Artificial Intelligence (AI) Literacy and Academic Performance of Tertiary Level Students: A Preliminary Analysis

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Abstract: This study intends to analyze the level of AI literacy among college students and its relationship to their academic performance. This investigation used a cross-sectional research design to address the research objective of the study. Eight hundred sixty-nine (869) college students served as participants in the investigation using an adapted instrument to measure AI literacy. Data from the respondents underwent statistical analysis, such as frequency, percentage, mean, independent *t*-test, Analysis of Variance, and Pearson-r Moment of Correlation. Results show that college students have a moderately high AI literacy level, and their academic performance was also highly satisfactory. The study also found significant differences in AI literacy in terms of college and gender and academic performance in terms of college, year level, and age. As for the relationship, there was a weak positive relationship between AI literacy and the academic performance of college students.

Keywords: Artificial Intelligence (AI) literacy, Academic performance, College students, Higher education institutions, AI perception

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INTRODUCTION

Artificial Intelligence (AI) has emerged as a technologically transformative force remodeling different aspects of our lives. AI is revolutionizing industries and driving advancements at an unprecedented pace. In a previous paper by Crompton and Burke (2023), they mentioned in their review that undergraduate students were the most studied aspect of AI in higher education. The application of AI has become part of our social and personal lives. Some schools have integrated AI-enabled technologies in education to leverage students' personalized learning and reduce teachers' administrative tasks (Ng et al., 2022). As AI continues to gain prominence, it becomes crucial for individuals to develop AI literacy, particularly college students, who are the future leaders and professionals of our rapidly evolving world. Ng et al. (2023) stated that there are already global interventions to include AI literacy in the current educational standards and strategic plans. However, Zhang et al. (2023) stated that educating young learners to become AI-literate citizens poses several challenges. At the same time, a paper also presented how the concept of AI readiness among educators is essential in practice and profession (Luckin et al., 2022). Based on the discussion, they focused on AI readiness within the education and training sectors. They developed a seven-step framework for being an AI-ready educator. However, in the words of Cope et al. (2021), AI will never take over the teacher role because how it works and what it does is so profoundly different from human intelligence. Chan and Tsi (2023) also suggested that although some believe that AI may replace teachers, a majority still argue that human teachers possess unique qualities that make them irreplaceable. Regarding student perception, Mertala and colleagues (2022) suggested that AI was like an anthropomorphic technology with cognitive qualities like humans.

AI literacy refers to the understanding and fluency in the fundamental concepts, applications, and implications of artificial intelligence. According to a recent article, AI literacy intends to narrow the gap between research and practical knowledge transfer of AI-related skills (Velander et al., 2024). However, Bearman and colleagues (2023) argued that their discourse analysis identified few confusing definitions and little overt reference to AI as a research object. By fostering AI literacy among college students, we prepare them with the skills and knowledge necessary to explore the AI-driven landscape, contribute to its development, and make informed decisions that shape its future trajectory. In order to accomplish this task, they need to train and improve the teachers' capacity and capability of utilizing AI. A past study from China showed that teachers' AI literacy level was above the neutral point (Zhao et al., 2022).

Moreover, AI literacy enables college students to critically analyze and evaluate the information and data they encounter in their academic pursuits. A previous paper by Herawati et al. (2024) indicated positive perspectives on the use of AI in learning among students in Malaysia. They perceived AI as a tool that enriches their learning experience and increases access to educational resources. With the proliferation of online resources and information overload, the ability to discern reliable sources, detect biases, and understand the algorithms that shape content recommendations becomes crucial. Cardon and colleagues (2023) also mentioned that one perceived disadvantage of AI is less critical thinking and authentic writing capacity. AI literacy empowers students to

differentiate between credible information and misinformation, promoting intellectual rigor and fostering a research-oriented mindset. Thus, AI education can be taught in classrooms as an extension of computer science, which requires teachers to have a solid knowledge base in coding, data, AI technologies, and ethical issues (Kim & Kwon, 2023). In the same aspect, technical and teacher support mediate to enhance AI literacy among college students (Shen & Cui, 2024). Nevertheless, in a local study by Chua and colleagues (2023), they intend to call for an ethical, safe, and regulated use of AI in the Philippines. As part of their proposal, enhancing AU governance, establishing an AI ethics committee, and promoting AI literacy and upskilling programs are vital to fulfilling a regulated AI in education.

One area where AI literacy holds immense potential is enhancing academic performance among college students. One benefit can be the efficiency and better idea generation in writing (Cardon et al., 2023). As educational institutions increasingly integrate AI technologies into their systems, students with a solid understanding of AI can leverage these tools to optimize their learning experiences and excel in their studies. In local literature, Asirit and Hua (2023) found that college students' AI familiarity depended on age, academic year, and field of study. Thus, AI-powered educational platforms can deliver personalized content, adaptive assessments, and intelligent tutoring mechanisms that serve individual student needs. However, a scoping review by Laupichler et al. (2022) indicated that research on AI literacy is still young and needs further refinement regarding definition in adult education and the contents that need to be taught to non-experts. By leveraging AI, college students can receive tailored feedback, identify learning gaps, and access resources that align with their unique learning styles, ultimately leading to improved academic outcomes.

Furthermore, as AI continues to disrupt various industries, college students with a strong foundation in AI literacy are better positioned for future career opportunities. In a conference, Wilton and colleagues (2022) reiterated the call from researchers of many disciplines to address the need to promote AI literacy, especially those with or without technical backgrounds. Proficiency in AI concepts and tools opens doors to diverse fields such as data science, machine learning, robotics, and AI ethics. As stated in a local study from Bancoro (2024), AI tools offer personalized learning experiences among students; however, further growth and improvement are necessary to embrace this new perspective. By developing AI literacy early on, students can acquire the skills increasingly sought after by employers across industries, giving them a competitive edge in the job market. However, in the Philippines, policymakers should reassess their stance regarding AI's increasing presence in the educational system (Giray et al., 2024).

Finally, AI literacy is becoming essential for college students in our AI-driven world. Nevertheless, based on the literature review, there still needs to be a gap in the prevalence of AI literacy among college students and its impact on their academic performance. Additionally, in the Philippines, although there is a proliferating trend when it comes to researching Artificial Intelligence, there needs to be more that mainly focuses on the impact of AI literacy on academic performance. This realization prompted the investigator to investigate the said phenomenon, and thus, this study proceeded forward.

The main objective of this investigation is to explore the AI literacy and academic performance of selected college students from a tertiary education institution. At the same time, the relationship between AI literacy and

the participants' academic performance should be analyzed. The result of this study has several implications, especially for students, faculty, the school administration, and the institution itself. At the same time, it can also be part of the growing local literature for AI-related studies for future researchers.

METHODS
Research Design
The investigator used a descriptive–correlation study with an online survey via Google form as the primary data-gathering tool in this study. The study aims to explore the relationship between students' AI literacy and academic performance and analyze variance in the level of AI literacy among the students. Therefore, the said research design was applicable to current endeavors.

Respondents
This study's population consisted of college students from a local tertiary education institution located in Olongapo City, Philippines. Eight hundred sixty-nine (869) students voluntarily participated in the online survey spearheaded by the investigator from August to September 2023, during the first semester of the academic year 2023-2024.

The study's investigator used purposive sampling to gather enough respondents. Also, to be part of the survey, the respondents must possess the following criteria: 1) bona fide student of the participating institution, 2) currently enrolled within the semester of the academic year, 3) has an internet connection and gadget, and 4) willing to participate in the online survey. Table 1 displays the summary of the descriptive characteristics of the participants for the study.

Table 1 depicts the frequency and percentage distribution of the students' demographic characteristics. In terms of college, more respondents

came from the CCS (f=324) than from CEAS (f=289) and CAHS (f=256). In terms of year level, there were more first-year level respondents (f=352) as compared to second-year (f=260), third-year (f=139), and fourth-year (f=118) levels. As for the age of the respondents, those less than 20 dominated the rest of the groups, with a frequency of 541. This result is followed by the age bracket 21-25 years old with a frequency of 292, then by the age bracket 26-30 years old and 31 years old and above with a frequency of 18 apiece. As for gender, there were more females (f=472) than males (f=380) and those who preferred not to say (f=17).

TABLE 1. *Demographic characteristics*

Characteristics	*f*	%
College		
CAHS	256	29.5
CCS	324	37.3
CEAS	289	33.3
Year Level		
First Year	352	40.5
Second Year	260	29.9
Third Year	139	16.0
Fourth Year	118	13.6
Age		
< 20 years old	541	62.3
21-25 years old	292	33.6
26-30 years old	18	2.1
> 31 years old	18	2.1
Gender		
Female	472	54.3
Male	380	43.7
Prefer not to say	17	2.0
Total	**869**	**100.0**

Instrumentation
To obtain the necessary data for the study, the investigator adapted an instrument by Carolus et al. (2023) from their paper MAILS-Meta AI literacy scale: Development and testing of an AI literacy questionnaire based on well-founded competency models and psychological change and meta-competencies. In the adaptation, the investigator considered the AI literacy aspect only, wherein three (3) sub-variables focused on the use and

application of AI (six items), knowledge and understanding of AI (six items), and ethics of AI (three items). After this consideration, the investigator pilot-tested the modified instrument first and subjected it to Cronbach Alpha reliability analysis, wherein it yielded an overall coefficient of .980, higher than the benchmark score of .70 for reliability acceptance (Taber, 2018).

Statistical Analysis

In determining the statistical analysis for the research, the investigator used descriptive and inferential statistics with the software Statistical Package for Social Science (SPSS) Package version 23. This software helped the investigator calculate the following statistical treatments: frequency and percentage distribution for the demographic characteristics and mean distribution for AI literacy. On the other hand, the computation also employed Analysis of Variance (ANOVA) for the test of difference for the respondents' AI literacy and academic performance and Pearson-r Moment of Correlation for the test of the relationship between AI literacy and academic performance.

Furthermore, the respondents employed a five (5) point Likert scale response for answering the online survey. The numerical values have the following corresponding descriptive interpretation: 1-very low; 2- low; 3-moderately high; 4-high; and 5-very high.

RESULT

This study analyses the perceived level of Artificial Intelligence (AI) literacy and academic performance of college students from a local tertiary education institution. After careful data analysis, the following tables present the study's results.

TABLE 2. *Artificial intelligence (AI) literacy*

Items	Mean	Interpretation
Use and Apply AI	3.09	Moderately High
Know and Understand AI	3.28	Moderately High
AI Ethics	3.30	Moderately High
AI Literacy	3.22	Moderately High

Legend: 1.00-1.79=Very low; 1.80-2.59=Low; 2.60-3.39=Moderately High; 3.40-4.19=High; 4.20-5.00=Very High

Table 2 presents the mean scores and descriptive interpretations of different aspects of artificial intelligence (AI) literacy. The results indicate that the respondents have demonstrated moderately high proficiency and understanding in various AI-related domains. In terms of using and applying AI, the mean score is 3.09, suggesting that respondents possess a moderately high ability to utilize and implement AI technologies. Similarly, the mean score for knowing and understanding AI is 3.28, indicating a moderately high level of knowledge and comprehension of AI concepts. The aspect of AI ethics also received a moderately high mean score of 3.30, indicating a sound understanding of ethical considerations associated with AI applications. Overall, AI literacy, as reflected by the mean score of 3.22, is also moderately high. These findings suggest that the respondents possess a solid foundation of AI literacy, enabling them to effectively engage with and navigate AI technologies and related ethical considerations.

TABLE 3. *Academic performance of the respondents*

Grade	*f*	Interpretation
75-79%	23	Satisfactory
80-84%	152	Good
85-89%	374	High Satisfactory
90-94%	294	Very Good
> 95%	26	Excellent
Average	**1.89 (85.5%)**	**High Satisfactory**

Table 3 presents the respondents' academic performance based on their Grade Point Average (GPA). The table includes the frequency of respondents in each GPA range and provides an interpretation for each range. Among the respondents, 23 individuals achieved a GPA between 75-79%, indicating a "Satisfactory" level of performance. A larger group of 152 individuals obtained a GPA ranging from 80-84%, indicating a "Good" level of performance. The most common GPA range was 85-89%, with 374 individuals falling within this range, signifying a "High Satisfactory" level of performance. Additionally, 294 individuals achieved a GPA between 90-94%, indicating a "Very Good" level of performance. A smaller group of 26 individuals obtained a GPA of 95% or above, denoting an "Excellent" level of performance. The average GPA for all respondents was 1.89, equivalent to 85.5% on a percentage scale. This average GPA falls within the "High Satisfactory" range. These findings suggest that most of the respondents demonstrated satisfactory to excellent levels of academic performance, with the most common performance level being "High Satisfactory."

TABLE 4. *Differences in the AI literacy and Academic Performance of the Students when grouped according to college*

Variables	F	Sig.
Use and Apply AI	17.08*	.000
Know and Understand AI	2.74	.065
AI Ethics	5.43*	.005
AI Literacy	8.40*	.000
Academic Performance	24.90*	.000

*Note: *$p < .05$; df1=2; df2=866*

Table 4 presents the results of the result of ANOVA assessing the differences in AI literacy and students' academic performance when grouped according to college. For the variable "use and apply AI," a significant difference is found between groups since the study got $F(2, 866) = 17.084$, $p= .000$. Similarly, for the variable "AI ethics" and "AI literacy," the study also obtained significant findings and garnered the following values, $F(2, 866)= 5.433$, $p= .005$ and $F(2, 866)= 8.404$, $p= .000$ respectively. The probability values obtained were significant at a .05 alpha significance level. Thus, it is safe to assume that significant differences exist when we group the variables according to college. However, in the case of "know and understand AI," there was no significant difference since $F(2, 866)= 2.739$, $p= .065$, wherein the p-value was higher than the alpha significance level of .05.

Moreover, for the variable "academic performance," a significant difference is found between groups, wherein the study generated $F(2, 866)= 24.901$, $p= .000$. These findings suggest significant differences in AI literacy and academic performance among students when grouped according to their colleges. Further investigation may be necessary to explore the factors contributing to these variances and their consequences for AI education and academic outcomes within different college settings.

TABLE 5. *Differences in the AI literacy and academic performance of the students when grouped according to year level*

Variables	F	Sig.
Use and Apply AI	3.00*	.030
Know and Understand AI	1.39	.244
AI Ethics	1.04	.374
AI Literacy	2.08	.102
Academic Performance	12.28*	.000

*Note: *$p < .05$; df1=3; df2=865*

Table 5 demonstrates the results of the ANOVA computation analyzing

the differences in AI literacy and students' academic performance when grouped according to year level. The table shows that only the "use and apply AI" garnered a significant finding based on the computation. The study obtained $F(3, 865)= 3.000$, $p= .030$, wherein the probability value was significant at the .05 alpha significance level. As for the remaining sub-variables of the A literacy, the following values were $F(3, 865)= 1.392$, $p= .244$ for the "know and understand AI," $F(3, 865)= 1.040$ for the "AI ethics," and $F(3, 865)= 2.077$, $p= .102$ for the overall "AI literacy" variable.

For the variable "academic performance," the obtained a significant difference between groups since $F(3, 865)= 12.283$, $p= .000$. These findings suggest that while AI literacy and specific aspects of AI knowledge and understanding do not vary significantly across different year levels, there are significant differences in academic performance.

TABLE 6. *Differences in the AI literacy and academic performance of the Students when grouped according to age*

Variables	F	Sig.
Use and Apply AI	2.02	.109
Know and Understand AI	1.85	.137
AI Ethics	0.39	.762
AI Literacy	1.32	.268
Academic Performance	2.90*	.034

*Note: *p < .05; df1=3; df2=865*

Table 6 depicts the Analysis of Variance (ANOVA) calculation results examining the differences in AI literacy and students' academic performance when grouped according to age. Generally, it is easy to decipher that there were no particular differences in the students' perception of AI literacy. The table showed the following results: for the "use and apply AI," the study produced $F(3, 865)= 2.021$, $p= .109$. For

the "know and understand AI," the computation yield $F93, 865)= 1.847$, $p= .137$. Regarding "AI ethics," it generated $F(3, 865)= 0.388$, $p= .762$. Lastly, the "AI literacy" generated $F(3, 865)= 1.315$, $p= .268$. All the probability values generated during the computation were insignificant at a .05 Alpha significance level. Thus, it is safe to assume that there was no substantial evidence to prove variations in the students' perceptions.

However, for the variable "academic performance," the study found a significant difference between age groups since $F(3, 865)= 2.899$, $p= .034$. These findings imply that while there are no significant differences in AI literacy and specific aspects of AI knowledge and understanding across different age groups, there is a significant difference in academic performance.

TABLE 7. *Differences in the AI literacy and academic performance of the students when grouped according to gender*

Variables	F	Sig.
Use and Apply AI	10.89*	.000
Know and Understand AI	5.91*	.003
AI Ethics	5.07*	.003
AI Literacy	8.79*	.000
Academic Performance	0.41	.662

*Note: *p < .05; df1=2; df2=866*

Table 7 represents the results of the Analysis of Variance examining the differences in AI literacy and students' academic performance when grouped according to gender. In general, significant findings were produced by the statistical treatment. In particular, the variable "use and apply AI" got a significant difference with a result of $F(2, 866)= 10.889$, $p= .001$. Similarly, the variable "know and understand AI" also produced a significant difference, with $F(2, 866)= 5.912$, $p= .003$. In the case of

"AI ethics," the variable also shows a significant difference between genders since it generated $F(2, 866)= 5.067$, $p= .003$. Regarding "AI literacy," a significant difference was detected between genders due to $F(2, 866)= 8.786$, $p= .001$. The associated probability values were all lower than the .05 alpha significance level. Hence, it is safe to assume that in terms of gender, the study found significant differences in the students' AI literacy. However, the table showed no significant difference between genders for the "academic performance" variable since the study found $F(2, 866)= 0.412$, $p= .662$. These results propose significant differences in AI literacy among genders and specific AI knowledge and understanding aspects. However, there is no significant difference in academic performance between genders.

TABLE 8. *Relationship between AI Literacy and academic performance*

Variables	Academic Performance
Use and Apply AI	.053
	.121
Know and Understand AI	.107*
	.002
AI Ethics	.101*
	.003
AI Literacy	.096*
	.004

*Note: *p < .05*

Table 8 presents the relationship between AI literacy and the respondents' academic performance. For the variable "Use and Apply AI," a weak positive correlation is observed with academic performance (r = .053, p = .121). Similarly, a weak positive correlation is found for the variable "Know and Understand AI" (r = .107, p = .002). The "AI Ethics" variable also shows a weak positive correlation with academic performance (r = .101, p =

.003). Furthermore, a weak positive correlation is observed for the variable "AI Literacy" (r = .096, p = .004). These findings suggest a slight positive relationship between AI literacy and academic performance, indicating that individuals with higher AI literacy tend to have slightly better academic performance. However, the weak correlations indicate that AI literacy alone may not be the sole determinant of academic performance, and other factors might also contribute. Further research is needed to explore the complex relationship between AI literacy and academic performance further.

DISCUSSION

The central aspect of this study is for the investigator to determine AI literacy among college students and its relevance to their academic performance. From the generated results of the study, the investigator provided some exciting and thought-provoking findings that can benefit individuals at the forefront of education.

The study's findings regarding AI literacy among college students were unprecedented. Each latent variable of AI literacy, namely use and apply AI, know and understand AI, and AI ethics, generated scores corresponding to moderately high levels of perception among college students. About the current findings, Zhao et al. (2022) and Obenza et al. (2024) also generated almost a similar mean score from their study (above the neutral score). Another article from Wood and colleagues (2021) disclosed that students and faculty reported limited AI literacy. Also, Manrique and Palomares (2024) found that their study's respondents are highly familiar with AI's ease of use and usefulness. In addition, in a literature review, ethics in AI is the least noted term for FATE (Fairness, Accountability,

Transparency, and Ethics). They considered ethics a relatively broad and an umbrella term in most studies (Memarian & Doleck, 2023; Chounta et al., 2022). There were also some potential challenges for teachers, such as vague and unclear protocols in policy and curriculum, a need for more understanding of AI and its limitations and the emotional aspects relative to an individual's preconception (Velander et al., 2024). As for the general academic performance of the respondents in the study, most of them have relatively high satisfactory marks. This result coincides with the previous finding of local literature wherein students' academic performance was above average (Bancoro, 2024).

To make the study even more interesting, variance was generated among the groups when the investigator tried to group the respondents based on their demographic characteristics. For instance, for use and applying AI, college, year level, and gender generated significant differences. For the know and understand AI, only gender yields significant results. As for AI ethics, college and gender were the significant findings. Moreover, for the overall AI literacy, the study generated significant variations in college and gender groupings among the respondents. A previous paper by Asirit and Hua (2023) revealed that college students' familiarity with AI depends on age, academic year, and field of study.

Finally, for the relationship between the two variables in the study, in general, there was a weak positive association. This result somehow disagreed with the findings of Bancoro (2024), wherein the investigator found no significant association between students' academic performance and AI use. However, a later study by Lestari and colleagues (2021) found a significant relationship between skills achievement and AI use. Alshater (2022) also agrees that AI tools can significantly enhance academic performance. Thus,

the study found a credible answer for the study's primary aim: whether there is a relationship between AI literacy and the academic performance of college students. Although it is still too early to argue the relevance of such findings, the current study finally laid its foundation for future exploration by other researchers interested in exploring artificial intelligence (AI) literacy. In particular, two latent variables in the study yielded similar results regarding the overall AI literacy outcome. Knowing and understanding AI, as well as AI ethics, also produced weak and positive relationships with the academic performance of college students.

These exciting findings provided an essential and vital foundation for understanding students' perceptions of Artificial Intelligence (AI). The results can also be leveraged so that students can consider enhancing their capabilities and raising their literacy levels in this technologically diverse and driven educational system.

CONCLUSION

The study revealed a moderately high level of AI literacy among the respondents. The investigator also observed the same AI use and application level, knowledge and understanding, and AI ethics. Regarding the respondents' academic performance, they generally have a high satisfaction rate based on their grade point average (GPA). When the study grouped the respondents according to college and gender, statistical differences were found in AI literacy. As for academic performance, the study observed variance in college, year level, and age. In general, AI literacy and the respondents' academic performance had a weak positive association. Furthermore, the same result was observed for knowing and understanding AI and AI ethics.

Based on the preceding results of the study, the investigator at this moment suggests the following essential recommendations:

- Students are encouraged to promote general awareness and appropriate artificial intelligence (AI) use. Technology-based learning is already available to every student, and even the younger generations can adapt to current trends regarding AI usage in learning. Thus, providing them with proper knowledge and guidance is a must.

- Essential upskilling and retooling are necessary for the faculty to keep abreast of the fast-paced changes in the educational landmark. Proper training and skills development are vital to help one decide suitable measures and techniques using AI in education.

- For the school administration, although AI is slowly making its way into college students' learning process, it is still equally important to understand and conduct a more in-depth analysis of how to regulate these different tools for the benefit of both students and faculty. Sound decision-making with a win-win situation can be employed.

- For the institution, prior to implementing rules and regulations for the proper use of AI technologies and tools, a credible and reliable investigation can support the institution's general perspective regarding the use of AI in the students' learning experience.

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