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Dependency on Artificial Intelligence, Study Habits, and Geometry Achievement of College Students at DNSC

Queenzel Nicole E. Taboco[1], Ryza Mae D. Mangalaw[2*], Stephen E. Salvacion[3], Regie M. Angkahas[4], Abel E. Sadji[5]
Davao del Norte State College, Institute of Teacher Education, Panabo, Philippines[1, 2, 3, 4, 5]
taboco.queenzelnicole@dnsc.edu.ph [1], mangalaw.ryzamae@dnsc.edu.ph [2*],
salvacion.stephen@dnsc.edu.ph [3], angkahas.regie@dnsc.edu.ph [4], abel.sadji@dnsc.edu.ph [5]

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Abstract
Purpose: This study aimed to determine whether artificial intelligence dependency and study habits can predict students' achievements in geometry.
Research Methodology: A quantitative descriptive-correlational design was employed to describe the general findings of the study, using three adapted and validated questionnaires to measure and determine the predictive influence of dependency on artificial intelligence and study habits on students' geometry achievement among 120 first and second year Bachelor of Secondary Education (BSEd) Mathematics students from Davao del Norte State College, selected through simple random sampling.
Results: Based on the results, respondents frequently used artificial intelligence tools and demonstrated generally positive study habits, and their overall performance in geometry was very satisfactory. However, statistical analysis using the mean, standard deviation, and Pearson's r showed no significant relationship between dependency on artificial intelligence and geometry achievement or between study habits and geometry achievement, indicating that these variables did not influence students' performance in the subject.
Conclusions: There is no significant relationship between dependency on artificial intelligence and geometry achievement, as well as between study habits and geometry achievement
Limitations: The findings suggest that dependency on artificial intelligence and study habits are not strong predictors of success in geometry.
Contributions: This study recommends exploring other factors, such as motivation, teaching strategies, and technological literacy, that may better explain variations in academic performance and guide educators in designing more effective interventions to improve students' learning outcomes in geometry.

Keywords: *Artificial Intelligence, Davao Del Norte State College, Geometry Achievement, Mathematics Students, Quantitative, Study Habits*

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1. Introduction

Geometry achievement refers to students' knowledge and proficiency in learning geometric concepts and skills, typically assessed through standardized geometry tests (Awi, Naufal, Sutamrin, & Huda, 2024). However, because geometry is inherently abstract, many students experience difficulties that lead to low academic performance (Kusumah & Martadiputra, 2022). Prior studies have indicated that students often lack the cognitive and process skills necessary to comprehend complex geometric concepts, such as circle theorems, and to provide appropriate reasoning (Motseki & Jojo, 2022).

Tagaeva, Talipov, and Saipbekova (2024) further emphasized the importance of closely monitoring students' geometric performance throughout the learning process.

Evidence from the Islamic University of Riau in Indonesia also revealed persistent problems in geometry achievement among Mathematics Education students. Abdurrahman and Nofriyandi (2022) reported that 55.7% of students struggled to recall the discussed content, 41% did not understand lecture materials, 54.9% had difficulty applying postulates and theorems, and 41.8% struggled to sequence and execute steps in problem-solving. Similarly, a study by Nurhakim, Bistari, and Yani (2022) at the Sultan Muhammad Syafiuddin Islamic Institute showed that 33% of students could not recall formulas, only 33% could transform geometric concepts into alternative forms, and 66% could not identify essential terms and foundational elements of a concept.

In the Philippine context, Ordiz and Mecate (2022) found that 43.1%of 153 Mathematics Education students at a state university in Eastern Visayas were unclassifiable in terms of geometric ability, indicating a significant decline in geometry achievement. Similarly, at the West Visayas State University in Iloilo City, Bacio Jr and Sagge Jr (2019) found that students scored below 60% on all geometry-related assessments. The overall performance, averaging 40.65 or 51%, demonstrated poor geometric ability. Recent research suggests that artificial intelligence can enhance learning outcomes by providing individualized instruction and adaptive learning environments (Popenici & Kerr, 2017).

Almaiah et al. (2022) acknowledged a gap in the literature concerning artificial intelligence adoption in educational settings and its effects on student achievement. Research by Wu, Zhang, Li, and Liu (2022) indicates that students display varying levels of acceptance toward AI assisted learning environments. The findings of this study will benefit educators and learners. Teachers will gain insights into how to better support students in improving their skills and geometry achievements. Students, in turn, will be able to identify ways to enhance their understanding and performance in geometry. School administrators may also use the results to design programs and interventions that target students' geometric abilities.

2. Literature Review and Hypotheses Development

2.1 Literature Review

2.1.1 Geometry Achievement

Achievement in geometry plays a significant role in the success of learning and applying geometry concepts and principles among students. Bozkurt and Ruthven (2017) found that critical thinking improves with meaningful exposure to geometric knowledge. According to recent results by Ayebale, Habaasa, and Tweheyo (2020), it has been found that the study habits and curriculum strategies play a significant role in determining the outcome in geometry. Adelabu, Makgato, and Ramaligela (2019) highlighted the importance of technology in offering dynamic tools to learn, whereas Naufal, Abdullah, Osman, Abu, and Ihsan (2021) attributed it to the enhancement of visualization and reasoning abilities with the help of Van Heile framework.

2.1.2 Dependency on Artificial Intelligence

Reliance on artificial intelligence has a substantial impact on the cognitive, emotional, and social development of university students, according to the valid dependence on artificial intelligence scale (Morales-García, Sairitupa-Sanchez, Morales-García, & Morales-García, 2024). The role of artificial intelligence in academic performance can be exemplified by its capability to redesign the teaching and learning processes by providing personalized tools specific to the needs of individual students (Al-Zahrani & Alasmari, 2024). The application of artificial intelligence in education enables students to be exposed to individualized educational experiences, which simplifies their work, including research, writing, and problem solving (Khalifa & Albadawy, 2024). Additionally, its integration is consistent with contemporary teaching approaches that prioritize learner-centered, adaptive, and technology-driven education[1]. The advantages of artificial intelligence in education are tremendous because it can improve the teaching and learning experience by providing personalized assistance, engaging activities via creative programming, and by being incorporated into the curriculum, which encourages both students and teachers (Seo, Tang, Roll, Fels, & Yoon, 2021). The risks of artificial intelligence in

learning are that students may abuse such technology, for example, by cheating on exams or skipping the learning process entirely, which can compromise academic integrity (Ayala-Pazmiño, 2023). The overuse of artificial intelligence devices can inhibit the acquisition of critical problem-solving skills because students who overuse artificial intelligence demonstrate fewer problem-solving skills (Çela, Fonkam, & Potluri, 2024).

2.1.3 Study Habits

Sarker (2020) studied the correlation between students' performance and their study habits and found a positive relationship between students' study habits and academic achievement. A study habit can be defined as dedicating a specific and uninterrupted period each day to engage in learning (Sarker, Gain, Saha, Mondal, & Ifte, 2024). Time Management is a collection of concepts, practices, skills, tools, and systems that collaborate to enable individuals to obtain more value for their time, thereby enhancing their quality of life (Subramanian, 2016). According to Ganzon and Edig (2022),students with good time management can work efficiently and smartly; they can make plans, organize, and accomplish what they wish to do efficiently in a specific amount of time. These fundamental factors, including their physical and mental well-being, can affect the overall performance of the students (Darmawan, 2017; Lismana, Komaini, Arsil, Padli, & Zarya, 2022). Similarly, Nuwagaba, Mwesigye, and Karoro (2022) determined that the physical status of students had a direct effect on their study habits, such as time management and examination preparation.

2.1.4 Motivation

Motivation may arise from intrinsic factors, such as personal achievement, interest, and challenge, or from extrinsic factors, including salary, rewards, and promotions (Sjarifudin, Widyastuti, Renwarin, & Suroso, 2025). Jossberger, Brand-Gruwel, van de Wiel, and Boshuizen (2020) also confirm the connection between academic achievement and motivation by showing that persistence and effort are critical predictors of academic achievement in higher education institutions. Having efficient test-taking strategies may lead to significant improvements in one's scores (Khoshsima, 2018; Lee, 2019).The effects of test-taking strategies extend beyond test performance and affect academic performance in general. Note-taking is described as the act and practice of documenting significant information by writing (Lam, 2021). Note taking improves the performance of students (Gary, 2021) and enhances their ability to understand better and pay attention in the classroom.

2.1.5 Reading Ability and Memory

Reading ability requires the integration of cognitive skills, such as working memory, attention, and comprehension (Andreola et al., 2021). According to studies, reading ability and academic success are related (Ghani, Jamian, & Jobar, 2022), and this claim is supported by Jala (2020), who implied that reading ability is a significant factor in the overall academic performance of students. Memory can be described as the mental process with the primary aim of acquiring, storing, and retrieving information, which can be elaborated, stored, and retrieved when the need arises. Markant, Ruggeri, Gureckis, and Xu (2016) address how memory of the students is promoted by means of active learning, implying that the method underlining this effect can result in improved academic performance.

2.1.6 Dependency on Artificial Intelligence and Geometry Achievement

The correlation between the dependency of college students on artificial intelligence and their success in geometry can be understood through the view of various elements of educational technology, individualization of instructions, and student interaction. As stated by Khare, Stewart, and Khare (2018), artificial intelligence-based tools and systems can be used to improve the performance and understanding of geometry classes among students.

2.1.7 Study Habits and Geometry Achievement

The ability to master abstractions and become a good problem solver in geometry is conditional on the study of skills related to proper time management, taking notes systematically, and reviewing regularly (Siahi & Maiyo, 2015). Rabia, Mubarak, Tallat, and Nasir (2017) indicated that concentration in the right environment where one is studying has little or no distractions and therefore, learning of challenging concepts regarding geometry.

2.2 Hypotheses

The following hypotheses were proposed, serving as a basis for the investigation at the 0.05 level of significance.

- H_1: There is no significant relationship between the dependency on artificial intelligence and geometry achievement among BSEd Mathematics students
- H_2: There is no significant relationship between study habits and geometry achievement among BSEd Mathematics students
- H_3: The dependency on artificial intelligence and study habits do not significantly predict geometry achievement among BSEd Mathematics students

3. Methodology

3.1 Research Design

This study employed a quantitative research design, specifically utilizing descriptive correlational approaches. This design illustrates not only the variables under investigation but also the natural relationships that exist among them (Villa & Sebastian, 2021). The quantitative method was appropriate because it allowed for the systematic measurement and analysis of numerical data related to the use of artificial intelligence, study habits, and geometry achievement.

The descriptive research design can examine single or multiple variables and present data gathered through observation, thereby depicting phenomena in their natural state without altering the conditions of the variables (Villamin, Lopez, Thapa, & Cleary, 2025). The correlational research design aimed to identify associations among variables in a non-invasive and naturally occurring context Laerkner, Egerod, and Hansen (2015) and examined relationships between variables without establishing direct causation (Krause, 2018).

The descriptive approach enabled the researchers to determine the level of students' dependency on artificial intelligence, their study habits, and their geometry achievement, while the correlational design facilitated the examination of the relationships between dependency on artificial intelligence and geometry achievement, and between study habits and geometry achievement.

3.2 Research Respondents

This research involved first- and second-year Bachelor of Secondary Education (BSEd) Mathematics students enrolled at Davao del Norte State College. The researchers employed simple random sampling to select the respondents, ensuring that each participant was randomly chosen. The required sample size was determined using the Online Raosoft Sample Size Calculator with a 95% confidence level and 5% margin of error (Raosoft, 2004). The final sample consisted of 74 first-year and 46 second-year students, with a total of 120 respondents.

3.3 Research Instruments

To gather data for this study, the researchers used three (3) sets of questionnaires to determine whether dependency on artificial intelligence and study habits predicted geometry achievement. Two questionnaires for the independent variables were adapted from previous studies, validated, and pilot-tested, while a multiple-choice test was used for the dependent variable.

3.3.1 AI Reliance Scale

The researchers employed an adapted standardized questionnaire developed by Al-Tkhayneh, Alghazo, and Tahat (2023), which originally contained three indicators: usage (six items), benefits (five items), and risks (four items), for a total of 15 items. In this study, 13 items were retained after minor wording revisions were made to suit the research context of this study. The instrument was then pilot tested, yielding a Cronbach's alpha of 0.78, indicating acceptable internal consistency and reliability. Some items were removed due to conceptual redundancy, and one item from Morales-García et al. (2024) was incorporated to strengthen the scale's reliability. The final instrument consisted of 13 items: 5 - Strongly Agree, 4 - Agree, 3 - Moderately Agree, 2 - Disagree, and 1 - Strongly Disagree. The instrument was pilot-tested and yielded a Cronbach's alpha of 0.78, indicating acceptable reliability as can be seen in Table 1.

Table 1. Reliability and interpretation scale for students' dependency on artificial intelligence

Parameter Limit	Descriptive Equivalent	Interpretation
4.20 - 5.00	Very High	This means that students' dependency on artificial intelligence is always evident.
3.40 - 4.19	High	This means that students' dependency on artificial intelligence is frequently evident.
2.60 - 3.39	Moderate	This indicates that students' dependency on artificial intelligence is occasionally evident.
1.80 - 2.59	Low	This means that students' dependency on artificial intelligence is rarely evident.
1.00 - 1.79	Very Low	This means that the students' dependency on artificial intelligence was not evident at all.

3.3.2 Study Habits Inventory

The Study Habits Inventory was adapted from Villa and Sebastian (2021) and consisted of seven indicators: time management, physical status, note-taking, motivation, test-taking strategies, reading ability, and memory. The instrument was validated and pilot tested, yielding a Cronbach's alpha of 0.91. Some items were removed due to redundancy, and additional items from related studies were incorporated to strengthen the instrument's validity. A five-point Likert scale was adopted in scoring each item thus: 5 - Strongly Agree, 4 - Agree, 3 - Moderately Agree, 2 - Disagree, and 1 - Strongly Disagree as can be seen in Table 2.

Table 2. Study habit level evaluation with the corresponding parameter limits, descriptive equivalent, and interpretation.

Parameter Limit	Descriptive Equivalent	Interpretation
4.20 - 5.00	Very High	This means that the study habits of the students are always evident.
3.40 - 4.19	High	This means that the study habits of the students are frequently evident.
2.60 - 3.39	Moderate	This means that the study habits of the students are occasionally evident.
1.80 - 2.59	Low	This means that the study habits of the students were rarely evident.
1.00 - 1.79	Very Low	This means that the study habits of the student are not evident at all.

3.3.3 Geometry Achievement Test

The Geometry Achievement Test adapted from Gada (2024) was used to measure students' geometry achievement. The test originally contained 50 items but was reduced to 30 after the expert validation. The instrument yielded a Cronbach's alpha of 0.92, indicating excellent reliability of the scale. Each correct answer was scored as one point and incorrect answers as zero (Ocy, Sarifah, & Riyadi, 2025), as can be seen in Table 3.

Table 3. Parameter limits, descriptive equivalents, and interpretation of students' geometry achievement

Parameter Limit	Descriptive Equivalent	Interpretation
25 - 30	Very High	This implies that the student's geometry achievement was outstanding.
19 - 24	High	This implies that the students' geometry achievement was very satisfactory.
13 - 18	Average	This implies that the students' geometry achievement was satisfactory.

7 - 12	Low	This implies that the students' geometry achievement was poor.
1 - 6	Very Low	This implies that the students' geometry achievement is very poor.

4. Results and Discussions

4.1 Level of Students' Dependency on Artificial Intelligence in terms of Usage

Table 4 presents the level of dependency on artificial intelligence of students in terms of usage. The statement, *"I depend on artificial intelligence to solve my mathematics problems"* yielded the highest mean of 3.43 with a descriptive equivalence of high, indicating that the item is frequently evident. The statement, *"I use AI-generated solutions to do my mathematics assignments"* had a mean of 3.38, which falls under the moderate descriptive equivalent, suggesting that the item is occasionally evident. The statement, *"I copy AI-provided answers to solve my mathematics problems quickly"* held the lowest mean of 3.17, which is also within the moderate descriptive equivalent. The category mean of 3.31 aligns with the moderate descriptive equivalent, indicating that students' dependency on artificial intelligence in terms of usage is occasionally evident. The standard deviation of 0.723 indicates a moderate level of variability in the responses.

Table 4. Level of students' dependency on artificial intelligence in terms of usage

No	Items	Mean	SD	Descriptive Equivalent
1	I depend on artificial intelligence to solve my math problems.	3.43	0.816	High
2	I used AI-generated solutions to complete my mathematics assignments.	3.38	0.832	Moderate
3	I copy AI-provided answers to solve my mathematics problems quickly.	3.17	0.833	Moderate
4	I use artificial intelligence to solve my mathematics problems.	3.28	0.780	Moderate
	Category	**3.31**	**0.723**	**Moderate**

These findings reveal that students are beginning to integrate artificial intelligence into their academic practices, particularly in mathematics, but their usage remains moderate. According to Pala, NOBIS Jr, and Lagrimas (2025), the over-reliance of the learners on artificial intelligence can reduce their critical thinking and independent problem-solving skills.

4.2 Level of Students' Dependency on Artificial Intelligence in terms of Benefits

Table 5 presents students dependency on artificial intelligence in terms of benefits. The highest mean was observed in item number 2, *"Artificial intelligence will improve my understanding of mathematical concepts"*, which received a mean score of 3.93, while other items such as *"Artificial intelligence could easily enhance the process of learning mathematics"* with a mean of 3.78, and *"Artificial intelligence is efficient and effective in solving mathematics problems"* got a mean of 3.63 also got high ratings which these items fall under the high descriptive equivalent. Although the lowest mean was 3.42 for item 3, *"Relying on artificial intelligence to solve mathematics problems is essential,"* it is still within the descriptive equivalent of high. The mean of the category was 3.64, which is congruent with the high descriptive equivalent. The standard deviation of 0.684 also indicates medium variability in the students' responses.

Table 5. Level of students' dependency on artificial intelligence in terms of benefits

No	Items	Mean	SD	Descriptive Equivalent
1	Artificial intelligence can easily enhance the process of learning mathematics.	3.78	0.801	High
2	Artificial intelligence will improve my understanding 3of	3.93	0.769	High

	mathematical concepts.			
3	Relying on artificial intelligence to solve mathematics problems is essential.	3.42	0.826	High
4	Artificial intelligence is efficient and effective in solving mathematical problems.	3.63	0.840	High
5	Artificial intelligence is not a threat to my learning of mathematics.	3.44	0.896	High
	Category	**3.64**	**0.684**	**High**

Based on the results, both BSEd Mathematics 1st- and 2nd-year students agreed that artificial intelligence will improve their understanding of the concepts in mathematics, and it could easily enhance the process of their learning in mathematics. These results are supported by Seo et al. (2021), who stated that artificial intelligence improves learning by personalizing, engaging, and adapting content to students' requirements.

4.3 Level of Students' Dependency on Artificial Intelligence in terms of Risks

Table 6 presents the dependency of students on artificial intelligence based on risks. The highest mean of 3.93, which falls under the high descriptive equivalent, was obtained for item 4, *"I fear that artificial intelligence might replace my current skills and abilities in mathematics."* This was followed by item 3, *"Relying on artificial intelligence for critical mathematics may cause risks and errors"* with a mean of 3.85. The lowest mean obtained with item number 2, *"Using artificial intelligence for mathematics solutions might result in incorrect or uncontrolled calculations,"* which is 3.73, also falls within the same range. The category mean of 3.81, with a high descriptive equivalent, indicates that students are often aware of the risks posed by artificial intelligence. The low standard deviation of 0.661 suggests that the students were more likely to be consistent in their opinions on the dangers of artificial intelligence.

Table 6. Level of students' dependency on artificial intelligence in terms of risks

No	Items	Mean	SD	Descriptive Equivalent
1	Reliance on artificial intelligence could lead to a loss of independent mathematical thinking.	3.74	0.772	High
2	Using artificial intelligence for mathematical solutions might result in incorrect or uncontrolled calculations.	3.73	0.799	High
3	Relying on artificial intelligence for critical mathematics tasks may cause errors.	3.85	0.806	High
4	I fear that artificial intelligence may replace my current skills and abilities in mathematics.	3.94	0.802	High
	Category	**3.81**	**0.661**	**High**

According to the findings, both the first- and second-year BSEd Mathematics 1st and 2nd-year students said that they believe that their creative mathematical thinking may be lost when they rely on artificial intelligence and that the use of artificial intelligence to find their answers may be wrongly calculated. These findings are reinforced by Çela et al. (2024), who found that overreliance on artificial intelligence negatively affects problem-solving and creativity, as well as autonomy.

4.4 Summary of the Students' Levels of Dependency on Artificial Intelligence

A summary of the dependency of artificial intelligence among the students is presented in Table 7. The mean of the indicator that obtained the highest mean was risks with 3.81, which falls in the descriptive equivalent of high, followed by benefits with 3.64. Finally, usage had the lowest mean of 3.31, which falls under the moderate descriptive equivalent. The standard deviation is very low at 0.510, hence the overall mean of the dependency on artificial intelligence is 3.59, which is under high descriptive equivalent. The low standard deviation of the responses shows that the students' responses were quite agreeable or consistent in nature.

Table 7. Summary of the students' level of dependency on artificial intelligence

Indicators	Mean	SD	Descriptive Equivalent
Usage	3.31	0.723	High
Benefits	3.64	0.684	High
Risks	3.81	0.661	High
Category	**3.51**	**0.510**	**High**

According to the findings, BSEd Mathematics 1st and 2nd -year students did confirm that they were not yet in a position to apply the artificial intelligence tools in their routine academic activities. The findings are supported by the research of Vieriu and Petrea (2025), who stated that although the perception of artificial intelligence is generally positive in terms of its benefits on increasing the efficiency and performance of learning studies, the reliability of the artificial intelligence produced is also a major concern, over-reliance also poses a significant concern, and the loss of critical thinking skills is also possible.

4.5 Level of Study Habits of Students in Terms of Time Management

Table 8 presents the results of the study habits of students in terms of time management. Item number 4, "If I have to study for a longer time, I take rest in between" yielded the highest mean of 3.65 under the descriptive equivalent of high. Item number 5, *"I divide the time according to the matter to be answered with respect to the number of questions"* had a mean of 3.57, which is still a high descriptive equivalent. The lowest mean score of 3.17 appeared in item number 1, *"I study mathematics everyday "*which had a moderate descriptive equivalent. The category mean of 3.41 is in the moderate descriptive equivalent, which shows that in some cases, the time management skills of students are manifested. The overall standard deviation of 0.510 indicates that students' responses were relatively consistent, with only minor variations across the group.

Table 8. Level of study habits of students in terms of time management

No	Items	Mean	SD	Descriptive Equivalent
1	I study mathematics every day.	3.17	0.714	Moderate
2	I study mathematics at a specific time of the day.	3.45	0.672	Moderate
3	I do my mathematics homework daily.	3.23	0.716	Moderate
4	If I have to study mathematics for a longer time, I take a break in between.	3.65	0.669	High
5	I divide the time according to the matter to be answered with respect to the number of questions asked.	3.57	0.719	High
	Category	**3.41**	**0.510**	**Moderate**

Based on the results, BSEd Mathematics 1st and 2nd year students concurred that they took a break in between if they needed to study longer, and that they segmented the time depending on the problem to be answered based on the number of questions. This is reinforced by the investigation of Jubay, Ledres, Fernandez, Mancao, and Guerrero (2021), which revealed that students with moderate time management skills are likely to benefit from creating structured routines to prevent the hassles of multitasking and instead achieve better academic results.

4.6 Level of Study Habits of Students in terms of Physical Status

Table 9 shows the study habits of students based on their physical status. The highest mean under the high descriptive equivalent was 4.04, which was item number 3, *"I realized the importance of mathematics for my future career."* The second highest mean was 3.94 for item 6, *"I easily get distracted by the surroundings at the time of the study"* followed by 3.85 mean of item 5, "*I can improve my study habits in mathematics"* which also falls under high descriptive equivalent. Conversely, the lowest mean of 3.24 belongs to the item number 2, *"I develop an automatic interest in the lessons in*

mathematics as soon as I start studying it" Although it got the lowest mean score, this still falls under the high descriptive equivalent. The mean of the category of 3.74 represents a high level of study habits in terms of physical status. The category's standard deviation of 0.478 indicates that students' responses were relatively consistent, with only minor variations across the group.

Table 9. Level of study habits of students in terms of physical status

No	Items	Mean	SD	Descriptive Equivalent
1	I have all the required books and other relevant study materials.	3.28	0.767	Moderate
2	I develop an automatic interest in mathematics lessons as soon as I start studying them.	3.24	0.697	High
3	I have realized the importance of mathematics for my future career.	4.04	0.760	High
4	Other stray thoughts gradually flow in as soon as I settle down to study.	3.80	0.616	High
5	I can improve my study habits in mathematics.	3.85	0.694	High
6	I was easily disturbed by the surroundings during the study.	3.94	0.781	High
	Category	**3.74**	**0.478**	**High**

This finding is aligned with the results of a study by Gonzalez, Hernandez, Coltrane, and Mancera (2014), who found that despite adequate levels of physical activity among students, there is no correlation with academic results, lead to the idea that physical preparedness is not a conditional factor of academic success. Similarly, Shang and Keat (2023) highlighted the mediating influence of emotional and mental health, as well as physical activity, on students' academic performance.

4.7 Level of Study Habits of Students in terms of Note-taking

Table 10 shows the level of study habits of students in terms of note-taking. Item number 5, *"I understand mathematics better when I take notes myself"* got the highest mean of 3.86, thus indicating a very common direct linkage between the active note-taking habit of students and its role in enhancing their understanding of mathematics. Conversely, the lowest ranking item was item number 3, *"I find it difficult to take down notes in mathematics class"* with a mean of 3.34 under the moderate descriptive equivalent. The category mean is 3.61, under the high descriptive equivalent. This means that students 'study habits are frequently evident in their note-taking habits. The standard deviation of 0.611 suggests a moderate variation in students' note-taking habits, with individual responses varying, showing that not all students demonstrate this habit equally.

Table 10. Level of study habits of students in terms of note-taking

No	Items	Mean	SD	Descriptive Equivalent
1	During classroom teaching in mathematics, I take notes sincerely.	3.78	0.814	High
2	At home, I compare my class notes with the notes from mathematics textbooks.	3.48	0.889	High
3	I find it difficult to take notes in mathematics class.	3.34	0,893	Moderate
4	I enjoy noting the key math concepts the teacher emphasizes.	3.59	0.772	High
5	I understand mathematics better when I take notes.	3.86	0.792	High
	Category	**3.61**	**0.611**	**High**

The results indicate that both BSEd Mathematics 1st- and 2nd-year students share a common perspective that they understand mathematics better when they take notes themselves and that they take

down notes sincerely in mathematics. Al-Ghazo (2023) emphasized the positive contribution of note-taking in students' comprehension and lead them to a successful academic performance.

4.8 Level of Study Habits of Students in terms of Motivation

Table 11 presents the results of the study habits of students in terms of motivation. Among the four items assessed, item number 1, *"I take help of anybody if I do not follow anything"* recorded the highest mean of 3.95 and falls under the high descriptive equivalent. Item 3, *"I attend my mathematics classes regularly on time"* also generated a high descriptive equivalent with a mean of 3.88, which points to the consistency and sense of responsibility in their schoolwork. Conversely, the lowest mean score of 3.35 occurred for item 2, *"I study the lesson in mathematics at home thoroughly before it is taught in the classroom,"* with a moderate descriptive equivalent. The category mean of 3.70 reveals a generally high level of motivation among the respondents regarding their study habits in mathematics. Moreover, the standard deviation of 0.530 indicates that the responses were relatively consistent.

Table 11. Level of study habits of students in terms of motivation

	Items	Mean	SD	Descriptive Equivalent
1	I seek help from anyone if I do not understand something.	3.95	0.672	High
2	I study the mathematics lesson at home thoroughly before it is taught in the classroom.	3.35	0.806	Moderate
3	3. I regularly attend mathematics classes on time.	3.88	0.847	High
4	4. I attempted to compensate for my mathematical deficiencies.	3.62	0.852	High
	Category	**3.70**	**0.530**	**High**

The findings indicate that the students in both 1st and 2nd-year BSEd mathematics students agreed that whenever they do not understand anything, they seek assistance from others and attend mathematics classes regularly and at the appropriate time. This is further evidenced by the research conducted by This is further evidenced by the research conducted by Campanilla (2024), which found that learner's motivation was significantly correlated with their mathematics achievement, indicating that higher levels of motivation are associated with improved mathematics performance.

4.9 Level of Study Habits of Students in terms of Test-taking Strategies

Table 12 presents the study habits of students in terms of test-taking strategies. Item number 2, *"Before writing the answers to the questions in the mathematics examination, I read very carefully the entire question in the test paper"* is the highest-ranked test-taking strategy with a mean of 4.05, which belongs to a high descriptive equivalent. This was followed by item number 7, "*I feel tense at the beginning of the mathematics examination"* with a mean of 3.93. On the other hand, item number 8, *"I record my examination result in mathematics"* was the lowest ranked strategy with a mean of 3.46. Although this strategy is the lowest ranked, it is still under a high descriptive equivalent.

The category mean of 3.72 indicates a high descriptive equivalence. This means that the study habits of students were frequently evident in their test-taking strategies. The standard deviation of 0.430 suggests a relatively low variability in responses, indicating that most students demonstrated similar levels of consistency and confidence in their test-taking strategies.

Table 12. Level of study habits of students in terms of test-taking strategies

No	Items	Mean	SD	Descriptive Equivalent
1	During mathematics examination days, I sleep usually at night	3.53	0.888	High

2	Before writing the answers to the questions in the mathematics examination, I carefully read the entire question in the test paper.	4.05	0.672	High
3	In my mathematics examination, I answered the questions in their serial order.	3.58	0.718	High
4	Before the mathematics examination, I read my notes carefully.	3.92	0.751	High
5	I prepare for the mathematics examination from the guides/notes available in the market.	3.63	0.757	High
6	I drew an outline of answers for each question before writing the answers to the questions in the examination.	3.77	0.730	High
7	I feel tense at the beginning of the exam.	3.93	0.758	High
8	I record my examination results in mathematics.	3.46	0.732	High
9	I singled out the difficult topic based on my examination results.	3.65	0.785	High
10	I tend to compare my mathematics marks with others after the results are declared.	3.69	0.797	High
	Category	**3.72**	**0.430**	**High**

Based on the results, both BSEd mathematics 1st and 2nd-year students agreed that they read the entire question in the test paper very carefully before writing the answers to the questions in their mathematics examination. Improving these test-taking strategy skills can help students perform well, boost their confidence, and deeply understand mathematical concepts, which can lead to positive academic outcomes (Tee, Leong, & Rahim, 2018).

4.10 Level of Study Habits of Students in terms of Reading Ability

Table 13 presents the study habits of students in terms of reading ability. Item 1, *"I study figures and graphs very carefully while reading"* and item 5, *"I stop from time to time to reflect on the mathematical ideas I'm reading,"* were the highest-ranked reading ability with a mean of 3.68 under a high descriptive equivalent. Meanwhile, the item that got the lowest mean of 3.03 is number 3, *"I study in the library regularly"* which is under the moderate descriptive equivalent.

The category mean was 3.50, which indicates a high descriptive equivalent. This means that the study habits of the students were frequently evident in terms of reading ability. The standard deviation of 0.528 reflects a moderate variation in students' responses.

Table 13. Level of study habits of students in terms of reading ability

No	Items	Mean	SD	Descriptive Equivalent
1	1. I study figures and graphs carefully while reading.	3.68	0.735	High
2	2. I continue my reading despite the difficulties understanding the meaning of some mathematical languages.	3.54	0.766	High
3	3. I regularly study in the library.	3.03	0.869	Moderate
4	4. When the math text becomes difficult, I read it aloud to help me better understand the concepts.	3.59	0.796	High
5	5. I stop from time to time and reflect on the mathematical ideas I read.	3.68	0.698	High
	Category	**3.50**	**0.528**	**High**

In line with the results, both BSEd Mathematics 1st- and 2nd-year students agreed that when they read, they carefully study figures and graphs and reflect on the mathematical ideas from time to time. To support this result, Sofyan, Wahid, and Idris (2021) presented how the reading-aloud strategy improves students' comprehension in analyzing and interpreting the content of what they have read.

4.11 Levels of Study Habits of Students in terms of Memory

Table 14 indicates the results of the study habits of students in the context of memory. Item 1, *"I try to recall the matter after reading it"* had the highest mean score of 3.85 and a high descriptive equivalent. The next item with the highest mean of 3.63 is item number 4, *"I forget the mathematical content discussed in class"* with a high descriptive equivalent. Meanwhile, item 3, *"I forget the deadline of math-related assignment or activities"* received the lowest mean score of 3.33 with a moderate descriptive equivalent. Moreover, the category mean of the study habits of students in terms of memory is 3.59, with a high descriptive equivalent. This implies that the amount of study practice among the students is frequently evident. The standard deviation of 0.570 implies that there is a moderate difference in the responses of students.

Table 14. Level of study habits of students in terms of memory

No	Items	Mean	SD	Descriptive Equivalent
1	I try to recall the matter after reading it.	3.85	0.718	High
2	I cram certain things without understanding them.	3.55	0.960	High
3	I forget deadlines for math-related assignments or activities.	3.33	0.853	Moderate
4	I forget the mathematical content that was discussed in class.	3.63	0.841	High
	Category	**3.59**	**0.570**	**High**

Based on the results, both 1st and 2nd year BSEd mathematics students agreed that they try to recall the matter after reading it, and despite the attempt to recall discussions, they still tend to forget the content discussed in their respective classes. This result aligns with the study by Comighud (2021), which established that strong memory abilities have a positive impact on students' academic performance.

4.12 Summary of the Students' Levels of Study Habits

Table 15 shows a summary of the students' study habits. The highest-ranked indicator was Physical Status, with a mean of 3.74 under the high descriptive equivalent and a standard deviation of 0.478. This indicates that students frequently maintain their physical status in their studies. The standard deviation of 0.478 suggests low variability in responses, meaning that most students consistently reported similar behaviors in managing their physical well-being to support their study habits. The lowest-ranked indicator was time management, with a mean of 3.41 and a standard deviation of 0.510. Although this indicator was the lowest-ranked compared with the other indicators, it still fell within the high category. The high ratings across all indicators indicate that these approaches are effective and relevant to learning. The overall study habits scores, with a mean of 3.61 and a low standard deviation of 0.359, imply that students generally exhibit strong study habits. The low standard deviation suggests a close level of consistency among students' responses, with minimal variation.

Table 15. Summary of the students' level of study habits

Items	Mean	SD	Descriptive Equivalent
Time Management	3.41	0.510	High
Physical Status	3.74	0.478	High
Note-taking	3.61	0.611	High
Motivation	3.70	0.530	High
Test-taking Strategies	3.72	0.430	High
Reading Ability	3.50	0.528	High
Memory	3.59	0.570	High
Overall	**3.61**	**0.359**	**High**

Based on the results both 1st and 2nd year BSEd mathematics students agreed that they applied more physical status and motivation in their study habits. Castillo et al. (2023) noted that efficient study habits

may encourage students to be more active in their learning without making them feel overloaded and distracted and that study habits are also a substantial factor that determines academic success.

4.13 Level of Students' Geometry Achievement

Table 16 shows the level of BSEd Mathematics students' geometry achievement in terms of test scores in geometry with a mean score of 21 with a high descriptive equivalent. This indicates that the geometry achievement of BSEd Mathematics students is satisfactory. The results were obtained from the data gathered through a 30-item test questionnaire adapted from the Geometry Achievement Test (Ocy et al., 2025). In addition, the relatively low standard deviation of 2.945 indicates that students' scores were clustered closely around the mean, suggesting a consistent level of performance across the group.

Table 16. Level of students' geometry achievement

Indicator	Mean	SD	Descriptive Equivalent
Geometry Achievement	21	2.945	High

Based on the results, both the BSEd mathematics 1st and 2nd year students showed high results in their achievement in geometry, implying that many students demonstrated a strong understanding of the geometry concepts being assessed. According to Ajai and Ogungbile (2025), methods of teaching geometry in the laboratory resulted in better student performance, as evidenced by a higher mean score in the post-test, which implied that there was a high degree of geometry performance after the intervention. In addition, the geometry performance of Ghanaian students showed that the average score was 53.3%, which was defined as an above-average performance level (Sam, Mensah, Eduah, Dobre, & Asiamah, 2024).

4.14 Significant Relationship between Dependency on Artificial Intelligence and Study Habits toward Geometry Achievement

To check whether the dependency on artificial intelligence and geometry achievements had a significant correlation, the Pearson correlation test was used. The outcome provided a Pearson r value of-0.120 and a p-value of 0.191. This means that the relationship is very weak and not significant at the 0.05 level. Thus, we cannot conclude that the dependence of artificial intelligence and achievement in geometry has a significant correlation between students. There was also a study of the correlation between study habits and geometry achievement using the Pearson correlation test. The Pearson r value generated was -0.029, with a p-value of 0.756. This also indicates a very weak negative correlation, which is not statistically significant at the 0.05 level. Therefore, study habits and geometry achievement were not significantly related to dependency on artificial intelligence, as can be seen in Table 7.

Table 17. Significant relationship between dependency on artificial intelligence and study habits toward geometry achievement

Variable Correlated	r	p-value	Decision on H_0	Decision on Relationship
Dependency on Artificial Intelligence and Geometry Achievement	- 0.120	0.191	Accept	Not Significant
Study Habits and Geometry Achievement	- 0.029	0.756	Accept	Not Significant

Considering these results, the dependency on artificial intelligence and geometry achievement were very weakly negatively correlated among the BSED math students. It also demonstrates the very weak negative correlation between study habits and geometry achievement. Marzuki, Widiati, Rusdin, Darwin, and Indrawati (2023) also confirmed this observation, emphasizing that reliance on artificial intelligence technologies to solve problems can negatively affect students who are unable to think and reason independently. In addition, these results seem to contradict the premises of the Technology Acceptance Model (TAM), which states that perceived usefulness and ease of use of technology,

including artificial intelligence tools, positively relate to the attitude and behavioral intentions of users to use them, and eventually lead to better performance (Davis, 1989).

Moreover, the results show a very weak negative correlation between study habits and geometry achievement among BSEd Mathematics students, which is supported by the claim of Gumapac, Yulo, Nanud, and Baluyos (2025), who showed that there was no significant relationship between students' study habits regarding motivation, organization, active engagement, and use of resources, managing schoolwork stress, effective note-taking, and preparedness, and students' performance in mathematics. However, the results disprove the claim by Aljaffer et al. (2024) that there is a significant relationship between students' study habits and their level of achievement in geometry.

Given the absence of significant associations, regression analysis was not performed. Conducting regression in this context would be inappropriate, as the data do not support a predictive relationship between the identified variables and geometry achievement, thereby limiting the validity and relevance of any further predictive modeling.

5. Conclusions

5.1 Conclusion

The findings of the study indicate that dependency on artificial intelligence is high in terms of benefits and risks but moderate in terms of usage, suggesting that BSEd Mathematics students frequently manifest dependency on artificial intelligence. The level of study habits in all seven indicators, namely time management, physical status, note-taking, motivation, test-taking strategies, reading ability, and memory, was also high, indicating that students frequently practice these study habits. In terms of academic performance, the geometry achievement of BSEd Mathematics students was high, indicating very satisfactory performance in geometry. However, the results revealed no significant relationship between dependency on artificial intelligence and geometry achievement or between study habits and geometry achievement. These findings suggest that geometry achievement may be influenced by other factors not covered in this study.

5.2 Research Limitations

This study has several limitations that should be considered. First, the sample size and heterogeneity may be insufficient to permit generalization of the findings across broader populations. Second, the measurement instruments used may have limitations in terms of their validity and reliability. Finally, the limited duration of data collection may restrict the study's capacity to capture the long-term effects on academic achievement.

5.3 Suggestions and Direction for Future Research

Based on the study's findings, several recommendations are offered. Students are encouraged to continue developing good academic habits, including effective time management, note-taking, and maintaining motivation, while responsibly utilizing artificial intelligence as a supplementary learning tool in geometry. Mathematics teachers should promote interactive, student-centered teaching by incorporating guided problem-solving, formative assessment, and appropriate technological tools to strengthen students' understanding of geometrical concepts. School administrators are advised to enhance academic support systems through accessible learning materials, structured academic advising, study skills programs and responsible AI training. The ITED Mathematics Faculty should adopt a holistic approach to geometry learning by integrating study skills, computer literacy, and problem-solving techniques into the curriculum. Finally, future researchers should examine additional variables, such as cognitive ability, learning styles, classroom management, and availability of teaching resources, to gain a more comprehensive understanding of the factors influencing academic performance.

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Author Contributions

QNET conceptualized the study and was primarily responsible for the research design, data collection, data analysis, and manuscript preparation. RMDM contributed to the development of the research methodology, carried out data collection, performed data validation and statistical analyses, and assisted in the interpretation of findings and initial drafting of the manuscript. SES supported the literature review and contributed to structuring the research framework. RMA was involved in data verification, editing, and formatting of the manuscript. AES provided overall supervision of the research process, conducted critical revisions, and reviewed the final manuscript. All authors have read and approved the final version of the manuscript.

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