

Students' Perceptions of the Use of ChatGPT in Mathematics Learning: A Descriptive Study

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Abstract:

The increasing integration of generative artificial intelligence into education has positioned ChatGPT as a potential supplementary tool in mathematics learning. This study aims to describe students' perceptions of ChatGPT use in mathematics learning across nine dimensions: usage intensity, purposes of use, ease of use, learning benefits, support for independent learning, information reliability, critical evaluation, limitations and risks, and attitudes toward ChatGPT. A quantitative descriptive design was employed, involving 143 students with experience using ChatGPT in mathematics learning. Data were collected through a 28-item questionnaire using a five-point Likert scale and analyzed using descriptive statistics. The findings show that students' overall perception of ChatGPT use was high, with a mean score of 3.92. The highest score was found in attitudes toward ChatGPT (4.22), categorized as very high, while information reliability obtained the lowest score (3.48), although it remained in the high category. These findings indicate that students perceive ChatGPT as accessible, useful, and supportive of mathematics learning, while also recognizing the need to verify AI-generated information and avoid excessive dependence. The study highlights the importance of teacher guidance and critical AI literacy to ensure that ChatGPT supports mathematical understanding and independent thinking rather than replacing them.

Keywords: ChatGPT; Mathematics Learning; Students' Perceptions

INTRODUCTION

The development of digital technology has driven transformations across various aspects of life, including education. Generative artificial intelligence (AI) has emerged as one of the rapidly developing innovations supporting learning activities (Auna & Hamzah, 2024; Supriyono et al., 2024). ChatGPT is one such generative AI technology capable of generating text, explanations, examples, and interactive responses based on users' questions (H. S. A. Auna & Hamzah, 2024; Supriyono et al., 2024). This technology provides students with opportunities to obtain learning assistance that is rapid, flexible, and personalized (Dristian et al., 2023). The use of ChatGPT in mathematics learning has become an important phenomenon because mathematics requires conceptual understanding, reasoning, and systematic problem-solving skills.

Mathematics learning develops students' abilities to understand concepts, apply procedures, engage in reasoning, and solve problems. High-quality mathematics instruction should

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not emphasize only the achievement of final answers but also students' understanding of the mathematical steps and reasoning underlying those answers (Dristian et al., 2023). ChatGPT can support this process by providing alternative explanations, sample problems, solution hints, and feedback in response to students' questions (Marasabessy & Hasanah, 2021). Its dialogic interaction enables students to ask follow-up questions when they encounter difficulties in understanding learning materials (H. S. Auna et al., 2025; Sihotang et al., 2025). The use of this technology therefore has the potential to enrich students' mathematics learning experiences when employed appropriately.

Students can use ChatGPT to support independent mathematics learning activities. The technology can be used to review learning materials, check solution steps, compare methods, or obtain simpler explanations (Ihsani & Siswono, 2024). Its ease of access enables students to obtain additional learning resources beyond formal instructional hours (Alfian et al., 2025). The interactive responses provided by ChatGPT also allow students to explore various questions according to their individual learning needs. This pattern of use indicates that ChatGPT has the potential to function as a flexible and accessible learning support tool.

The use of ChatGPT in mathematics learning also presents academic and pedagogical challenges that require careful consideration. AI systems may generate conceptual errors, calculation mistakes, or explanations that are inappropriate for the mathematical context of a problem (H. S. A. Auna & Hamzah, 2024). Students who accept AI-generated answers without verification may be at risk of developing misconceptions and misunderstanding mathematical procedures (Sutrisno AB et al., 2025; Wahba, 2024). Dependence on ChatGPT may also reduce opportunities for students to develop independence, reasoning, and critical-thinking skills (Nurcahyani & Noviani, 2026). Therefore, students' perceptions of the accuracy, usefulness, ease of use, and limitations of this technology are important aspects in understanding how ChatGPT can be used responsibly.

Previous studies have examined the use of ChatGPT and generative AI in various educational contexts. Several studies have highlighted the potential of these technologies to support learning, provide feedback, improve access to information, and assist students in completing academic tasks (Jauhiainen & Garagorry Guerra, 2025; Lestari, 2024). Research in

mathematics education has also begun to explore ChatGPT's ability to explain concepts, solve problems, and provide alternative solution procedures (Sarumaha & Saputri, 2025). The findings indicate that the usefulness of ChatGPT is determined not only by the capabilities of the system but also by students' attitudes, trust, and patterns of use (Liu et al., 2023; Rusmiati et al., 2025). User perceptions are therefore an important factor influencing technology acceptance and the quality of its use in learning processes.

Research on students' perceptions of ChatGPT use in mathematics learning requires further examination through a comprehensive descriptive approach. Although previous studies have demonstrated ChatGPT's potential to support learning, explain mathematical concepts, and provide alternative problem-solving procedures (Lestari, 2024; Sarumaha & Saputri, 2025), students' experiences and perceptions as direct users have not yet been fully examined in an integrated manner. Aspects such as usage patterns, purposes of use, ease of access, learning benefits, trust in AI-generated answers, and students' critical awareness still need to be analyzed within a comprehensive descriptive framework. Furthermore, the usefulness of ChatGPT is influenced by students' attitudes, trust, and patterns of use (Rusmiati et al., 2025), highlighting the importance of understanding not only the technological capabilities but also how students accept, utilize, and evaluate AI-generated outputs. Therefore, descriptive research is needed to obtain a more comprehensive empirical account of students' perceptions of ChatGPT use in mathematics learning.

This study aims to describe students' perceptions of ChatGPT use in mathematics learning. These perceptions are examined in terms of learning benefits, ease of use, support for the learning process, information reliability, and the limitations of ChatGPT use. The novelty of this study lies in presenting a descriptive profile that integrates students' usage experiences, purposes of use, trust in AI-generated outputs, and critical awareness within the context of mathematics learning. The findings are expected to provide an empirical basis for teachers and learning developers in designing effective, critical, and responsible uses of ChatGPT. Accordingly, this study contributes to the development of AI-assisted mathematics learning that continues to place conceptual understanding, thinking processes, and student independence at the center of instruction.

METHODS

This study employed a quantitative approach using a descriptive research design. This design was selected to describe students' perceptions of ChatGPT use in mathematics learning based on their experiences using the technology as a learning aid. The study did not involve any experimental treatment and was not intended to examine causal relationships between variables. The research focused on students' perceptions regarding usage intensity, purposes of use, ease of access, learning benefits, support for independent learning, information reliability, critical evaluation skills, limitations, risks, and attitudes toward ChatGPT use.

The participants were students who had experience using ChatGPT in mathematics learning activities. Respondents were selected through purposive sampling based on several criteria: students who participated in mathematics learning, were familiar with and had used ChatGPT, used ChatGPT to understand learning materials, find examples of problems, assist in solving problems, or recheck answers, and were willing to participate in the study. This sampling technique was employed to ensure that the data were obtained from students with direct experience using ChatGPT in mathematics learning.

The research instrument was a closed-ended questionnaire developed based on the research objectives and aspects of artificial intelligence use in education. The questionnaire consisted of 28 statements covering nine aspects: usage intensity, purposes of use, ease of use, learning benefits, support for independent learning, information reliability, critical evaluation, limitations and risks, and students' attitudes toward ChatGPT. Each statement was rated using a five-point Likert scale: strongly agree, agree, moderately agree, disagree, and strongly disagree. Positive statements were scored from 5 to 1, whereas negative statements were scored in reverse order.

Before data collection, the questionnaire was reviewed by experts to assess content validity, language clarity, and the relevance of each item to the research objectives. The questionnaire consisted of 28 items covering nine dimensions of students' perceptions of ChatGPT use in mathematics learning. The responses were measured using a five-point Likert scale, with positive and negative items scored accordingly. The questionnaire blueprint is presented in Table 1.

Table 1. Questionnaire Instrument Blueprint

No.	Dimension Measured	Indicator	Item Numbers	Number of Items
1	Usage intensity	Frequency of ChatGPT use in mathematics learning	1–2	2
2	Purposes of use	Understanding learning materials, finding example problems, solving problems, and checking answers	3–6	4
3	Ease of use	Ease of access, operation, and asking questions	7–9	3
4	Learning benefits	Conceptual understanding, solution steps, and alternative methods	10–13	4
5	Support for independent learning	Independent learning, reviewing materials, and overcoming learning difficulties	14–16	3
6	Information reliability	Trustworthiness, clarity, and appropriateness of mathematical explanations	17–19	3
7	Critical evaluation	Checking answers, comparing sources, and evaluating AI responses	20–22	3
8	Limitations and risks	Incorrect answers, dependency, and reduced independence in thinking	23–25	3
9	Attitudes toward ChatGPT	Acceptance, interest, and responsible use	26–28	3
Total				28

Data were collected by distributing the questionnaire to respondents either directly or through an online survey platform. Before completing the questionnaire, respondents were informed about the purpose of the study, data confidentiality, the voluntary nature of participation, and the instructions for completing the questionnaire. Respondents were asked to provide answers based on their actual experiences using ChatGPT in mathematics learning. The collected data were then checked for completeness, coded, tabulated, and prepared for descriptive analysis.

The data were analyzed using descriptive statistics, including frequencies, percentages, minimum scores, maximum scores, means, and standard deviations. The results were used to describe the general tendency of students' perceptions of ChatGPT use in mathematics learning. The interpretation of mean scores was based on five categories, as presented in Table 2.

Table 2. Criteria for Interpreting Mean Scores

No.	Mean Score Range	Category
1	1.00–1.80	Very Low
2	1.81–2.60	Low
3	2.61–3.40	Moderate
4	3.41–4.20	High
5	4.21–5.00	Very High

The results of the analysis were subsequently presented in tables and narrative descriptions to provide a comprehensive overview of students' perceptions of ChatGPT use in mathematics learning.

RESULTS

This study involved 143 students as respondents. Data were collected using a closed-ended questionnaire consisting of 28 statements measured on a five-point Likert scale. The questionnaire assessed nine dimensions of students' perceptions of ChatGPT use in mathematics learning. The results of the analysis are presented in the form of mean scores and interpretive categories for each measured dimension.

Table 3. Results of the Analysis of Students' Perceptions of ChatGPT Use

No.	Measured Dimension	Mean	Category
1	Usage intensity	3.62	High
2	Purpose of use	4.05	High
3	Ease of use	4.18	High
4	Learning benefits	4.12	High
5	Support for independent learning	3.96	High
6	Information reliability	3.48	High
7	Critical evaluation	3.71	High
8	Limitations and risks	3.89	High
9	Attitude toward ChatGPT	4.22	Very High
Overall mean		3.94	High

As shown in Table 3, the overall mean score of students' perceptions of ChatGPT use was 3.94, which falls into the high category. Of the nine dimensions analyzed, eight were categorized as high. The attitude toward ChatGPT dimension was categorized as very high, with a mean score of 4.22. The lowest mean score was found for information reliability, at 3.48, although it remained within the high category.

To illustrate the comparison of mean scores across the dimensions, the results are subsequently presented in graphical form. The graph depicts the distribution of students' perception scores across the nine measured dimensions. This visual presentation is intended to provide a clearer illustration of the differences in mean scores among the dimensions. The values presented in the graph are based on the analysis results shown in Table 3.

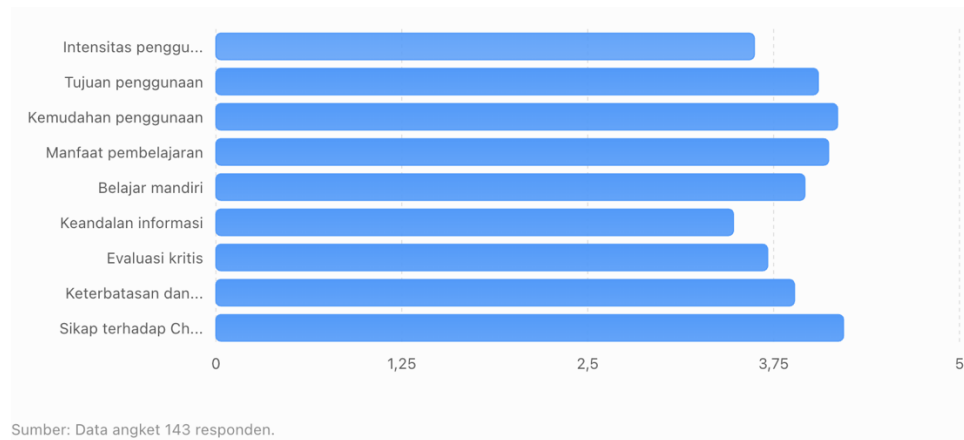


Figure 1. Mean Scores of Students' Perceptions of ChatGPT Use

Figure 1 shows that the mean scores for the nine dimensions ranged from 3.48 to 4.22. The attitude toward ChatGPT dimension had the highest mean score, at 4.22, followed by ease of use at 4.18 and learning benefits at 4.12. Information reliability had the lowest mean score, at 3.48.

The purpose-of-use dimension obtained a mean score of 4.05, while support for independent learning obtained a score of 3.96. The limitations and risks dimension obtained a score of 3.89, followed by critical evaluation at 3.71. Usage intensity obtained a mean score of 3.62. All dimensions were categorized as high, except for attitude toward ChatGPT, which was categorized as very high.

DISCUSSION

The overall perception of students regarding the use of ChatGPT in mathematics learning obtained a mean score of 3.92, which falls into the high category. This finding indicates that ChatGPT is perceived as a technology that provides tangible benefits in supporting learning activities, particularly when students need additional explanations, worked examples, or assistance in understanding material they have not yet mastered. This condition demonstrates that the potential of generative AI as a fast, flexible, and accessible learning technology is directly experienced by students in their learning activities (Dristian et al., 2023; Supriyono et al., 2024). However, this positive perception should not be interpreted as evidence of a causal improvement in learning outcomes because the present study is descriptive in nature; rather, it indicates that ChatGPT has gained strong acceptance as a source of support for mathematics learning.

The ease-of-use dimension obtained a mean score of 4.18 and was categorized as high. This score indicates that students experienced no significant difficulties when accessing ChatGPT, asking questions, or obtaining responses to support their mathematics learning needs. Such ease of use enables students to utilize ChatGPT spontaneously when encountering difficulties, without having to wait for explanations from teachers or search for learning resources through more time-consuming processes. This finding reinforces the view that generative AI technology offers advantages in terms of accessibility and flexibility because it can provide responses tailored to users' questions within a relatively short period (Lestari, 2024). Ease of access is therefore an important factor contributing to ChatGPT's acceptance as a learning companion, although ease of use does not automatically guarantee the accuracy of the information provided.

The purpose-of-use dimension obtained a mean score of 4.05, which falls into the high category. This finding indicates that students' use of ChatGPT was not limited to obtaining final answers but was also associated with the need to understand learning materials, request examples, obtain assistance in solving problems, and check answers they had already produced. This pattern suggests that ChatGPT was utilized as a support tool at several stages of the mathematics learning process, ranging from understanding problems to evaluating solution outcomes. Ihsani and Siswono (2024) reported that AI can be used to review learning materials, check solution steps, compare methods, and obtain explanations in simpler language. The findings of the present study indicate that the function of ChatGPT has moved beyond that of an answer provider toward becoming a source of cognitive assistance used according to students' learning needs.

The perceived learning benefits dimension obtained a mean score of 4.12 and was categorized as high. This score indicates that students perceived ChatGPT as helpful in understanding concepts, obtaining additional explanations, finding examples, and overcoming difficulties in mathematics learning. These perceived benefits suggest that ChatGPT responses can function as temporary support when students have not yet achieved sufficient understanding through the primary explanations provided by teachers or textbooks. This function is consistent with the view that learning technologies can provide assistance in the form of explanations, examples, solution hints, and learning support adapted to users' needs (Marasabessy & Hasanah, 2021). In this context, ChatGPT is more appropriately understood as cognitive scaffolding that

assists students in constructing understanding rather than as a substitute for mathematical thinking and reasoning.

The support for independent learning dimension obtained a mean score of 3.96 and was categorized as high. This finding indicates that students were able to use ChatGPT when studying outside the classroom, reviewing learning materials independently, and obtaining assistance without always depending on the presence of a teacher. Such support is important because it provides students with opportunities to manage their time, determine which materials they wish to review, and ask follow-up questions according to the difficulties they encounter. The use of AI as an out-of-class learning resource is also consistent with the findings of Alfian et al. (2025), who emphasized that AI technology can expand students' access to learning resources. Nevertheless, a high perception of support for independent learning cannot be directly interpreted as evidence of strong self-regulation, because independent learning requires not only access to assistance but also the ability to set goals, control strategies, evaluate understanding, and take responsibility for the learning process.

The information reliability dimension obtained a mean score of 3.48, representing the lowest score among all dimensions, although it still fell into the high category. This finding indicates that students maintained a relatively critical position toward ChatGPT-generated responses. Students acknowledged the usefulness and convenience of ChatGPT while simultaneously recognizing that not all information provided by the system is necessarily correct or acceptable without verification. This attitude is related to the characteristics of generative AI, which can produce linguistically convincing responses while still having the potential to contain conceptual errors, calculation mistakes, or inappropriate solution procedures (Auna & Hamzah, 2024). The relatively lower score for information reliability suggests that students were beginning to recognize the need to verify AI-generated answers, particularly in mathematics, where conceptual accuracy, formulas, solution steps, and calculation results are essential.

The critical evaluation dimension obtained a mean score of 3.71 and was categorized as high. This finding indicates that students tended not to accept ChatGPT responses entirely passively but instead reconsidered their correctness and relevance to the problems being studied. This ability is important because the use of AI in mathematics learning requires users to examine

solution steps, compare responses with other sources, and identify possible errors. Such evaluative awareness is consistent with studies that emphasize dialogic interaction, follow-up questions, and response verification as important components of using AI to clarify understanding (H. S. Auna et al., 2025; Sihotang et al., 2025). The high score on this dimension indicates the potential development of AI literacy among students, although the present study did not directly measure whether this critical attitude was consistently translated into actual verification practices when students used ChatGPT.

The limitations and risks dimension obtained a mean score of 3.89 and was categorized as high. This finding indicates that students were sufficiently aware of the risks associated with ChatGPT use, including the possibility of receiving incorrect answers, becoming dependent on technology, reducing their cognitive effort, or using generated answers without understanding the underlying process. Awareness of these risks is important because ChatGPT's ability to generate responses rapidly may encourage students to bypass thinking processes that should otherwise be carried out independently. Sutrisno AB et al. (2025) emphasized that the use of AI without verification may lead to misconceptions, while Nurcahyani and Noviani (2026) warned that dependence on AI may weaken independence, reasoning, and critical thinking skills. The high score on the risk dimension indicates that students recognized not only the benefits of ChatGPT but also the potential consequences of its use for the quality of the learning process.

The attitude toward ChatGPT dimension obtained a mean score of 4.22, making it the highest-scoring dimension and placing it in the very high category. This finding indicates that students had a highly positive acceptance of ChatGPT and perceived it as a technology relevant to their mathematics learning needs. This acceptance can be explained by the relationship between perceived usefulness, ease of use, and experiences of receiving assistance aligned with their learning needs. Rusmiati et al. (2025) explained that the usefulness of ChatGPT is determined not only by its technological capabilities but also by students' attitudes, trust, and patterns of use. The high attitude score demonstrates that ChatGPT has gained practical legitimacy among students as a learning companion. However, this positive acceptance needs to be directed toward reflective acceptance that remains accompanied by verification and academic responsibility.

The score pattern across the nine dimensions indicates that students expressed the strongest perceptions regarding attitude, ease of use, learning benefits, and purpose of use, whereas information reliability received the relatively lowest score. This pattern reveals a distinction between technology acceptance and the level of trust placed in the accuracy of the outputs generated by the technology. Students appeared to accept ChatGPT as a useful and easy-to-use tool but did not entirely regard it as an information source free from error. This condition is consistent with the view that effective AI use in education depends not only on access and acceptance but also on the ability to evaluate, verify, and use information responsibly (Rusmiati et al., 2025; Sutrisno AB et al., 2025). These findings suggest that the primary challenge in utilizing ChatGPT for mathematics learning is no longer merely increasing technology acceptance, but ensuring that such acceptance develops alongside critical literacy and students' epistemic responsibility.

The findings have important implications for the use of ChatGPT in mathematics learning. ChatGPT should be positioned as a tool to support thinking rather than as a machine that simply provides final answers. Teachers can design learning activities that require students to compare ChatGPT-generated responses with manual solutions, identify errors in AI responses, verify the accuracy of formulas, and explain the mathematical reasoning underlying each solution step. Such strategies allow the benefits of ChatGPT to be maintained while reducing the risks of dependence and passive acceptance of information. The teacher's role is therefore essential in cultivating habits of verification, dialogue, reflection, and argumentation so that students' interactions with AI continue to support the development of conceptual understanding and mathematical thinking skills.

CONCLUSIONS

This study concludes that students generally perceive ChatGPT positively as a support tool in mathematics learning. ChatGPT is considered accessible, flexible, and useful for understanding mathematical concepts, obtaining solution examples, addressing learning difficulties, checking answers, and supporting independent learning. Nevertheless, this positive perception is accompanied by concerns regarding the reliability of generated information, the possibility of inaccurate responses, the need for verification, and the risk of excessive dependence on artificial

intelligence. ChatGPT should therefore be regarded not as an unquestionable source of mathematical knowledge, but as a complementary learning tool that requires critical evaluation, academic responsibility, and appropriate teacher guidance.

This study is limited by its descriptive quantitative design, purposive sampling, reliance on self-reported questionnaire responses, and focus on students' perceptions rather than objectively measured learning outcomes or actual patterns of ChatGPT use. The findings consequently cannot establish causal relationships or determine whether positive perceptions directly lead to improved mathematical understanding or reasoning. Future research should employ experimental, quasi-experimental, longitudinal, or mixed-methods designs to examine how ChatGPT use influences mathematical achievement, conceptual understanding, problem-solving, critical thinking, and learning autonomy. Further studies should also investigate actual interaction patterns with ChatGPT, the effectiveness of teacher-guided verification strategies, and differences in the impact of ChatGPT across students with varying levels of digital literacy, self-regulated learning, and mathematical ability.

AUTHOR CONTRIBUTIONS

All authors contributed to the conceptualization, methodology, data analysis, writing, and revision of the manuscript. All authors approved the final version.

DISCLOSURE STATEMENT

The authors declare no conflict of interest.

AI USE STATEMENT

AI tools were used solely for language editing and grammar improvement. The authors remain responsible for the accuracy, originality, and integrity of the manuscript.

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