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The Effect of ChatGPT Utilization on Students' Digital Literacy at SMA Negeri 1 2X11 Kayutanam

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Abstract

The rapid development of artificial intelligence (AI), particularly ChatGPT, has transformed learning practices by providing students with immediate access to information and interactive academic support. However, empirical evidence regarding its influence on digital literacy among secondary school students remains limited. This study examined the effect of ChatGPT utilization on the digital literacy of students at SMA Negeri 1 2X11 Kayutanam. A quantitative approach with a descriptive design was employed, involving 82 students selected through simple random sampling from a population of 448 students. Data were collected using questionnaires, supported by interviews and a literature review, and analyzed through descriptive statistics and simple linear regression using SPSS version 25. The findings showed that both ChatGPT utilization and students' digital literacy were categorized as good. Hypothesis testing demonstrated that ChatGPT utilization had a positive and statistically significant effect on digital literacy ($t = 4.558$, $p < 0.001$), accounting for 20.6% of the variance in students' digital literacy ($R^2 = 0.206$). These findings indicate that responsible ChatGPT utilization can contribute to strengthening students' digital literacy. This study provides empirical evidence regarding the role of

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generative AI in secondary education and offers practical implications for schools and educators seeking to integrate ChatGPT into learning while promoting critical thinking, information verification, and ethical digital practices.

Keywords: Artificial Intelligence; ChatGPT Utilization; Digital Literacy; Learning Technology; Secondary Education

INTRODUCTION

The rapid advancement of information technology has significantly transformed educational practices by reshaping how students access, process, and communicate information. Digital technologies have evolved beyond their traditional role as communication tools and are now essential components of modern learning environments that facilitate flexible, interactive, and student-centered education (Rosyad & Harsono, 2021). The continuous expansion of internet-based technologies has also encouraged educational institutions to integrate digital resources into teaching and learning activities, allowing students to obtain information more efficiently regardless of time and geographical limitations (Suhiroh & Zuhri, 2021).

The increasing accessibility of digital technologies has accelerated educational innovation while simultaneously creating new challenges associated with information management and critical thinking. Digital transformation requires learners not only to operate technological devices but also to develop competencies that enable them to locate, understand, evaluate, and utilize digital information responsibly in academic contexts (Aziz et al., 2021). Consequently, technology has become an inseparable element of contemporary education because it supports independent learning, collaborative activities, and continuous knowledge acquisition in increasingly digital societies (Andita & Yusuf, 2021).

One of the most influential outcomes of digital transformation is the rapid development of Artificial Intelligence (AI). AI has evolved from a theoretical concept into an intelligent technology capable of simulating various human cognitive processes, including learning, reasoning, language understanding, and problem solving. Recent developments demonstrate that AI has become an important technological innovation capable of improving educational effectiveness through adaptive and intelligent learning systems (Jamaaluddin & Sulistyowati, 2021). As AI technologies continue to mature, their educational

applications have expanded considerably, enabling learners to receive immediate academic assistance while promoting more personalized learning experiences (Mutaqin et al., 2023).

The integration of AI into education has become increasingly prominent because intelligent systems are capable of supporting instructional activities through automated feedback, personalized recommendations, and interactive communication. These technological capabilities allow AI to function as an educational partner rather than merely a computational tool, thereby improving learning efficiency and facilitating students' comprehension of complex concepts (Astuti & Baysha, 2024). Moreover, the growing adoption of AI across educational institutions reflects its strategic role in preparing learners for digital societies characterized by rapid technological advancement and continuous knowledge development (Anam et al., 2025).

Among various AI applications, ChatGPT has emerged as one of the most widely utilized generative AI platforms within educational settings. ChatGPT employs Natural Language Processing (NLP) to generate human-like responses that enable users to engage in interactive conversations while obtaining explanations, academic references, writing assistance, and problem-solving support. Its ability to respond contextually has encouraged students to incorporate ChatGPT into daily learning activities as an accessible and efficient educational resource (Manza & Wayahdi, 2025). Since its introduction, ChatGPT has transformed conventional learning patterns by providing immediate access to knowledge without requiring students to search through multiple digital sources manually (Pebrian & Farhat, 2023).

The growing popularity of ChatGPT has generated considerable attention among educators because it offers substantial educational opportunities while simultaneously introducing important pedagogical challenges. Students may benefit from ChatGPT through faster access to information, clearer conceptual explanations, improved academic writing, and enhanced learning efficiency. Nevertheless, unrestricted dependence on AI-generated responses may reduce learners' motivation to evaluate information critically or develop independent reasoning abilities, thereby influencing the quality of learning outcomes (Hermanto et al., 2024).

This educational phenomenon has become increasingly relevant because students are now interacting with AI technologies on a daily basis. Rather than relying exclusively on textbooks or conventional search engines, many learners prefer obtaining instant responses

from conversational AI platforms. Such behavioral changes indicate that AI has begun influencing not only information acquisition but also students' approaches toward learning, problem solving, and academic decision-making (Faiz & Kurniawaty, 2023).

The extensive utilization of ChatGPT highlights the growing importance of digital literacy as a fundamental competency required in contemporary education. Digital literacy is widely recognized as a multidimensional competence encompassing the ability to access digital resources, comprehend information, evaluate source credibility, produce digital content, and demonstrate ethical behavior within digital environments. These competencies enable learners to interact critically and responsibly with rapidly expanding digital information ecosystems (Salim et al., 2023).

Digital literacy has become increasingly essential because technological advancement continuously increases the availability of online information whose quality and credibility vary considerably. Students who possess strong digital literacy skills are more capable of distinguishing reliable information from inaccurate or misleading content while utilizing digital technologies productively for academic purposes. Conversely, inadequate digital literacy may encourage excessive dependence on technological systems without sufficient verification or critical evaluation of generated information (Kurnia et al., 2017).

Within AI-supported learning environments, digital literacy serves as an important foundation for ensuring that technological innovations contribute positively to educational development rather than replacing students' independent thinking. Learners are expected to use ChatGPT not merely as an automatic answer generator but as a learning assistant that supports analytical reasoning, information verification, and reflective learning practices. Therefore, effective AI utilization should always be accompanied by adequate digital literacy competencies that enable students to interpret AI-generated information critically and responsibly (Kurnianingsih et al., 2020).

Educational researchers increasingly argue that successful integration of AI depends not only on technological accessibility but also on learners' capacity to evaluate digital information before accepting it as factual knowledge. Students who critically analyze AI-generated responses are more likely to develop meaningful understanding, whereas passive acceptance of automatically generated answers may weaken higher-order thinking skills essential for lifelong learning (Amri et al., 2024).

Furthermore, ethical awareness has become an equally important component of digital literacy because AI technologies raise concerns regarding academic integrity, plagiarism, misinformation, and responsible information sharing. Students should therefore understand that AI-generated content requires verification, appropriate citation, and thoughtful interpretation before being incorporated into academic work. Such awareness strengthens responsible digital citizenship and promotes sustainable educational use of emerging technologies (Nugraha, 2023).

The increasing integration of ChatGPT into educational activities has encouraged numerous researchers to examine its educational implications from various perspectives. Likewise, AI-powered learning environments have been shown to increase students' engagement by providing adaptive learning experiences that correspond to individual educational needs (Hidayah, 2025).

Several empirical studies have specifically investigated ChatGPT as an educational technology. Evidence indicates that ChatGPT assists students in completing academic tasks, generating ideas, improving writing quality, and obtaining explanations more efficiently than conventional learning resources (Hidayat et al., 2025). Other researchers also emphasize that the interactive nature of ChatGPT enables students to conduct independent learning while strengthening their confidence in exploring unfamiliar concepts through immediate feedback and contextual explanations (Bahy & Abdul Majid, 2025).

Research concerning digital literacy has similarly demonstrated that students' ability to evaluate, verify, and manage digital information determines the effectiveness of technology-assisted learning. Learners with higher digital literacy are generally more capable of identifying credible information sources, interpreting online content critically, and utilizing digital technologies ethically throughout academic activities (Junaidi et al., 2025). These competencies have become increasingly significant because digital learning environments continuously expose students to large volumes of information with varying levels of reliability.

Recent investigations have also explored the relationship between ChatGPT and digital literacy. Previous findings indicate that students possessing stronger digital literacy competencies tend to utilize ChatGPT more responsibly by validating AI-generated information before applying it to academic assignments (Fadliyah & Zatadini, 2024). Similarly, digital literacy has been identified as an important moderating factor influencing

students' perceptions of AI technologies and their ability to maximize educational benefits while minimizing potential risks associated with technological dependency (Aswidani, 2025).

Although previous studies have contributed valuable insights regarding Artificial Intelligence and digital learning, important limitations remain evident within the existing literature. Most available studies concentrate on higher education students, while empirical investigations involving senior high school students remain comparatively limited. Furthermore, many studies primarily evaluate ChatGPT from the perspectives of academic achievement, learning effectiveness, creativity, or user perception without comprehensively examining its direct influence on students' digital literacy competencies across multiple dimensions.

Existing research has not sufficiently explained how ChatGPT influences the development of digital literacy among senior high school students, particularly within Indonesian educational contexts. Moreover, previous investigations rarely measure digital literacy comprehensively by incorporating competencies related to digital access, information comprehension, information verification, digital creativity, and digital ethics simultaneously. This limitation demonstrates the necessity for empirical research that specifically analyzes the relationship between ChatGPT utilization and students' digital literacy using a multidimensional framework. This study offers several distinctive contributions to the existing body of knowledge. First, it focuses specifically on senior high school students, a population that remains underrepresented in current ChatGPT research. Second, this study conceptualizes ChatGPT through five dimensions comprising learning ability, critical thinking, problem-solving ability, language and information understanding, and adaptability, while digital literacy is examined through five complementary dimensions consisting of digital access and technology utilization, information comprehension, information verification, digital creativity and content production, as well as digital ethics and security. Third, this research provides empirical evidence from SMA Negeri 1 2X11 Kayutanam, thereby extending current knowledge regarding AI implementation within Indonesian secondary education.

The theoretical foundation of this research integrates the concepts of Artificial Intelligence and digital literacy to explain how intelligent technologies may influence students' learning behavior. Artificial Intelligence is understood as a computational system capable of performing cognitive functions that resemble human intelligence through

adaptive learning and natural language processing technologies (Kaplan & Haenlein, 2019). Meanwhile, digital literacy represents a comprehensive competence that enables individuals to access, evaluate, produce, communicate, and utilize digital information responsibly within contemporary technological environments (Belshaw, 2011).

From this perspective, ChatGPT should not merely be viewed as an information-generating application but as a technological medium whose educational value depends largely on users' ability to evaluate and interpret its responses critically. Students who possess adequate digital literacy are expected to maximize ChatGPT's educational benefits while minimizing the risks associated with misinformation, plagiarism, and excessive technological dependence. Consequently, strengthening digital literacy remains an essential prerequisite for the responsible integration of Artificial Intelligence into formal education.

Based on these considerations, this study aims to analyze the influence of ChatGPT on students' digital literacy at SMA Negeri 1 2X11 Kayutanam. Specifically, the research seeks to describe students' level of ChatGPT utilization, identify their level of digital literacy, and examine whether ChatGPT significantly affects the development of digital literacy competencies among senior high school students. The findings are expected to enrich the theoretical discourse concerning Artificial Intelligence in education while providing practical recommendations for teachers, schools, and policymakers in designing balanced learning strategies that encourage students to utilize ChatGPT critically, ethically, creatively, and responsibly as part of sustainable digital education.

METHODS

This study employed a quantitative research method with a descriptive approach to examine the effect of ChatGPT utilization on students' digital literacy at SMA Negeri 1 2X11 Kayutanam. The research was conducted from May to June 2026, with data collection beginning on 24 May 2026. The quantitative approach was selected to test the proposed hypothesis through statistical analysis and to describe the relationship between the independent and dependent variables. The independent variable was ChatGPT utilization, which was measured using five indicators: learning ability, critical thinking ability, problem-solving ability, language and information comprehension, and adaptability. The dependent variable was students' digital literacy, measured through five indicators: access and use of

digital technology, digital information comprehension, information evaluation and verification, digital creativity and content production, and digital ethics and security. These indicators were developed into 50 questionnaire items based on the theoretical framework adopted in the study.

The study population consisted of 448 students enrolled in grades X, XI, and XII at SMA Negeri 1 2X11 Kayutanam during the 2025/2026 academic year. A sample of 82 students was selected using simple random sampling, with the sample size determined by the Slovin formula at a 10% margin of error. This sampling technique ensured that each student had an equal opportunity to participate in the research. Data were collected using a structured questionnaire distributed through Google Forms via WhatsApp. Preliminary data were also obtained through observations, interviews with six students, and a literature review to support the research background. Instrument validity was assessed using the Pearson Product–Moment correlation, indicating that all questionnaire items were valid (r-count > r-table = 0.217). Instrument reliability was evaluated using Cronbach's Alpha, producing a coefficient of 0.912 for both variables, indicating excellent internal consistency.

The collected data were analyzed using SPSS version 25. Descriptive statistics were employed to describe respondents' characteristics and research variables. Prior to hypothesis testing, the data satisfied the assumptions of normality and linearity. The research hypothesis was then tested using a simple linear regression t-test, while the coefficient of determination (R^2) was calculated to determine the contribution of ChatGPT utilization to students' digital literacy.

RESULTS

a. Normality Test

Table 1. Normality Test Results

One-Sample Kolmogorov-Smirnov Test		
		Unstandardized Residual
N		82
Normal Parameters [a,b]	Mean	0.0000000
	Std. Deviation	12.06229476

Most	Absolute	0.102
Extreme Differences	Positive	0.102
	Negative	-0.062
Test Statistics		0.102
Asymp. Sig. (2- tailed)		,072 [c]
a. Test distribution is Normal.		
b. Calculated from data.		
c. Lilliefors Significance Correction.		

source: Compiled by the researcher (2026)

Table 1. Normality Test Results shows that the Asymp. Sig. (2-tailed) value is 0.072, which exceeds 0.05, indicating that the data are normally distributed. Therefore, the data satisfy the normality assumption and are suitable for subsequent regression analysis.

b. Linearity Test

Table 2. Linearity Test Results

ANOVA [a]						
Model		**Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**
1	Regression	3060,646	1	3060,646	20,776	,000 [b]
	Residual	11785,415	80	147,318		
	Total	14846,061	81			
a. Dependent Variable: Literacy Digital Student						
b. Predictors: (Constant), ChatGPT						

source: Compiled by the researcher (2026)

Table 2. Linearity Test Results shows an F value of 20.776 with a significance value of 0.000 ($p < 0.05$), indicating a statistically significant linear relationship between ChatGPT use (X) and students' digital literacy (Y). Therefore, the data satisfy the linearity assumption for linear regression analysis.

c. Hypothesis Test (t-Test)

Table 3. Hypothesis Test Results

Coefficients [a]						
Model		**Unstandardized Coefficients**		**Standardized Coefficients**	**t**	**Sig.**
		B	**Std. Error**	**Beta**		
1	(Constant)	48,043	9,612		4,998	0,000
	ChatGPT	0.451	0.099	0.454	4,558	0,000
a. Dependent Variable: Literacy Digital Student						

Table 3. Hypothesis Test Results shows that the t value is 4.558 with a significance value of 0.000 ($p < 0.05$), indicating that ChatGPT use (X) has a positive and statistically significant effect on students' digital literacy (Y).

d. Coefficient of Determination Test

Table 4. Coefficient of Determination Test Results

Model Summary [b]				
Model	**R**	**R Square**	**Adjusted R Square**	**Std. Error of the Estimate**
1	,454 [a]	0.206	0.196	12.13745
a. Predictors: (Constant), ChatGPT				
b. Dependent Variable: Literacy Digital Student				

source: Compiled by the researcher (2026)

Table 4. Coefficient of Determination Test Results shows an R Square value of 0.206, indicating that ChatGPT use (X) explains 20.6% of the variance in students' digital literacy (Y), while the remaining 79.4% is explained by factors not included in this study.

DISCUSSION

The findings demonstrate that ChatGPT has a positive and statistically significant effect on students' digital literacy at SMA Negeri 1 2X11 Kayutanam. The hypothesis testing showed that ChatGPT utilization significantly predicted students' digital literacy ($t = 4.558$, $p < 0.001$), indicating that increased use of ChatGPT was associated with higher levels of digital literacy. Furthermore, the coefficient of determination ($R^2 = 0.206$) revealed that ChatGPT accounted for 20.6% of the variance in students' digital literacy, while the remaining 79.4% was explained by other factors beyond the scope of this study. These findings suggest that although ChatGPT contributes meaningfully to digital literacy development, students' competencies are also shaped by additional educational, technological, and individual factors.

The descriptive analysis indicates that students perceived ChatGPT positively across all measured dimensions, including learning ability, critical thinking, problem-solving ability, language and information comprehension, and adaptability. The highest mean scores were observed in the indicators related to information analysis and systematic problem-solving, suggesting that students primarily use ChatGPT as a learning assistant capable of providing

structured explanations and alternative solutions. These findings imply that ChatGPT functions not merely as an information retrieval tool but also as an interactive learning resource that supports students in organizing knowledge and understanding complex academic materials.

Regarding digital literacy, students demonstrated favorable competencies in accessing digital technologies, understanding digital information, evaluating information sources, creating digital content, and practicing digital ethics. Nevertheless, the responses also indicate that several students remain less confident in critically evaluating digital information and independently verifying AI-generated content before applying it in academic contexts. This finding suggests that technological accessibility alone is insufficient to develop comprehensive digital literacy unless accompanied by critical evaluation skills and responsible information practices. Therefore, ChatGPT should be regarded as a complementary learning tool rather than a substitute for students' independent reasoning and analytical thinking.

The positive relationship identified in this study supports previous findings that Artificial Intelligence can improve learning effectiveness by facilitating access to information and enhancing students' engagement in academic activities (Faiz & Kurniawaty, 2023). Similarly, Hermanto et al. (2024) argued that AI-based technologies improve students' understanding of learning materials through more interactive and personalized learning experiences. The present findings extend this perspective by demonstrating that the educational benefits of ChatGPT are also reflected in broader aspects of digital literacy, including information management and ethical technology use.

The findings are also consistent with Mutaqin et al. (2023), who emphasized that Artificial Intelligence enhances teaching and learning processes by providing adaptive educational support according to learners' needs. In the present study, students perceived ChatGPT as a practical learning companion capable of delivering immediate explanations and assisting them in solving academic problems. Such perceptions explain why learning ability and problem-solving emerged as the strongest dimensions of ChatGPT utilization among the respondents.

Furthermore, the results corroborate the study conducted by Fadliyah and Zatadini (2024), which reported that students with better digital literacy tend to utilize ChatGPT more effectively and responsibly. Similarly, Aswidani (2025) argued that digital literacy influences users' perceptions and acceptance of AI technologies in educational settings. The current

findings reinforce these arguments by demonstrating that ChatGPT contributes positively to digital literacy when students actively evaluate, interpret, and apply AI-generated information rather than accepting responses uncritically.

Despite these positive outcomes, the relatively moderate coefficient of determination indicates that ChatGPT is not the sole determinant of students' digital literacy. Digital literacy represents a multidimensional competence influenced by numerous educational and social factors, including learning motivation, teachers' digital competence, school support, internet accessibility, and students' prior technological experience. Consequently, the effective integration of ChatGPT into education should be accompanied by systematic efforts to strengthen students' critical thinking, digital ethics, and information evaluation skills in order to maximize the educational benefits of Artificial Intelligence.

The findings of this study provide several important theoretical contributions to the growing body of literature on Artificial Intelligence and digital literacy in education. First, the results reinforce the proposition that AI-based technologies can function not only as information retrieval tools but also as learning facilitators that support students' cognitive development when integrated appropriately into educational practices. The positive relationship identified between ChatGPT utilization and digital literacy suggests that students who actively engage with AI technologies have greater opportunities to improve their ability to access, interpret, evaluate, and utilize digital information effectively. This finding supports the view that digital literacy should be understood as a multidimensional competence that develops through meaningful interactions with digital technologies rather than through technological exposure alone (Salim et al., 2023).

From the perspective of Artificial Intelligence theory, the findings also confirm that conversational AI has considerable educational potential because of its ability to provide adaptive responses, structured explanations, and personalized assistance according to learners' needs. Such characteristics enable ChatGPT to facilitate independent learning, strengthen students' analytical thinking, and encourage more efficient problem-solving processes. Nevertheless, the effectiveness of AI-assisted learning depends substantially on students' ability to evaluate AI-generated information critically before applying it in academic contexts (Kaplan & Haenlein, 2019).

This study also contributes to the existing literature by extending previous research that primarily focused on university students. By examining senior high school students, the

present research demonstrates that AI-supported learning has begun influencing digital literacy development at earlier educational levels. The findings therefore broaden current understanding regarding the implementation of ChatGPT in secondary education and provide additional empirical evidence from the Indonesian educational context, where research on AI utilization among school students remains relatively limited.

From a practical perspective, the findings indicate that ChatGPT has the potential to become an effective complementary learning resource when accompanied by appropriate instructional guidance. Teachers should encourage students to use ChatGPT not merely to obtain instant answers but to compare information, explore multiple perspectives, verify sources, and develop independent reasoning. Integrating AI-assisted activities into classroom instruction may therefore improve students' engagement while simultaneously strengthening their digital literacy competencies.

Schools also have an important responsibility to establish clear guidelines regarding the ethical and responsible use of Artificial Intelligence in learning activities. Educational institutions should promote digital literacy programs that emphasize information verification, academic integrity, digital ethics, and responsible technology use. Such initiatives may reduce students' dependence on automatically generated responses while encouraging them to develop critical thinking and reflective learning habits. Furthermore, professional development programs for teachers are necessary to ensure that educators possess sufficient competencies to integrate AI technologies effectively into classroom practice (Hidayah, 2025).

The results additionally have implications for educational policymakers. As Artificial Intelligence becomes increasingly integrated into educational environments, policies should focus not only on expanding technological access but also on strengthening digital literacy competencies among students and teachers. Educational policies that combine AI integration with digital literacy development may contribute to more sustainable and responsible technology-enhanced learning environments.

Despite these contributions, this study has several limitations that should be acknowledged. First, the research was conducted in a single public senior high school involving only 82 respondents; therefore, the findings cannot be generalized to all educational contexts in Indonesia. Second, the study employed a quantitative cross-sectional design that explains statistical relationships but does not explore students' experiences or

learning processes in depth. Future studies employing mixed-methods or qualitative approaches may provide richer insights into how students interact with ChatGPT during learning activities.

Another limitation concerns the explanatory power of the research model. Although ChatGPT significantly influenced students' digital literacy, the coefficient of determination ($R^2 = 0.206$) indicates that approximately 79.4% of the variation in digital literacy is explained by factors not included in this study. Variables such as learning motivation, digital learning environments, teacher competence, parental support, internet accessibility, and students' prior technological experience may also contribute substantially to digital literacy development and should therefore be examined in future investigations.

Overall, this study demonstrates that ChatGPT has a meaningful role in supporting students' digital literacy development when utilized critically, ethically, and responsibly. Rather than replacing human learning processes, ChatGPT should be viewed as an educational support tool that complements students' independent learning and critical thinking. The novelty of this research lies in providing empirical evidence on the influence of ChatGPT on digital literacy among Indonesian senior high school students using multidimensional indicators for both variables. Consequently, the findings enrich the current literature on Artificial Intelligence in education while offering practical recommendations for educators, schools, and policymakers seeking to integrate AI into learning in a balanced, responsible, and pedagogically meaningful manner.

CONCLUSION

This study concludes that ChatGPT has a positive and significant effect on students' digital literacy at SMA Negeri 1 2X11 Kayutanam. Students demonstrated a good level of ChatGPT utilization, particularly in supporting learning, problem-solving, and information comprehension, while their digital literacy was also categorized as good across the dimensions of digital access, information evaluation, content creation, and digital ethics. These findings indicate that more effective use of ChatGPT is associated with higher levels of digital literacy.

The results successfully address the research objective by confirming that ChatGPT can support the development of students' digital literacy when used critically and responsibly. Although ChatGPT contributes to improving digital literacy, other factors beyond the scope

of this study also influence students' digital competencies. This study contributes to the growing literature on Artificial Intelligence in education by providing empirical evidence of the relationship between ChatGPT utilization and digital literacy among senior high school students. Practically, the findings encourage teachers and schools to integrate ChatGPT into learning while promoting critical thinking, information verification, and ethical technology use. Future research is recommended to involve larger samples, examine additional variables influencing digital literacy, and employ mixed-methods or longitudinal approaches to provide a more comprehensive understanding of AI-assisted learning.

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