Artificial Intelligence-Assisted Learning and Mathematics Achievement of Learners

J Marie Alvin D. Torres[1], Sharon L. Apohen[2]

[1]DepEd Negros Island Region, Philippines

[2]La Carlota City College, Philippines

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ABSTRACT

This study investigated the relationship between Artificial Intelligence (AI) - assisted learning intensity and mathematics achievement of Grade 10 learners in one of the public secondary schools in Negros Occidental during the school year 2026-2027. A quantitative, descriptive correlational design was employed involving 286 learners selected through simple random sampling technique. Data were gathered using a validated 25-item AI-Assisted Learning Intensity Scale and the learners' official Mathematics General Weighted Average (GWA) during the school year 2025-2026. Results showed a moderate level of AI-assisted learning intensity while mathematics achievement was rated outstanding. No significant relationship was found between AI-assisted learning intensity and mathematics achievement. The findings suggest that AI can support learning; however, mathematics achievement is also influenced by factors such as learner engagement, instructional quality, and effective study habits, which warrant further investigation.

Keywords: Artificial Intelligence, AI-Assisted Learning, Learning Intensity, Mathematics Achievement, Grade 10 Learners, Mathematics Education.

INTRODUCTION

The increasing use of generative Artificial Intelligence (AI) has transformed mathematics education by providing learners with instant explanations, personalized guidance, and automated feedback that support learning (Kreijkes et al., 2025; Limosinero, 2025). AI-powered tools such as ChatGPT and intelligent tutoring systems have become accessible learning resources, enabling students to solve mathematical problems more efficiently and independently (Engelbrecht & Borba, 2024; Husni, 2025). While these technologies offer significant educational benefits, concerns remain regarding their influence on students' conceptual understanding and independent mathematical reasoning.

Research suggests that excessive reliance on AI may encourage cognitive offloading, wherein learners depend on technology to perform tasks that require active thinking, potentially limiting the development of problem-solving and critical thinking skills (Skulmowski, 2023; Wang et al., 2025). Consequently, students may demonstrate correct answers without fully understanding the underlying mathematical concepts, a phenomenon described as synthetic fluency (Wang et al., 2025). Consistent with Mayer's (2024) Cognitive Theory of Multimedia Learning and Sweller's (1988) Cognitive Load Theory, meaningful mathematics learning occurs when learners actively process, organize, and integrate information rather than passively receiving solutions from technological tools.

These concerns are particularly relevant among Grade 10 learners, who encounter more advanced algebraic and geometric concepts requiring higher-order thinking and conceptual reasoning (Hongthong et al., 2024). Although AI can enhance learning support and accessibility, its educational value depends on how students use it to facilitate understanding rather than replace cognitive effort (Asare et al., 2023; Canonigo, 2024; Lee et al., 2023).

Despite the increasing integration of AI into mathematics education, limited empirical evidence exists regarding the relationship between AI-assisted learning intensity and mathematics achievement among public secondary school learners in the Philippine context. This gap highlights the need to examine whether the extent of AI use is associated with students' mathematics achievement. Hence, this study investigates the relationship between AI-assisted learning intensity and mathematics achievement among Grade 9 learners in one of the public secondary schools in Negros Occidental.

METHODOLOGY

This study employed a quantitative descriptive-correlational research design to determine the relationship between AI-assisted learning intensity and mathematics achievement among Grade 10 learners in a public secondary school in Negros Occidental during School Year 2026–2027. The study involved 286 Grade 10 learners selected from a population of 1,000 using simple random sampling and Yamane's formula with a 5% margin of error.

Data were collected using a 25-item AI-Assisted Learning Intensity Scale adapted from the AI-TAM framework of Baroni, Re Calegari, and Celino (2022). The scale measured five dimensions: perceived usefulness, perceived ease of use, engagement and interaction, learning support, and AI usage intensity. Respondents' mathematics achievement was determined using their official Mathematics General Weighted Average (GWA) for School Year 2025–2026. The instrument was validated by five experts using Lawshe's Content Validity Ratio, obtaining a CVR of 1.00. Pilot testing yielded a Cronbach's alpha of .904, indicating excellent internal consistency.

Data were analyzed using frequency and percentage for the respondents' profile, mean and standard deviation for AI-assisted learning intensity and mathematics achievement, and Spearman's Rank-Order Correlation to determine the significant relationship between AI-assisted learning intensity and mathematics achievement. Statistical significance was tested at the 0.05 level. Ethical considerations, informed consent, confidentiality, and the voluntary participation of respondents were observed throughout the data-gathering process.

RESULTS AND DISCUSSIONS

Demographic Profile of the Learners

Table 1. Frequency and Percentage Distribution of the Demographic Profile of Learners.

Profile	Category	f	%
Sex			
	Male	129	45.10
	Female	157	54.90
	Total	286	100.00
Socioeconomic Status			
	Less than ₱10,957	103	36.01
	₱10,957–₱21,914	82	28.67
	₱21,915–₱43,828	46	16.08
	₱43,829–₱76,669	30	10.49
	₱76,670–₱131,484	12	4.20
	Above ₱131,484	13	4.55
	Total	286	100.00
Father's Highest Educational Attainment			
	No Formal Education (Never attended school)	3	1.05
	Elementary Level/Graduate	10	3.50
	High School Level/Graduate	84	29.37
	Vocational/Technical Course	16	5.59

	College Level/Graduate	141	49.30
	Postgraduate(Master's/Doctorate)	17	5.94
	Not Applicable	15	5.24
	Total	286	100.00
Mother's Highest Educational Attainment			
	No Formal Education (Never attended school)	1	.35
	Elementary Level/Graduate	6	2.10
	High School Level/Graduate	78	27.27
	Vocational/Technical Course	11	3.85
	College Level/Graduate	159	55.59
	Postgraduate(Master's/Doctorate)	27	9.44
	Not Applicable	4	1.40
	Total	286	100.00

Table 1 presents the demographic profile of the respondents in terms of sex, socioeconomic status, and parents' highest educational attainment. These characteristics provide essential background information that may help explain differences in learners' AI-assisted learning intensity and mathematics achievement.

In terms of sex, 157 (54.90%) of the respondents are female, while 129 (45.10%) are male. This indicates that female learners slightly outnumbered male learners in the study, although both groups were well represented. The distribution is important because previous research suggests that learners' use of artificial intelligence may differ according to sex.

Matobobo (2026) reported that male students generally demonstrate greater confidence and are more willing to use AI tools for academic purposes, whereas female students tend to be more careful in adopting these technologies and place greater emphasis on responsible and ethical use. The study also noted that these differences are influenced by factors such as learning environment and previous experience with technology rather than sex alone. Furthermore, the OECD (2023) reported that female students in the Philippines slightly outperformed their male counterparts in mathematics. These findings imply that sex may influence both AI-assisted learning behaviors and mathematics achievement, making it a relevant variable to consider when interpreting the results of the present study.

Regarding socioeconomic status, the largest group of respondents came from households earning less than ₱10,957 per month (f=103, %=36.01), followed by those with monthly incomes ranging from ₱10,957 to ₱21,914 (f=82, %=28.67). Only a small proportion belongs to higher-income households. This distribution suggests that most respondents came from families with limited financial resources. Family income plays an important role in students' access to educational technologies because it affects the availability of internet services, digital devices, and other learning resources.

Consistent with this result, Poh et al. (2026) found that students from families with better economic conditions were more likely to engage actively with generative AI because they had greater access to technology and stronger digital skills. Likewise, studies on the digital divide explain that financial limitations often reduce students' opportunities to maximize AI-based learning platforms despite their willingness to use them. Since socioeconomic status has also been associated with differences in mathematics performance (OECD, 2023), it may influence both the level of AI use and academic achievement among learners.

With respect to the father's highest educational attainment, nearly half of the respondents (f = 141, % = 49.30) reported that their fathers had completed a college degree, while 84 (29.37%) indicated that their fathers were high school graduates. Smaller percentages reported fathers who completed postgraduate education, vocational education, elementary education, or had no formal education. A few respondents also indicated that the category

was not applicable. The findings suggest that many respondents have fathers with relatively high educational backgrounds. Research has shown that parents with higher educational attainment are generally more capable of supporting their children's academic development because they possess greater familiarity with educational resources and digital technologies.

According to Adair et al. (2025), students whose parents attained higher levels of education were more likely to use generative AI regularly for school-related activities. Similarly, Cosby et al. (2025) explained that educated parents are often better prepared to guide their children in using AI responsibly and effectively, which may encourage more productive learning experiences.

A similar pattern was observed in the mother's highest educational attainment. More than half of the respondents (f = 159, % = 55.59) reported that their mothers had completed a college degree, while 78 (27.27%) were high school graduates and 27 (9.44%) have postgraduate education. Only a few respondents reported mothers with lower educational attainment. These results indicate that the majority of learners came from households where mothers had attained relatively high levels of education. Previous studies have emphasized that parents who possess higher educational qualifications are generally more confident in supporting technology-enhanced learning.

Similar to the findings of this study, Adair et al. (2025) found that students whose parents had advanced educational backgrounds reported more frequent use of generative AI, partly because these parents viewed AI as a valuable educational resource rather than merely a technological innovation. Likewise, Cosby et al. (2025) noted that parents with stronger educational backgrounds are more likely to provide guidance on the appropriate use of AI tools, helping learners develop responsible and effective study habits.

Overall, the demographic profile shows that the Grade 10 learners were predominantly female, mostly belonged to low-income households, and generally had parents who completed college education. These characteristics provide important context for understanding the learners' educational environment. Previous studies indicate that demographic factors such as sex, socioeconomic status, and parents' educational attainment can influence students' access to technology, attitudes toward AI, and academic performance. Therefore, these variables should be considered when interpreting the relationship between AI-assisted learning intensity and mathematics achievement, as they may contribute to variations in both outcomes.

Level of AI-assisted Learning Intensity of the Learners

Table 2. Level of AI-assisted Learning Intensity of Learners.

Statements	Mean	SD	Interpretation
Perceived Usefulness	**3.36**	**0.75**	**Moderate**
1. AI-based learning tools improve my mathematics performance.	3.31	0.96	Moderate
2. AI tools help me accomplish mathematics tasks more efficiently.	3.55	0.95	High
3. AI applications enhance my understanding of mathematics concepts.	3.35	1.02	Moderate
4. Using AI tools increase my productivity in mathematics learning.	3.15	1.02	Moderate
5. AI-based tools are beneficial to my mathematics studies.	3.45	0.93	High
Perceived Ease of Use	**3.78**	**0.73**	**High**
6. I can easily learn how to use AI-based tools.	3.90	0.93	High
7. I can easily use AI applications.	3.96	0.86	High
8. I can easily navigate AI learning platforms.	3.59	0.92	High
9. I can easily navigate and understand AI tools.	3.71	0.92	High
10. I can use AI tools without much difficulty.	3.73	0.97	High
Engagement and Interaction	**2.77**	**0.85**	**Moderate**
11. AI tools make mathematics learning more interesting.	3.06	1.06	Moderate
12. I participate actively when AI tools are used in the classroom.	2.75	1.07	Moderate
13. AI applications motivate me to study mathematics.	2.66	1.04	Moderate
14. AI-based activities increase my attention during lessons.	2.63	1.10	Moderate

15. I enjoy learning mathematics through AI tools.	2.76	1.11	Moderate
Learning Support	**3.64**	**0.76**	**High**
16. AI tools provide immediate feedback on my work.	3.63	0.95	High
17. AI applications help me solve difficult math problems.	3.85	0.96	High
18. AI tools support my independent learning.	3.21	1.18	Moderate
19. AI applications help me review mathematics lessons.	3.51	1.07	High
20. AI tools help me identify mistakes in my solutions.	3.98	0.92	High
AI Usage Intensity	**2.91**	**0.84**	**Moderate**
21. I frequently use AI tools when studying mathematics.	2.99	1.09	Moderate
22. I always rely on AI tools when answering mathematics assignments.	2.48	1.14	Low
23. I always use AI applications outside classroom hours for mathematics learning.	2.71	1.07	Moderate
24. I always use AI tools whenever I encounter difficult mathematics problems.	3.53	1.16	High
25. I spend a significant amount of study time using AI-assisted platforms.	2.85	1.05	Moderate
AI-Assisted Learning Intensity As a Whole	**3.29**	**0.61**	**Moderate**

Legend: (4.21-5.00)-Very High; (3.41-4.20)-High; (2.61-3.40)-Moderate; (1.81-2.60)-Low; (1.00-1.80)-Very Low

Table 2 presents the level of AI-assisted learning intensity of the Grade 10 learners in terms of perceived usefulness, perceived ease of use, engagement and interaction, learning support, and AI usage intensity. Overall, the students obtained a moderate level of AI-assisted learning intensity (M = 3.29, SD = 0.61), which indicates that students exhibit a moderate level of reliance on generative AI tools during mathematics study. This result suggests that AI is used as a helpful support in learning mathematics, but it has not become a constant or dominant part of the students' study routines.

The highest-rated dimension was perceived ease of use (M = 3.78, SD = 0.73), interpreted as high. The highest-rated statement under this dimension was "I can easily use AI applications" (M = 3.96, SD = 0.86). This finding indicates that Grade 10 students generally find AI tools easy to access, understand, and navigate while studying mathematics. Because the technology is easy to use, students may be more willing to explore it as a learning resource without needing extensive technical assistance.

This finding is supported by Yeribatuah and Boateng (2026), who found that learners commonly view AI applications as accessible and manageable for academic use. In a related study, Husni (2025) reported that simple navigation and user-friendly interfaces make AI tools more practical for students' everyday learning activities.

The lowest-rated dimension was engagement and interaction (M = 2.77, SD = 0.85), interpreted as moderate. The lowest-rated statement under this dimension was "AI-based activities increase my attention during lessons" (M = 2.63, SD = 1.10). This result suggests that although students recognize the usefulness of AI, it does not always make mathematics lessons more engaging or help them stay focused throughout classroom activities. In other words, AI may assist students with tasks, explanations, or practice, but its presence alone does not guarantee stronger attention or active participation during lessons. This finding highlights the importance of teacher guidance and well-designed learning activities in making AI use more interactive and meaningful for Grade 10 learners.

The second highest dimension was learning support (M = 3.64, SD = 0.76), interpreted as high. The highest-rated statement in this area was "AI tools help me identify mistakes in my solutions" (M = 3.98, SD = 0.92). This indicates that students value AI most when it gives immediate feedback and helps them notice errors in their mathematical work. Such support may help students review their solutions, correct mistakes, and improve their understanding before submitting assignments or moving to more difficult problems.

This result is consistent with Husni (2025), who observed that AI's ability to provide explanations, feedback, and step-by-step assistance is among the features most appreciated by learners.

In contrast, AI Usage Intensity was only moderate (M = 2.91, SD = 0.84). The statement "I always rely on AI tools when answering mathematics assignments" received the lowest mean in the entire scale (M = 2.48, SD = 1.14), interpreted as Low. This finding shows that Grade 10 learners do not strongly depend on AI when completing mathematics assignments. Instead, they appear to use AI only when they need help, clarification, or additional support.

This pattern differs from the heavier reliance reported by Limosinero (2025) and Jeevapriya et al. (2025), where learners used AI more regularly for academic tasks. The lower reliance observed in the present study may be a positive sign because it suggests that students still attempt to solve mathematical problems on their own rather than immediately depending on AI. This is important because Wang et al. (2025) and Skulmowski (2023) warned that excessive and passive AI use can weaken independent thinking by encouraging learners to depend on ready-made answers or explanations. The moderate level of AI use found in this study therefore suggests that, for these Grade 10 learners, AI functions more as an occasional learning aid than as a replacement for their own reasoning and effort in mathematics.

Level of AI-assisted Learning Intensity According to Learners' Profile

Table 3. Level of AI-assisted Learning Intensity of Learners when Grouped According to their Profile.

Profile	Category	Mean	SD	Interpretation
Sex				
	Male	3.47	0.56	High
	Female	3.14	0.61	Moderate
Socioeconomic Status				
	Less than ₱10,957	3.35	0.57	Moderate
	₱10,957–₱21,914	3.25	0.62	Moderate
	₱21,915–₱43,828	3.35	0.55	Moderate
	₱43,829–₱76,669	3.11	0.64	Moderate
	₱76,670–₱131,484	3.26	0.70	Moderate
	Above ₱131,484	3.38	0.78	Moderate
Father's Highest Educational Attainment				
	No Formal Education (Never attended school)	2.64	1.14	Moderate
	Elementary Level/Graduate	3.80	0.43	High
	High School Level/Graduate	3.27	0.57	Moderate
	Vocational/Technical Course	3.12	0.65	Moderate
	College Level/Graduate	3.32	0.60	Moderate
	Postgraduate (Master's/Doctorate)	3.30	0.59	Moderate
	Not Applicable	3.15	0.64	Moderate
Mother's Highest Educational Attainment				
	No Formal Education (Never attended school)	4.12	-	High
	Elementary Level/Graduate	3.65	0.57	High
	High School Level/Graduate	3.33	0.57	Moderate
	Vocational/Technical Course	3.20	0.47	Moderate
	College Level/Graduate	3.26	0.62	Moderate
	Postgraduate (Master's/Doctorate)	3.33	0.65	Moderate
	Not Applicable	2.99	0.71	Moderate

Legend: (4.21-5.00)-Very High; (3.41-4.20)-High; (2.61-3.40)-Moderate; (1.81-2.60)-Low; (1.00-1.80)-Very Low

Table 3 presents the level of AI-assisted learning intensity of the Grade 10 learners when grouped according to sex, socioeconomic status, and parents' highest educational attainment. The findings reveal slight variations across the different profile variables. However, only the highest and lowest group means are discussed.

In terms of sex, male respondents obtained the highest mean (M = 3.47, SD = 0.56), interpreted as high, whereas female respondents recorded a moderate level (M = 3.14, SD = 0.61). This finding indicates that male respondents demonstrated a greater tendency to incorporate AI tools into their mathematics learning than female respondents. One possible explanation is that male students may be more comfortable experimenting with new technologies and using them regularly for academic purposes.

This finding is consistent with Matobobo (2026), who observed that male learners generally reported higher confidence, stronger intentions, and more frequent use of AI across educational settings. In contrast, female learners tended to use AI more cautiously, often giving greater importance to responsible use, teacher guidance, and maintaining their own critical thinking skills. Nonetheless, these differences should be interpreted carefully because previous studies have emphasized that the influence of sex on AI use may vary according to learning experiences, technological exposure, and educational context. Moreover, while male respondents in the present study reported greater AI-assisted learning intensity, the OECD (2023) noted that female students in the Philippines continue to demonstrate slightly better mathematics performance. This suggests that greater AI use does not necessarily translate into higher mathematics achievement, highlighting sex as a possible moderating variable rather than a direct predictor.

In terms of socioeconomic status, respondents whose families earned above ₱131,484 per month obtained the highest mean (M = 3.38, SD = 0.78), whereas those with household incomes ranging from ₱43,829–₱76,669 recorded the lowest mean (M = 3.11, SD = 0.64). Despite these differences, all income groups were interpreted as having a moderate level of AI-assisted learning intensity. The findings imply that Grade 10 learners from different income levels generally relied on AI to a similar extent, although those from higher-income households showed slightly greater AI engagement. This pattern may be attributed to better access to internet services, digital devices, and AI-enabled learning resources commonly available to students from financially advantaged families.

According to Poh et al. (2026), socioeconomic status strengthens students' intention to use generative AI because learners with greater technological access and digital competence are more likely to integrate AI into their learning activities. Likewise, the Digital Divide Theory explains that differences in financial resources can create unequal opportunities to access educational technologies, while Bourdieu's Theory of Social Reproduction suggests that families with greater economic resources are often able to provide learning environments that encourage the effective use of technology. Since socioeconomic status has also been associated with mathematics achievement (OECD, 2023), it is reasonable to consider it as a contextual factor that may influence both AI-assisted learning intensity and academic performance.

Regarding the father's highest educational attainment, the highest AI-assisted learning intensity was observed among respondents whose fathers had completed elementary education (M = 3.80, SD = 0.43), interpreted as high, while the lowest mean was obtained by respondents whose fathers had no formal education (M = 2.64, SD = 1.14), interpreted as moderate. Although this result appears unexpected, it should be interpreted with caution because the group with no formal education consisted of only a few respondents, making the mean less representative of the broader population. Nevertheless, parental educational attainment remains an important factor in students' use of AI.

Adair et al. (2025) reported that learners whose parents attained higher levels of education were more likely to use generative AI for school-related tasks because these parents were generally more knowledgeable about educational technologies and more receptive to their use. Similarly, Cosby et al. (2025) explained that parents with stronger educational backgrounds are often better prepared to guide their children in using AI responsibly and effectively. These findings suggest that parental education may influence students' AI-assisted learning intensity through the quality of academic guidance and technology-related support available at home rather than through educational attainment alone.

A similar trend was observed for the mother's highest educational attainment. Respondents whose mothers had no formal education obtained the highest mean (M = 4.12), interpreted as high, while those whose mothers' educational attainment was not applicable recorded the lowest mean (M = 2.99, SD = 0.71), interpreted as moderate. Although the highest mean was recorded for respondents whose mothers had no formal education, this finding should also be interpreted cautiously because it represents only a very small number of respondents and may not reflect the general population of Grade 9 learners. Existing literature generally indicates the opposite trend.

Adair et al. (2025) found that students whose parents possessed higher educational qualifications reported more frequent use of generative AI, largely because these parents were more confident in supporting technology-enhanced learning. Likewise, Cosby et al. (2025) emphasized that parents with greater digital knowledge are more likely to encourage appropriate AI use and provide guidance on when and how AI can be used effectively for academic purposes. Therefore, while the descriptive findings of the present study show variations across parental educational groups, they should be interpreted alongside the sample distribution and existing evidence rather than viewed as conclusive patterns.

Overall, the findings indicate that differences in AI-assisted learning intensity across demographic groups were relatively small, with most categories falling within the moderate level. The results suggest that learners' use of AI is influenced not only by individual preferences but also by their demographic and family background. Consistent with previous literature, sex, socioeconomic status, and parents' educational attainment may shape students' opportunities, confidence, and support in using AI for learning. Consequently, these profile variables should be considered important contextual factors when examining the relationship between AI-assisted learning intensity and mathematics achievement among Grade 10 learners.

Level of Mathematics Achievement of the Learners

Table 4. Level of Mathematics Achievement of Learners.

Level of Mathematics Achievement of the Learners	f	Mean	SD	Interpretation
Outstanding	213	92.08	3.59	Outstanding
Very Satisfactory	70			
Satisfactory	3			
Fairly Satisfactory	0			
Did Not Meet Expectations	0			
Total	286			

Legend: (90-100)-Outstanding; (85-89)-Very Satisfactory; (80-84)-Satisfactory; (75-79)-Fairly Satisfactory; (below 75)-Did Not Meet Expectations

Table 4 presents the level of mathematics achievement of the Grade 10 learners. The results reveal that the respondents attained an overall mean score of 92.08 (SD = 3.59), which is interpreted as outstanding. Of the 286 respondents, the majority (213) achieved an outstanding rating, while 70 respondents obtained a very satisfactory rating. Only 3 respondents were classified as satisfactory, and none fell under the fairly satisfactory or did not meet expectations categories.

The highest frequency was recorded in the outstanding category, with 213 respondents. This finding indicates that most Grade 10 learners performed exceptionally well in mathematics based on their classroom grades. The high level of achievement suggests that the respondents were generally able to meet or exceed the expected learning competencies covered during the academic year. One possible explanation is that students consistently completed classroom requirements, participated in learning activities, and demonstrated mastery of the competencies assessed by their teachers. However, these results should be interpreted within the context of classroom-based assessment.

As pointed out by Luzano (2024), mathematics grades often reflect performance on assessments that are closely aligned with the implemented curriculum, where teachers may prioritize completing the required competencies

within the school year. Consequently, high classroom grades may represent successful attainment of curriculum-based learning outcomes rather than broader mathematical reasoning skills measured by standardized international assessments.

On the other hand, the lowest frequency was observed in the satisfactory category, with only 3 respondents, while no respondent was classified as fairly satisfactory or did not meet expectations. This result indicates that very few Grade 10 learners experienced difficulty in achieving the expected level of mathematics performance. The absence of learners in the lower achievement categories suggests that most respondents were able to maintain satisfactory or higher academic performance throughout the grading period. Nevertheless, when these achievement results are examined alongside AI-assisted learning intensity, caution is warranted.

According to Alakayleh (2025) and Canonigo (2024), classroom grades may be more strongly influenced by factors such as consistent effort, compliance with academic requirements, regular practice, and teacher-designed assessments than by the higher-order mathematical reasoning skills that AI-supported learning is expected to enhance. Therefore, although the respondents demonstrated an outstanding level of mathematics achievement, this should not automatically be interpreted as evidence that AI-assisted learning directly produced higher academic performance. Instead, the findings suggest that mathematics achievement is likely shaped by multiple instructional and learner-related factors, with AI serving as only one possible contributor to students' overall academic success.

Relationship Between AI-assisted Learning Intensity and Mathematics Achievement

Table 5. Relationship between the AI-assisted Learning Intensity and Mathematics Achievement of Learners.

Variable	Test Statistics (r_s)	p-value	Decision for H_o	Interpretation
AI-assisted Learning Intensity vs. Mathematics Achievement	0.037	0.534	Failed to Reject H_o	Not Significant

Table 5 presents the relationship between AI-assisted learning intensity and mathematics achievement among the Grade 10 learners. The Spearman rank-order correlation analysis revealed a correlation coefficient of r_s = 0.037 with a p-value of 0.534, which is greater than the 0.05 level of significance. Hence, the null hypothesis was failed to be rejected, indicating that no significant relationship exists between AI-assisted learning intensity and mathematics achievement among the respondents.

The result suggests that the extent to which Grade 10 learners used AI-assisted learning tools was not associated with their mathematics achievement. Although AI can provide explanations, feedback, and learning support, increasing its use did not necessarily correspond to higher mathematics grades in the present study.

This finding contrasts with the positive relationships reported by Alakayleh (2025), Husni (2025), and Canonigo (2024), who found that AI-assisted learning contributed to improved academic outcomes. However, the present result is consistent with studies suggesting that the educational value of AI depends not simply on how often it is used, but on how learners use it during the learning process.

A possible explanation is provided by Asare et al. (2023), who found that AI use alone did not directly improve mathematics achievement. Instead, its influence became meaningful only when learners' interest and motivation toward mathematics were considered. Since mathematics interest was not included as a variable in the present study, it is possible that differences in students' motivation influenced how effectively AI supported their

learning. Consequently, some respondents may have benefited from AI, whereas others may not have experienced the same advantage, resulting in the absence of a significant overall relationship.

Another plausible explanation concerns the way AI was used by the respondents. Wang et al. (2025) explained that AI can function in two different ways: it can serve as a learning partner that strengthens students' reasoning, or it can become a substitute for thinking when learners rely on it to generate answers without fully understanding the concepts. If some Grade 10 respondents used AI to deepen their mathematical understanding while others depended on it mainly for convenience, these contrasting patterns could have balanced each other, leading to the very weak correlation observed in this study.

The descriptive findings of the present study also support this interpretation. AI-assisted learning intensity was found to be moderate overall, and the statement "I always rely on AI tools when answering mathematics assignments" received the lowest rating among all indicators. This suggests that respondents did not depend heavily on AI when completing mathematics tasks. According to Skulmowski (2023) and Wang et al. (2025), the risks and benefits of AI become more evident when learners engage in frequent and passive use that either replaces or substantially supports cognitive processes. Because the Grade 9 respondents reported only moderate AI usage, it is likely that AI had not been used intensively enough to produce a measurable influence on mathematics achievement. Instead, students' performance may have been shaped more strongly by classroom instruction, personal effort, regular practice, and teacher-guided learning, which is consistent with Luzano's (2024) description of curriculum-driven mathematics instruction in the Philippine educational setting.

It is also important to consider the distribution of the mathematics achievement scores. Most respondents obtained outstanding ratings, resulting in relatively little variation in academic performance. When the majority of learners achieve similarly high scores, detecting a statistical relationship with another variable becomes more difficult because there is limited variability to correlate. This may partly explain why AI-assisted learning intensity did not show a significant association with mathematics achievement despite its recognized value as a learning resource.

Overall, the findings indicate that AI-assisted learning intensity alone was not a significant predictor of mathematics achievement among the Grade 10 learners. Rather than suggesting that AI has no educational value, the results imply that its contribution to mathematics learning may depend on other learner-related factors, such as motivation, learning strategies, and the manner in which AI is used. Therefore, AI should be viewed as a supplementary learning tool whose effectiveness is influenced by the quality of its use and the broader instructional context, rather than by usage intensity alone.

CONCLUSIONS

Based on the findings of the study, the following conclusions were formulated:

The respondents represented diverse demographic backgrounds in terms of sex, socioeconomic status, and parents' educational attainment, with most coming from low-income households and having parents who attained college education.

Grade 10 learners moderately relied on generative AI tools in learning mathematics. They generally perceived AI as easy to use and useful in supporting their learning, particularly in providing immediate feedback and helping identify mathematical errors. However, AI contributed less to increasing learners' engagement and classroom interaction.

AI-assisted learning intensity showed only minimal variation across demographic groups. Although male respondents demonstrated slightly higher AI-assisted learning intensity than female respondents, respondents generally exhibited comparable levels of AI use regardless of socioeconomic status or parents' educational attainment.

Most of the Grade 10 learners successfully met or exceeded the expected mathematics learning competencies based on classroom assessment.

The frequency or intensity of AI use alone does not determine students' mathematics performance. Rather, mathematics achievement appears to be influenced by a combination of instructional practices, learner characteristics, study habits, motivation, and the manner in which AI is used during learning.

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