The Impact of AI Tools on Student Engagement and Academic Performance
DOI: https://doi.org/10.56738/issn29603986.geo2025.6.94
ISSN 2960-3986
GEO Academic Journal Vol. 6 No. 1 – 2025 series

The Impact of AI Tools on Student Engagement and Academic Performance

Josan D. Tamayo
Centro Escolar University Malolos, Philippines
jtamayo@ceu.edu.ph

Jose Cris O. Sotto
Centro Escolar University Manila, Philippines
josotto@ceu.edu.ph

Clarissa P. Vicente
Baliuag University
clarissavicente@baliuagu.edu.ph

MaryAnn T. Lim
Dr. Yanga's Colleges Inc.
tongskee@yahoo.com

Abstract

This study aims to investigate the impact of AI tools on student engagement and academic performance in the classroom. By conducting a quantitative analysis, the study explores the acceptability of AI tools among students and their effectiveness in enhancing engagement and improving academic outcomes. The findings revealed that there is a significant correlation between the use of AI Tools in the student engagement and academic performance of the students. The research provides valuable insights into the potential benefits and challenges of integrating AI tools in educational settings.

Keywords: Artificial Intelligence, AI, AI Tools, Student Engagement, Academic Performance

Introduction

Students and instructors perceive the impact of artificial intelligence systems on learner–instructor interaction in online learning as "double-edged swords" (Seo et al., 2021). Both students and instructors acknowledge the dual nature of AI systems, appreciating their capacity to enhance communication quality and quantity, deliver personalized support, and foster a sense of connection, yet expressing apprehensions regarding issues of responsibility, agency, and surveillance.

DOI: https://doi.org/10.56738/issn29603986.geo2025.6.94
ISSN 2960-3986
GEO Academic Journal Vol. 6 No. 1 – 2025 series

In a content analysis performed in 2023, the majority of the top 50 universities in the world are optimistic about the advantages of AI in education, but the acceptability of generative AI tools in research production is usually low (Sotto, Tamayo & Vicente, 2023).

Artificial Intelligence (AI) offers promise in tackling key education challenges, driving innovation in teaching and learning, and advancing Sustainable Development Goal 4; however, its swift advancements pose various risks and challenges that currently exceed policy discussions and regulatory frameworks (UNESCO 2023a).

A newly popularized technology, AI receives global attention with six different international attempts to regulate AI use. Sotto et al. (2023) noted that the said technological tool has been subjected to the use of the general populace and has impacted humanity in different ways even as authorities globally have not yet ensured safe practice across sectors.

UNESCO (2023b) provided a seven-step guide that governmental agencies can take to regulate generative AI and reassert public control in order to leverage its potentials across sectors, namely 1) Endorse international or regional general data protection regulations or develop national ones; 2) Adopt/revise and fund whole-of-government strategies on AI; 3) Solidify and implement specific regulations on the ethics of AI; 4) Adjust or enforce existing copyright laws to regulate AI-generated content; 5) Elaborate regulatory frameworks on generative AI; 6) Build capacity for proper use of GenAI in education and research; and 7) Reflect on the long-term implications of GenAI for education and research.

Among the guidelines, starting with the grassroot level is the most crucial. Teachers and researchers have to be educated on the proper use of AI tools through "thorough training and continuous coaching."

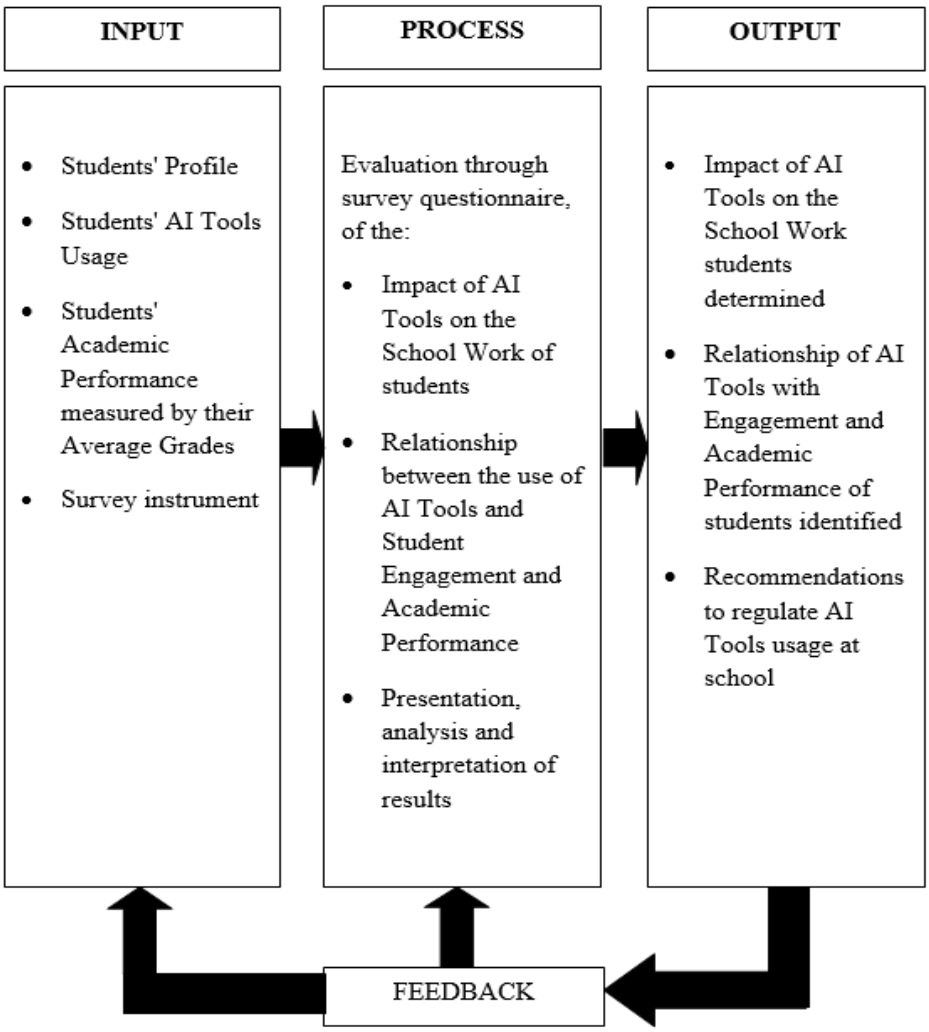
The researchers of the present study, who are also teachers by profession, aim to determine the impact of AI tools on students' engagement and academic performance. The current research delved into the students' motivations in using, their perceived confidence over the AI-generated outputs, level of dependability on AI tools, and the perceived impact on their classroom performance.

Theoretical Framework

In understanding the impact of AI Tools in the students' engagement and academic performance, the researchers utilized the Input-Process-Output system approach. This approach is composed of interrelated elements that serve as guidance by the researchers in solving the problem under investigation.

DOI: https://doi.org/10.56738/issn29603986.geo2025.6.94
ISSN 2960-3986
GEO Academic Journal Vol. 6 No. 1 – 2025 series

Figure 1
Conceptual Framework



Research Questions

The researchers investigated the impact of AI tools on schoolwork in relation to student engagement and academic performance of the first year to fourth year students enrolled in different Information Technology Education (ITE) programs from the higher education institution in the province of Bulacan.

Specifically, the researchers aimed to answer the following questions:

1. What is the profile of the students in terms of:
   1.1 sex,

DOI: https://doi.org/10.56738/issn29603986.geo2025.6.94
ISSN 2960-3986
GEO Academic Journal Vol. 6 No. 1 – 2025 series

1.2 year level, and
1.3 degree program?

2. How could the academic performance of the respondents be described?
3. What is the impact of AI tools on the engagement and academic performance of the respondents?
4. Is there a significant relationship between the use of AI tools and the engagement and academic performance of the respondents?

Literature Review

How AI Affects Jobs: Problems and Trends

People all over the world are changing the way they work because of AI. People are quite worried about losing their jobs because of this, but it is also what is making the sector grow so swiftly. 77% of the people who took the survey said they were afraid about losing their employment to AI in the next year, and more than half said they were very scared (Facebook, 2023). People are afraid that AI will take over jobs that people used to do since it makes things harder.

Many people think that AI will take away a lot of jobs all over the world. McKinsey believes that by 2030, AI developments might affect 15% of the world's jobs. This means that machines might do 400 million jobs (Haan, 2023). According to the McKinsey Global Institute, machines could do as much as 30% of the work in the world by 2030. AI was the sixth most common factor for job loss in the US in May 2023. Technology caused 3,900 jobs to be lost (National University, 2025). In addition, it's very likely that 36 million American occupations will be mechanized in the next 20 years (What's The Big Data, 2025). These data show that AI is having a big effect on the job market.

AI is becoming more common all around the world, but it depends on where you are and what you do. IBM says that 25% of organizations use AI to hire new workers. 58% of Chinese enterprises employ it, but only 25% of US corporations do (Haan, 2023). Additionally, nearly half of the organizations that employ ChatGPT and other AI technologies indicate that these tools have directly replaced labor (Exploding Topics, 2025). This tendency is especially clear in fields like technology and industry, where employment have been lost in the past because of automation. The US has lost 1.7 million manufacturing jobs since 2000, for example (Exploding Topics, 2025). The faster that jobs are being reduced in 2024 and early 2025 is closely related to the increased usage of AI, even in government institutions.

DOI: https://doi.org/10.56738/issn29603986.geo2025.6.94
ISSN 2960-3986
GEO Global Educators Professional Enhancement International Inc.
GEO Academic Journal Vol. 6 No. 1 – 2025 series

AI changes how individuals use technology as well as taking jobs away from them. A study of 6,300 students in Germany indicated that ChatGPT and other AI tools are mostly utilized for research, understanding course material, and creative work (von Garrel & Mayer, 2023). This means that schools are using AI more and more. humans are afraid that this software will take their jobs, but it also shows that AI could help humans work harder and learn new things. Experts say that in an economy driven by AI, reskilling, job transition services, and training programs are important for helping workers adjust to their new occupations (Forbes, 2023). The findings indicate that AI can improve things, but they also show how important it is to adopt rules that will limit its negative effects on jobs.

Adoption Rate among Students and Teachers

In a study sponsored by Turnitin, a huge discrepancy exists between student and teacher use of AI tools. Adoption rate was defined by Tyton Partners (2023) as "monthly, weekly, or daily usage of generative AI writing tools". According to data, approximately half of college students are utilizing AI tools, whereas only 22 percent of faculty members are incorporating them into their teaching practices.

The study noted a rising trend in student adoption of AI writing tools, with an increase from 27 percent in spring 2023 to 49 percent in fall 2023.

Among faculty who utilize AI, the primary use (43 percent) is to analyze prompts through AI tools to understand student perspectives, assuming students do the same, followed by 35 percent who teach students how to use generative AI writing tools effectively, and nearly one-third (29 percent) who employ these tools to enhance in-class activities.

Readiness of the Education Sector

With the figures related to usage of AI tools, it would be easy to conclude that the world has adapted to the newly embraced technology.

UNESCO Director for the Future of Learning and Innovation Sobhi Tawil described the situation as "still very much in the wilderness." Referring to the readiness of the education sector, Tawil added, "Institutions are not yet providing guidance or direction."

In a survey of over 450 schools and universities in May 2023, researchers found that fewer than 10% have developed institutional policies and/or formal guidance concerning the use of generative AI applications (UNESCO, 2023c).

In another study, data on the governmental use of AI for education (UNESCO, 2023d) revealed that only some seven countries (China, Finland, Georgia, Qatar, Spain, Thailand and Türkiye) reported that they had developed or were developing frameworks or training programmes on AI for teachers.

DOI: https://doi.org/10.56738/issn29603986.geo2025.6.94
ISSN 2960-3986
GEO Academic Journal Vol. 6 No. 1 – 2025 series

Meanwhile, most faculty members acknowledge the usefulness of AI tools, with many agreeing that students must learn to use them for future career success; however, while instructors may not perceive GenAI as beneficial for learning, they still believe it's essential for students' job readiness, suggesting the need for intervention by institutional leaders and vendors to address these differing perspectives (Tyton Partners, 2023).

How learning and teaching are affected by generative AI

More and more people in higher education are seeing generative AI (GenAI) as a game-changing technology. Both students and teachers agree that it might help students learn better. Tyton Partners (2023) says that students constantly think that GenAI is good for their education, while faculty members' perspectives, which were initially more cautious or unfavorable, have been getting better over time. This change in point of view shows that more and more individuals are starting to see AI technologies as useful tools for teaching and learning.

GenAI is becoming more prevalent in colleges and universities. Students and lecturers may use it to make things and automate jobs at all stages of their careers. Students know how important GenAI is for their future employment, but faculty members are usually slow to try out and use AI tools themselves. This difference demonstrates that executives in institutions and tech companies need to work together to assist professors learn more about AI and get better at it. To get the most out of GenAI on campuses, we need to promote its effective usage in education.

GenAI also makes things a lot more productive and efficient. Teachers are looking into how to employ AI for things like grading and testing. This might free up more time for them to teach in more meaningful ways. Also, students that use GenAI a lot utilize it both in and out of the classroom, which makes their learning better by giving them specialized help and speeding up their work. But there are also big moral and fairness issues with deploying GenAI. There are issues that need to be dealt with, like algorithmic bias, data privacy, and unequal access to AI technologies, to make sure that AI is used fairly and responsibly. A lot of groups are still working on rules to cope with these problems.

GenAI in education is a growing field that shows how it could make teaching and learning better by making it more effective, efficient, and accessible. But to fully fulfill this potential, everyone will need to work together to support instructors, uphold ethical standards, and make sure that all kids have equal access (Tyton Partners, 2023).

Method

Research Design

To investigate the problems stated in this study such as the profile of the students, their AI tools usage, and its impact on the engagement and academic performance, descriptive

DOI: https://doi.org/10.56738/issn29603986.geo2025.6.94
ISSN 2960-3986
GEO Academic Journal Vol. 6 No. 1 – 2025 series

research was employed. As to identify the relationship of the AI tools in the students' engagement and academic performance, correlational type of research was employed.

Research Participants

The population aggregates on this study consisted of all first to fourth year Information Technology Education students who have experience in using AI tools. The respondents were enrolled during the second semester of the academic year 2023-2024 from Centro Escolar University Malolos, Baliuag University, and Dr. Yanga's Colleges Inc. The participants consisted of two hundred sixty-one (261) students.

Sampling

In this study, the researchers used stratified random sampling techniques to identify the respondents. This method was used because the population was divided into categories or strata since the respondents were from different numbers of populations. Stratified random sampling aided to get the proportion to its size or enrolment. With this technique, the error of getting too many or too few samples were avoided.

The total number of each school can be seen in Table 1 or the Samples of the Study, as well as the number of respondents derived from the total population.

Table 1
Samples of the Study

School	Enrolment	%	Sample Size		
School 1	600	74	(261)	.74	193
School 2	123	15	(261)	.15	39
School 3	88	11	(261)	.11	29
	811	100			261

Research Instrument

There are two sources of data in this study. To identify the academic performance of the respondents, the average grades were acquired. The second source of data is the survey questionnaire to achieve the purpose of the study. The questionnaire is one of the most common instruments for data gathering. It is intended to contain information about conditions or practices of which the respondents are presumed to have knowledge.

The questionnaire was composed of two parts. Part I dealt with the respondent's personal data such as name, gender, year level, course and their average rating in all subject areas.

Part II contained statements that the respondents need to rate based on their level of agreement or disagreement. The questions were based on the ideas found from the readings of the researchers in thesis, journals, magazines as well as interviews with teachers and other school authorities. A reliability test such as Alpha (Cronbach) was facilitated to validate the

DOI: https://doi.org/10.56738/issn29603986.geo2025.6.94
ISSN 2960-3986
GEO Academic Journal Vol. 6 No. 1 – 2025 series

questionnaire since it is designed for this study only. A value of 0.942 was obtained which means the questionnaire is reliable and so it was used for this study.

Data Gathering Procedure

The researchers employed the descriptive survey method which was directed toward ascertaining the prevailing conditions. An approach to problem solving, it also sought to answer questions as to the real facts relating to existing conditions.

Administration of the Questionnaire

Using the research questions as bases, the researchers prepared a questionnaire that was later uploaded via Google Forms. The link was sent to the identified first year to fourth year students enrolled in any ITE courses. The results were tabulated, analyzed and interpreted.

Statistical Treatment of Data

The data were analyzed and interpreted with the use of mean, frequency count, percentage with reference to the majority criterion, and Pearson Product Moment Coefficient of Correlation (Guilford & Frutcher, 1996).

To measure the achievement of the students, the means were used. The means were considered the most reliable or accurate measure of the central location because it ordinarily fluctuates less widely than the mode and the median (Guilford & Frutcher, 1997). The achievement was categorized according to the University's grading system.

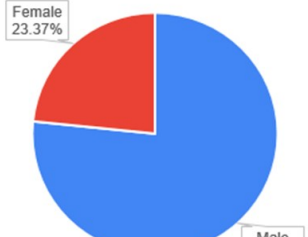
Results and Discussion

Based on the gathered data from the survey tool, interpretations were derived. To calculate the corresponding statistical treatment, Portable IBM SPSS Statistics v22 was utilized in the interpretation of data.

1. Profile of BSIT students

Based on the data collected, the respondents profile was summarized in Table 2, Table 3 and Table 4, respectively. In terms of sex, a total of two hundred (200) or 76.6% respondents are male and sixty-one (61) or 23.4% are female. As for the respondents' corresponding year level, seventy-eight (78) or 29.9% are first year students; seventy-two (72) or 27.6% from second year; sixty-two (62) or 23.8% are third year; and forty-nine (49) or 18.8% are fourth year. As for the degree program of the respondents, there are thirty-five (35) or 13.4% enrolled in BS in Computer Science program, one hundred ninety-nine (199) or 76.2% enrolled in BS in Information Technology program, while there are twenty-seven (27) or 10.3% enrolled in BS in Computer Engineering program.

Table 2



DOI: https://doi.org/10.56738/issn29603986.geo2025.6.94
ISSN 2960-3986
GEO Academic Journal Vol. 6 No. 1 – 2025 series

Profile of the Respondents According to Sex

Sex	Frequency	Percent
Male	200	76.6
Female	61	23.4
Total	261	100.0

Table 3

Profile of the Respondents According to Year Leve

Year Level	Frequency	Percent
I	78	29.9
II	72	27.6
III	62	23.8
IV	49	18.8
Total	261	100.0

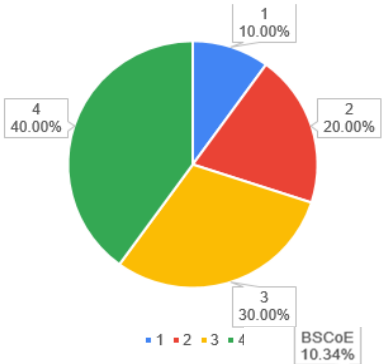
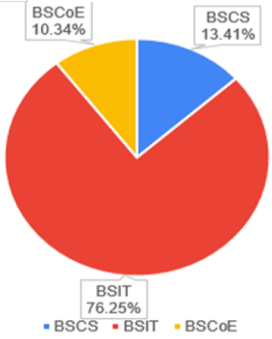


Table 4

Profile of the Respondents According to Course Enrolled in

Course	Frequency	Percent
BSCS	35	13.4
BSIT	199	76.2
BSCoe	27	10.3
Total	261	100.0



2. Engagement and Academic Performance of the Respondents

Two hundred sixty (261) first year to fourth year Information Technology Education students from the selected schools/universities in Bulacan served as the respondents of the study.

The average grades of the respondents during the first semester in all subject areas were gathered from the questionnaire distributed by the researchers.

The researchers used the means, and categorized the respondents based on the University's grading system in terms of academic achievement.

Table 5 shows the frequency distribution and academic achievement of the respondents. The computed mean is 2.0872 or close to 2.00. Respondents who have reached 2.00 were considered performing Very Satisfactorily, 60.5% of the respondents performed Very Satisfactory

DOI: https://doi.org/10.56738/issn29603986.geo2025.6.94
ISSN 2960-3986
GEO Academic Journal Vol. 6 No. 1 – 2025 series

while 39.5% of the respondents performed either Satisfactory, Fairly Satisfactory, Barely Satisfactory, and Unsatisfactory.

While conducting the survey, some respondents commented that they would perform better if they use AI Tools in moderation to some extent. They can focus their time and attention on learning, doing assignments, reviewing before examinations, attending classes and participating in class recitation while using AI Tools.

Table 5
Frequency Distribution and Academic Achievements of the Respondents

Mark	F	%	Mean
1.00	3	1.1	
1.25	26	10	
1.50	34	13	
1.75	50	19.2	
2.00	**45**	**17.2**	**2.0872**
2.25	24	9.2	
2.50	26	10	
2.75	37	14.2	
3.00	10	3.8	
5.00	6	2.3	
Total	261	100	

3. Impact of AI Tools in Engagement and Academic Performance of the Respondents

The impact of AI Tools on students' Engagement and Academic Performance was based on the evaluation provided by the respondents on the twenty statements. Each question has five (5) choices which were rated 5 for "Strong Agree" 4 for "Agree" 3 for "Undecided" 2 for "Disagree" and 1 for "Strongly Disagree". The sum of the responses of the students were tallied. Most of the questions aim to determine and test how students use AI Tools to meet their academic requirements. Table 6 shows the derived mean of the total responses of the respondents. The total responses which fall on and above the mean were defined as Frequent User of AI Tools and those below the mode were defined as Occasional User of AI Tools. One hundred twenty-eight (128) or 49.04% falls under the Frequent User of AI Tools while one hundred thirty-three (133) or 50.96% falls under the Occasional User of AI Tools. This represents that there are more Occasional User of AI Tools among the respondents in this study.

DOI: https://doi.org/10.56738/issn29603986.geo2025.6.94
ISSN 2960-3986
GEO Academic Journal Vol. 6 No. 1 – 2025 series

Table 6
Frequency Distribution and Total Responses of the of the Respondents

Total Response	Frequency	%	Summary
20-30	5	1.92%	50.96% Occasional User
31-40	13	4.98%	
41-50	37	14.18%	
51-60	78	29.89%	
61-70	**62**	**23.75%**	**Mean**
71-80	47	18.01%	
81-90	9	3.45%	49.04% Frequent User
91-100	10	3.83%	
Total	261	100.0	

Table 7 shows the sum of the responses of the students and their achievement. The responses from the questionnaire were tallied and matched with the academic achievement of the student respondents. The table is divided into two, the sum of the responses and half of the table was the frequency of the academic achievement of the respondents. Class limits from the total responses are formulated due to the wide variance derived.

Table 7
Frequency and Percentage Distribution of the Responses of the Respondents and their Achievements

Interval of Scores	F of the total Responses	%	Mark	F Of Acad. Achievement	%
20-30	5	1.92%	1.00	3	1.1
31-40	13	4.98%	1.25	26	10
41-50	37	14.18%	1.50	34	13
51-60	78	29.89%	1.75	50	19.2
61-70	**62**	**23.75%**	**2.00**	**45**	**17.2**
71-80	47	18.01%	2.25	24	9.2
81-90	9	3.45%	2.50	26	10
91-100	10	3.83%	2.75	37	14.2
Total	261	100.0	3.00	10	3.8
20-30	5	1.92%	5.00	6	2.3
31-40	13	4.98%	Total	261	100

DOI: https://doi.org/10.56738/issn29603986.geo2025.6.94
ISSN 2960-3986
GEO Academic Journal Vol. 6 No. 1 – 2025 series

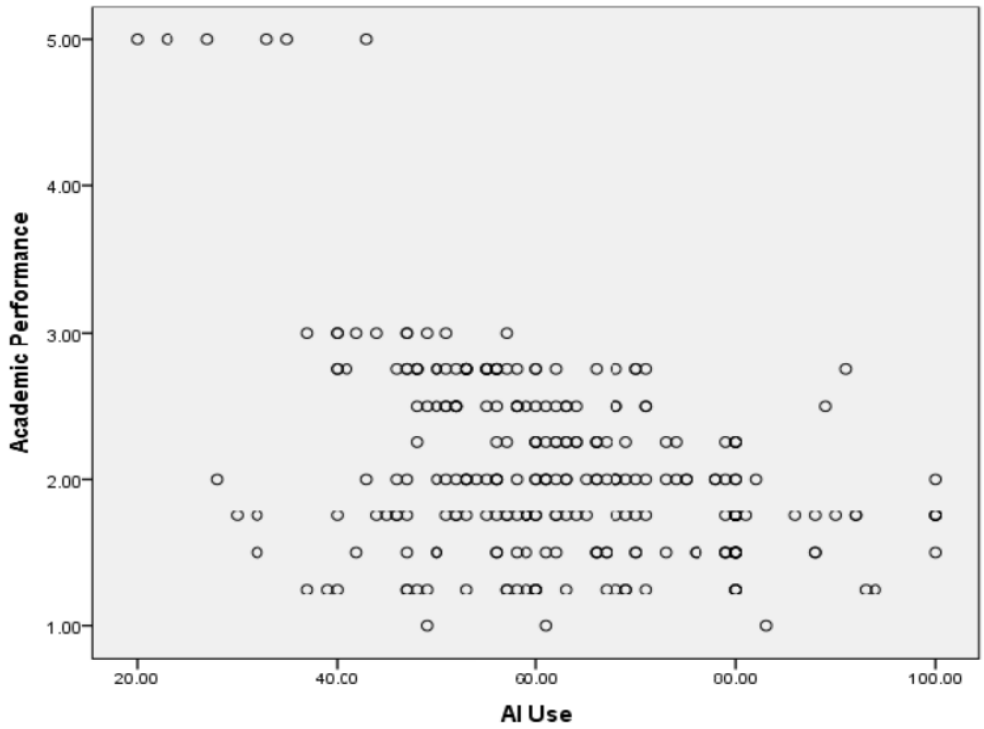
The researchers described the table at random for a clear interpretation. Between scores of 61-70, 41 or 23.75% total responses were recorded and got the highest while forty-five (45) respondents got an average grade of 2.00 which falls under very satisfactory academic performance.

Table 7 shows the summary of the responses from each question of the questionnaires. It can be noted that a considerable number of students are inclined to using the AI Tools in doing homework, school projects, and even participation in class recitation and following teacher's instruction with the use of AI Tools.

Based on the results of the study, using AI Tools has effects on doing school homework that was mentioned above. Students who use AI Tools to a great extent have performed Very Satisfactorily in class performance.

As shown from the table the study revealed that using AI tools has a remarkable impact on the academic performance, attendance to school and participation in school activities of the respondents.

Figure 1
Relationship Between Using AI Tools to Academic Performance



DOI: https://doi.org/10.56738/issn29603986.geo2025.6.94
ISSN 2960-3986
GEO Academic Journal Vol. 6 No. 1 – 2025 series

A scatter diagram shows the relationship of two variables: AI Tools usage and the Academic Performance of the respondents.

The y-axis is the frequency of the total responses of the students and x-axis is the frequency of the average Academic Performance of the respondents.

The marks show a downward linear trend between academic performance and AI Tools usage. It is clearly observed that there is a moderate negative correlation or moderate relationship between variables. The marks are related to each other which means when a student uses AI tools, it has a moderate impact on their academic performances.

It can be noted that although students perform in class activities, e.g. making projects, doing assignments, research work and many others using AI tools, there is a moderate impact on their performance in school. This debunks the common notion that use of AI tools largely affects the academic performance of the students.

This is consistent with the findings of the systematic review and meta-analysis of García-Martínez et al. (2023). Furthermore, educational artificial intelligence modalities were found to not only impact on the quantity of what the students learn but also the motivational levels or the willingness to learn. EAI not only helps to keep students focused while they are building something but also encourages their creative ability to shape their thoughts (Barak & Zadok, 2009 as cited in García-Martínez et al., 2023).

Relationship between the use of AI Tools and the Academic Performance of Students

Table 8 shows that there is a significant relationship between AI tools usage and academic performance of the students albeit low correlation. This is the result of the computed Pearson (r) value of -.423 with mean 61.8429 for x values and 2.0872 mean for y values. X values have a standard deviation of 14.84206 and 0.67959 standard deviation for y values. The computed r value of -.423 that the variables denote a moderately negative relationship.

As a rule of thumb, a correlation or relationship of -.423 which is lower than the tabular value of +1.000 at .01 level of significance, therefore the null hypothesis is accepted and that there is a significant relationship between AI tools and the academic performance of the students.

DOI: https://doi.org/10.56738/issn29603986.geo2025.6.94
ISSN 2960-3986
GEO Academic Journal Vol. 6 No. 1 – 2025 series

Table 8
Correlation Coefficient Between AI Tools And Academic Performance

Y values Responses of the Students		X values Academic Performance		Computed Pearson(r)	Tabular Value At .01 level of significance	Interpretation
Mean	Standard Deviation	Mean	Standard Deviation	= -.423**	0.01	denotes moderate relationship
2.0872	0.67959	61.8429	14.84206			

**. Correlation is significant at the 0.01 level (2-tailed).

Conclusions

Based on the findings, the researchers formulated the following conclusions:

1. Academic performance levels among students using AI tools indicate that AI tool usage may be associated with positive academic outcomes for many learners.
2. Usage patterns of AI tools among students reflect differing degrees of engagement with AI technologies in academic settings.
3. While AI tool usage does influence academic results, its effect is moderate and neither strongly positive nor strongly negative.
4. Understanding the interplay between AI tool adoption and student engagement or performance requires recognizing that AI is one of many factors impacting learning, highlighting the need for balanced integration of technology in educational environments.

Recommendations

Based on the study's conclusions, the following recommendations are presented.

1. Students can learn a lot by using AI technologies, as long as they do it in a safe and smart way. Using AI in this way has been linked to better grades. Parents also have a huge role to play. They should teach their kids how to utilize AI properly and not let them depend on it too much so that they keep learning.

2. Teachers should not just care about how well their students are doing; they should also show them how to use AI tools in a smart and correct way. AI is becoming a bigger part of students' life every day, therefore incorporating it in the classroom may make studying more fun and intriguing.

DOI: https://doi.org/10.56738/issn29603986.geo2025.6.94
ISSN 2960-3986
GEO Academic Journal Vol. 6 No. 1 – 2025 series

3. Schools and universities should think about utilizing AI in their classes, especially in subjects like Information and Communications Technology, where the curriculum may be changed to keep up with new technology. AI by itself does not have a large effect on how well you do in school; it depends on a number of other things too. Plan how to use AI along with other ways to study and good teaching approaches. Students who use technology wisely and well will be more interested in their classes and do better overall.

References

García-Martínez, I., Fernández-Batanero, J., Fernández-Cerero, J., & León, S. (2023). Analysing the Impact of Artificial Intelligence and Computational Sciences on Student Performance: Systematic Review and Meta-analysis. *Journal of New Approaches in Educational Research*, 12(1), 171-197. doi:https://doi.org/10.7821/naer.2023.1.1240

Seo, K., Tang, J., Roll, I. et al. The impact of artificial intelligence on learner–instructor interaction in online learning. *Int J Educ Technol High Educ* 18, 54 (2021). https://doi.org/10.1186/s41239-021-00292-9

Sotto, J., Tamayo, J., & Vicente, C. 2023. Content Analysis of Institutional Policies on the Use of AI in Top HEIs.

UNESCO. Artificial intelligence in education. Accessed March 3, 2024. https://www.unesco.org/en/digital-education/artificial-intelligence

UNESCO. 2023. Guidance for Generative AI in Education and Research. Retrieved March 3, 2024. https://unesdoc.unesco.org/ark:/48223/pf0000386693

UNESCO survey: Less than 10% of schools and universities have formal guidance on AI. June 22023. https://www.unesco.org/en/articles/unesco-survey-less-10-schools-and-universities-have-formal-guidance-ai

UNESCO. 2023. K-12 AI Curricula: A Mapping of Government-endorsed AI Curricula. Retrieved March 3, 2024. https://unesdoc.unesco.org/ark:/48223/ pf0000380602

Von Garrel, J., Mayer, J. Artificial Intelligence in studies—use of ChatGPT and AI-based tools among students in Germany. *Humanit Soc Sci Commun* 10, 799 (2023). https://doi.org/10.1057/s41599-023-02304-7