioned as a learning support tool that strengthens the learning process rather than replacing students' active engagement in understanding mathematical concepts.

Overall, teachers perceive that the potential for technology dependence resulting from the use of ChatGPT in mathematics learning is influenced by how the technology is used and integrated into the learning process. Although concerns remain regarding reduced independent learning, lower engagement in thinking processes, and increased dependence on instant answers, ChatGPT is still considered beneficial when used appropriately. Therefore, the use of ChatGPT in mathematics learning should be accompanied by appropriate learning strategies, teacher supervision, and strengthened digital literacy so that the technology can support personalized learning without reducing the quality of students' mathematical thinking processes.

4. Conclusion

The use of ChatGPT in mathematics learning indicates that artificial intelligence-based technology can support more flexible, interactive, and adaptive learning processes when used appropriately. From the perspectives of mathematics teachers, the effectiveness of ChatGPT is reflected not only in its ability to help students understand mathematical concepts, but also in its ability to support personalized learning through the provision of explanations, exercises, and feedback that are more responsive to students' learning needs. In this context, learning becomes more student-centered because students can adjust their learning pace and learning methods according to their level of understanding.

On the other hand, the use of ChatGPT in mathematics learning also presents several challenges. Teachers still face obstacles related to technological readiness, AI literacy, and the management of AI-based learning in the classroom. In addition, the accuracy of information generated by ChatGPT and the use of technology without verification processes remain concerns in mathematics learning. From mathematics teachers' perspectives, the use of ChatGPT still requires proper guidance, supervision, and instructional strategies to ensure that the technology does not replace students' mathematical thinking processes. This review also indicates the potential for technology dependence arising from the use of ChatGPT in mathematics learning. The ease of obtaining instant answers may affect students' engagement in mathematical reasoning and problem-solving processes. In some situations, students tend to focus more on final answers rather than understanding the overall solution process. If the use of ChatGPT is not managed properly, it may reduce students' independent learning and critical thinking skills in mathematics learning.

This study contributes to illustrating how mathematics teachers perceive the effectiveness, benefits, challenges, and potential for technology dependence arising from the use of ChatGPT in mathematics learning. In addition, the findings of this study may serve as a reference for teachers in designing and mapping ChatGPT-based mathematics learning that continues to support students' engagement in thinking processes and personalized learning in a more directed manner. However, this study still has limitations because it only focuses on mathematics teachers' perspectives and has not examined in greater depth the instructional strategies needed to reduce the potential for technology dependence in the use of ChatGPT. Furthermore, this study has not explored the direct implementation of ChatGPT in actual mathematics classroom contexts.

Therefore, future studies are recommended to explore the more ethical use of ChatGPT in mathematics learning processes, including instructional strategies that can maintain a balance between the use of AI technology and the development of students' critical thinking skills and independent learning.

References

Al-Mutawah, M. A. (2026). Mathematics teachers' perceptions of artificial intelligence in education (AIED): Practices and challenges. *Social Sciences and Humanities Open*, *13*(February), 102579. https://doi.org/10.1016/j.ssaho.2026.102579

Almarashdi, H. S., Jarrah, A. M., Khurma, O. A., & Gningue, S. M. (2024). Unveiling the potential: A systematic review of ChatGPT in transforming mathematics teaching and learning. *Eurasia Journal of Mathematics, Science and Technology Education*, *20*(12). https://doi.org/10.29333/ejmste/15739

Beege, M., Hug, C., & Nerb, J. (2024). AI in STEM education: The relationship between teacher perceptions and ChatGPT use. *Computers in Human Behavior Reports*, *16*(April), 100494. https://doi.org/10.1016/j.chbr.2024.100494

Egara, F. O., & Mosimege, M. (2024). Exploring the Integration of Artificial Intelligence-Based ChatGPT into Mathematics Instruction: Perceptions, Challenges, and Implications for Educators. *Education Sciences*, *14*(7). https://doi.org/10.3390/educsci14070742

Fadila, M. T., Untarti, R., Jazuli, A., & Jaelani, A. (2025). Mathematics in the AI Era: The Effectiveness of ChatGPT in Helping Students Solve HOTS Problems. *AlphaMath : Journal of Mathematics Education*, *11*(November), 191–204. https://doi.org/10.30595/alphamath.v11i2.28261

Firdaus, J. A., Ummah, R. I., Aprialini, R. R., Fithriyyah, A., Mahsus, & Faizin, A. (2025). Ketergantungan Penggunaan Kecerdasan Buatan (AI) pada Tugas Akademik Mahasiswa Terhadap Kemampuan Berpikir KritisdanKreatif. *Jurnal Kependidikan*, *14*(1), 1203–1214.

Fortuna, A., Prasetya, F., Samala, A. D., Rawas, S., Criollo-C, S., Kaya, D., Raihan, M., Andriani, W., Safitri, D., & Nabawi, R. A. (2025). Artificial intelligence in personalized learning: A global systematic review of current advancements and shaping future opportunities. *Social Sciences and Humanities Open*, *12*(November), 102114. https://doi.org/10.1016/j.ssaho.2025.102114

Funny, R. A., Kusumaningrum, M. A. D., & Rahmawati, F. K. (2024). *Southeast Asia Mathematics Education Journal Volume 14, No 1 (2024)*. *14*(1), 15–30.

Getenet, S. (2024). Pre-service teachers and ChatGPT in multistrategy problem-solving: Implications for mathematics teaching in primary schools. *International Electronic Journal of Mathematics Education*, *19*(1), 1–12. https://doi.org/10.29333/iejme/1414

Gouia-Zarrad, R., & Gunn, C. (2024). Enhancing students' learning experience in mathematics class through ChatGPT. *International Electronic Journal of Mathematics Education*, *19*(3). https://doi.org/10.29333/iejme/14614

Heung, Y. M. E., & Chiu, T. K. F. (2025). How ChatGPT impacts student engagement from a systematic review and meta-analysis study. *Computers and Education: Artificial Intelligence*, *8*(January), 100361. https://doi.org/10.1016/j.caeai.2025.10036

Husain, H., Syaharuddin, S., Yasriuddin, Y., & Agustina, S. W. (2026). *Efektivitas dalam Pembelajaran Matematika melalui Model NHT berba#sis PBL di SMPN 3 Binamu*. *8*, 193–208.

Kharis, S. A. A., & Zili, A. H. A. (2024). Chatgpt Sebagai Alat Pendukung Pembelajaran: Tantangan Dan Peluang Pembelajaran Abad 21. *Paedagoria : Jurnal Kajian, Penelitian Dan Pengembangan Kependidikan*, *15*(2), 206–214. http://journal.ummat.ac.id/index.php/paedagoria

Khusna, L. K., & Fadli, F. (2025). Pengaruh Ketergantungan Kecerdasan Buatan terhadap Motivasi Belajar Siswa pada Sistem Persamaan Linear Dua Variabel. *Jurnal Pendidikan Dan Kebudayaan*, *10*(2), 211–226. https://doi.org/10.24832/jpnk.v10i2.590

Li, M. (2024). Integrating Artificial Intelligence in Primary Mathematics Education: Investigating Internal and External Influences on Teacher Adoption. *International Journal of Science and Mathematics Education*, *23*(5), 1283–1308. https://doi.org/10.1007/s10763-024-10515-

Mazı, A. (2025). Developing a primary school teacher attitude scale for the use of ChatGPT in mathematics education. *Acta Psychologica*, *261*(October), 105729. https://doi.org/10.1016/j.actpsy.2025.10572

Mohamed, M. Z. B., Hidayat, R., Suhaizi, N. N. B., Sabri N. B. M., Mahmud, M. K. H. B., & Baharuddin, S. N. B. (2022). Artificial Intelligence in Mathematics Education: A Systematic Review. *Uniciencia*, *38*(1). https://doi.org/10.15359/ru.38-1.20

Prilop, C. N., Mah, D. K., Jacobsen, L. J., Hansen, R. R., Weber, K. E., & Hoya, F. (2025). Generative AI in teacher education: Educators' perceptions of transformative potentials and the triadic nature of AI literacy explored through AI-enhanced methods. *Computers and Education: Artificial Intelligence*, *9*(September), 100471. https://doi.org/10.1016/j.caeai.2025.100471

Putra, Z. H., Hermita, N., & Alim, J. A. (2021). Analisis Pengetahuan Matematika, Didaktika, dan Teknologi Calon Guru Sekolah Dasar Menggunakan Rasch Model. *Mosharafa: Jurnal Pendidikan Matematika*, *10*(3), 345–356. https://doi.org/10.31980/mosharafa.v10i3.667

Rasool, U., Li, J., & Liu, M. (2025). Perceptions of generative AI in teaching and learning: UTAUT and TPACK model-based study of teachers and students. *Acta Psychologica*, *261*(May), 105827. https://doi.org/10.1016/j.actpsy.2025.105827

Rizaldi, M., Sasalia, P., & Pancarita, P. (2024). Efektivitas Chatgpt Untuk Mendorong Berpikir Kritis Mahasiswa Dalam Menyelesaikan Masalah Aljabar. *EDU-MAT: Jurnal Pendidikan Matematika*, *12*(1), 168. https://doi.org/10.20527/edumat.v12i1.18668

Rakhmawati, M. R., Nirwana, F., Putri, Y. K., & Azzahra, A. (2025). *Analisis Efektivitas Artificial Intelligence (AI) Terhadap Pembelajaran Matematika Mahasiswa*. *7*(2), 466–476.

Rücker, C. R., & Becker-Genschow, S. (2025). Enhancing enthusiasm for STEM education with AI: Domain-specific chatbot as personalized learning assistant. *Computers and Education Open*, *9*(October), 100315. https://doi.org/10.1016/j.caeo.2025.100315

Supriyono, A., Lesmono, A. D., & Prihandono, T. (2024). Dampak dan Tantangan Pemanfaatan ChatGPT dalam Pembelajaran pada Kurikulum Merdeka: Tinjauan Literatur Sistematis. *Jurnal Pendidikan Dan Kebudayaan*, *9*(2), 134–152. https://doi.org/10.24832/jpnk.v9i2.5214

Tripathi, T., Sharma, S. R., Singh, V., Bhargava, P., & Raj, C. (2025). Teaching and learning with AI: a qualitative study on K-12 teachers' use and engagement with artificial intelligence. *Frontiers in Education*, *10*. https://doi.org/10.3389/feduc.2025.1651217

Wibowo, A., Prihanto, P., Yudanto, B. W., & Lestari, S. T. (2025). Analisis Efektivitas Pembelajaran ChatGPT untuk Meningkatkan Kemudahan Pemahaman Matematika Siswa SMA di Surakarta. *Decode: Jurnal Pendidikan Teknologi Informasi*, *5*(3), 1107–1119. https://doi.org/10.51454/decode.v5i3.1424

Youssef, E., Medhat, M., Abdellatif, S., & Al Malek, M. (2024). Examining the effect of ChatGPT usage on students' academic learning and achievement: A survey-based study in Ajman, UAE. *Computers and Education: Artificial Intelligence*, *7*(September). https://doi.org/10.1016/j.caeai.2024.100316