

Research Article

Development and Initial Validation of a Survey on College Students' Academic Use of Artificial Intelligence and Its Association with Study Habits, Classroom Engagement, and Academic Output Quality

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<https://doi.org/10.70847/741246>

Article history:

Received: 23 April 2026

Revised: 30 June 2026

Accepted: 12 August 2026



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Abstract

Artificial intelligence (AI) is increasingly integrated into higher education, yet evidence on students' academic use of AI and its perceived association with study habits, classroom engagement, and academic output quality remains limited in Philippine private higher education institutions. This study examined college students' reported AI use for academic tasks and perceptions of its association with these academic behaviors, including differences by sex, year level, and daily AI use. Using a quantitative cross-sectional descriptive-comparative design, data were collected from 351 college students through an adapted and validated research instrument. Exploratory factor analysis, Cronbach's alpha, and McDonald's omega established satisfactory construct validity and excellent internal consistency, while descriptive statistics, t-tests, ANOVA, and Tukey post hoc tests were used for analysis. Overall, students reported neutral levels of agreement regarding AI-related academic behaviors. Male and third-year students reported significantly higher agreement than female and lower-year-level students, while no significant differences were found based on daily duration of AI use. The findings suggest that students' sex and year level may influence perceptions and use of AI in academic contexts. The validated instrument may support future research and responsible AI integration in higher education.

Keywords: generative artificial intelligence; academic behaviors; study habits; classroom engagement; academic output quality; survey validation; higher education

1. Introduction

The rapid advancement of generative Artificial Intelligence (AI) has significantly transformed teaching and learning in higher education. AI-powered applications such as ChatGPT, Gemini, and QuillBot are increasingly being used by students to support academic activities, including brainstorming ideas, drafting written assignments, paraphrasing text, summarizing lecture materials, and improving written communication (Haderer & Ciolacu, 2022; Kasneci et al., 2023). The growing accessibility of these technologies has created new opportunities for improving learning efficiency while simultaneously raising questions regarding their influence on students' learning behaviors, academic engagement, and academic integrity. Consequently, understanding how students incorporate AI into their academic practices has become an important area of educational research.

Existing research indicates that the educational impact of AI is multifaceted. Studies focusing on academic uses of generative AI consistently report that students commonly employ AI tools for brainstorming, drafting assignments, paraphrasing written work, summarizing instructional materials, and accelerating task completion (Haderer & Ciolacu, 2022; Kasneci et al., 2023; Dwivedi et al., 2023). These applications may improve productivity and provide immediate academic assistance during learning. However, researchers have also cautioned that excessive dependence on AI-generated outputs may reduce opportunities for independent reasoning, critical thinking, and deeper cognitive engagement, while increasing concerns regarding originality and academic integrity (Kasneci et al., 2023; Stevkovska, 2024). These contrasting findings suggest that AI should not simply be viewed as beneficial or harmful; rather, its educational implications depend on how students integrate AI into their learning processes.

Beyond academic task completion, previous studies have investigated the relationship between AI and students' study habits. AI-generated explanations and summaries may facilitate learning by providing immediate access to information and simplifying complex concepts. Nevertheless, frequent reliance on these tools may reduce independent studying, note-taking, planning, self-monitoring, and sustained learning motivation (Kasneci et al., 2023; Dwivedi et al., 2023). These findings indicate that AI may influence students' self-regulated learning behaviors in different ways depending on how it is used.

Research has likewise explored the association between AI use and classroom engagement. Some studies suggest that AI can enhance classroom participation by helping students prepare for discussions and better understand learning materials. In contrast, other investigations have reported that students who rely heavily on AI may become less likely to participate in classroom discussions, collaborate with classmates, ask questions, or seek assistance from instructors (Hou et al., 2024; Xie & Wang, 2023). Similarly, studies examining academic output quality have produced mixed results. Although AI-assisted writing may improve writing efficiency and organization, researchers have raised concerns regarding originality, supporting evidence, coherence, and students'

ability to explain or defend their academic work (Cardon et al., 2023; Stevkovska, 2024). Collectively, these findings demonstrate that the perceived educational effects of AI remain inconsistent across different learning contexts.

Another important area of investigation concerns demographic differences in AI adoption. Previous studies have examined variations in AI use according to sex, educational level, and learning experience. Although these investigations provide useful insights, limited evidence is available regarding whether students' reported academic AI practices differ across year levels in private higher education institutions in the Philippine context. Moreover, previous research has primarily examined technology acceptance, AI literacy, or general AI perceptions rather than students' reported academic AI practices across multiple dimensions of learning. Consequently, evidence remains limited regarding how students perceive the association between AI use and their study habits, classroom engagement, and academic output quality within Philippine higher education institutions. Researchers have also emphasized the importance of responsible AI use and academic integrity in higher education. While AI can improve productivity and provide academic support, inappropriate reliance on AI-generated content may reduce students' independent thinking, weaken originality, and increase concerns regarding authorship and ethical academic practice (Kasneci et al., 2023; Dwivedi et al., 2023; Stevkovska, 2024). These concerns highlight the importance of understanding not only how frequently students use AI, but also how they perceive its influence on different aspects of their academic behavior.

Another limitation of the existing literature concerns measurement. Many previous studies have employed instruments that assess technology acceptance, AI literacy, or general perceptions of AI. Comparatively fewer studies have developed and evaluated multidimensional instruments capable of simultaneously measuring students' reported academic use of AI together with their perceived study habits, classroom engagement, and academic output quality. This methodological limitation provided the rationale for adapting and validating the survey instrument used in the present study.

In this study, four conceptually distinct constructs were examined. Academic use of AI refers to students' self-reported use of generative AI tools for academic activities such as brainstorming, drafting, paraphrasing, and summarizing instructional materials. Perceived effects on study habits refer to students' perceptions that AI use influences their study routines, planning, motivation, note-taking, and independent learning behaviors. Perceived classroom engagement refers to students' perceptions that AI use influences classroom participation, collaboration, help-seeking behaviors, and preparation for classroom activities. Perceived academic output quality refers to students' perceptions that AI use influences the originality, coherence, supporting evidence, and overall quality of their academic work. These constructs represent students' self-reported perceptions and should not be interpreted as objective measures of actual academic performance or learning outcomes.

This study is theoretically anchored in Self-Regulated Learning Theory (Zimmerman, 2000), Technology Acceptance Model (Davis, 1989), and

Cognitive Load Theory (Sweller, 1988). Self-Regulated Learning Theory explains how students plan, monitor, and regulate their learning behaviors, providing a theoretical basis for examining perceived study habits, classroom engagement, and academic work when AI is incorporated into learning. The Technology Acceptance Model explains students' adoption of AI technologies through perceived usefulness and perceived ease of use, thereby providing a theoretical explanation for students' reported academic use of AI. Cognitive Load Theory suggests that AI may reduce the mental effort required to complete academic tasks; however, excessive dependence on AI-generated information may also encourage cognitive offloading, potentially influencing students' engagement with learning activities and the perceived quality of their academic work. Together, these theories provide an integrated conceptual framework for understanding the relationship between students' reported academic use of AI and their perceived academic behaviors.

Accordingly, this study examined college students' reported use of AI for academic tasks and their perceptions of its association with study habits, classroom engagement, and academic output quality. It further investigated whether students' responses differed according to sex, year level, and daily duration of AI use. In addition, the study adapted and evaluated a multidimensional survey instrument through exploratory factor analysis and reliability testing to provide a valid and reliable measure for future research on students' academic use of AI.

The study examined the collected data from 351 students in various programs at Merchant Marine Academy of Caraga Incorporated in Butuan City. The main research questions of this study are:

1. What is the demographic profile of the respondents in terms of:
 - 1.1 sex;
 - 1.2 year level;
 - 1.3 academic program;
 - 1.4 daily time spent using artificial intelligence for academic tasks?
2. To what extent do respondents report their:
 - 2.1 use of artificial intelligence for academic tasks;
 - 2.2 AI-related study habits;
 - 2.3 AI-related classroom engagement; and
 - 2.4 AI-related academic output quality?
3. Do respondents' scores on these dimensions differ significantly according to:
 - 3.1 sex;
 - 3.2 year level; and
 - 3.3 daily time spent using artificial intelligence for academic tasks?

2. Materials and Methods

2.1. Research Design

This study employed a cross-sectional descriptive-comparative quantitative design involving literature-based instrument development and initial psychometric evaluation. A comprehensive review of recent literature on

artificial intelligence (AI) in education was conducted to identify the constructs and indicators relevant to students' academic use of AI. The reviewed literature served as the basis for developing and adapting the survey questionnaire used in the quantitative phase of the study. The investigation examined college students' reported use of AI for academic tasks and their perceptions regarding AI-related study habits, classroom engagement, and academic output quality. In addition, differences in respondents' scores were examined according to sex, year level, and daily time spent using AI for academic tasks.

2.2 Respondents and Sampling Procedure

The research was conducted at Merchant Marine Academy of Caraga, Incorporated (MMACI), a private higher education institution in Butuan City, Philippines, offering both maritime and non-maritime undergraduate programs. The sample comprised 351 officially enrolled undergraduate students from seven academic programs and the first, second-, and third-year students. The study used stratified random sampling, with academic program and year level serving as the strata, to obtain representation from the institution's different student groups. Students qualified for participation was officially enrolled in the institution during the data-collection period, voluntarily participation was noted with informed consent, and respondents can decline to take the survey without consequences. The resulting sample included unequal numbers of respondents across academic programs and year levels, as presented in Table 1. Therefore, the findings represent the participating students but require caution when generalized beyond the institution.

2.3 Research Instruments

The study used a structured, self-administered questionnaire adapted from relevant literature on AI use in higher education. It included demographic questions and 40 statements grouped into four dimensions: AI Use for Academic Tasks, AI-Related Study Habits, AI-Related Classroom Engagement, and AI-Related Academic Output Quality. Each dimension contained 10 statements. Respondents rated each statement using a five-point Likert scale: 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, and 5 = Strongly Agree. The scores represented respondents' levels of agreement rather than the frequency of AI use or objective academic outcomes. Exploratory Factor Analysis (EFA) examined the instrument's construct validity, while Cronbach's alpha and McDonald's omega assessed its internal consistency.

2.4 Data Collection and Analysis

Data were collected through an online questionnaire administered using Google Forms. The survey link was distributed to officially enrolled undergraduate students from different academic programs and year levels during the data collection period. Participation was voluntary, and respondents completed the questionnaire after providing informed consent. Descriptive statistics were used to summarize respondents' demographic characteristics and survey responses. Frequencies and percentages were computed for demographic variables, whereas weighted means and standard deviations were calculated to describe respondents' levels of agreement with statements regarding academic use of AI, AI-related study habits, AI-related classroom engagement, and AI-related academic output quality. The following interpretation was used for the

five-point Likert agreement scale: 1.00–1.80 (Strongly Disagree), 1.81–2.60 (Disagree), 2.61–3.40 (Neutral), 3.41–4.20 (Agree), and 4.21–5.00 (Strongly Agree). These verbal descriptions represented respondents' levels of agreement and were not interpreted as direct measures of AI-use frequency. Inferential statistics were employed to determine whether respondents' scores differed according to selected demographic variables. An independent-samples t-test was used to compare the responses of male and female students. One-way Analysis of Variance (ANOVA) was used to examine differences according to year level and daily time spent using AI for academic tasks. When statistically significant differences were identified, Tukey's Honestly Significant Difference (HSD) post hoc test was performed to determine which groups differed significantly from one another. To evaluate the psychometric properties of the adapted questionnaire, Exploratory Factor Analysis (EFA) was conducted to examine the underlying factor structure of the instrument, while Cronbach's alpha and McDonald's omega were computed to assess internal consistency reliability. All statistical analyses were performed using Jamovi, with the level of statistical significance set at $p < .05$.

2.5 Ethical Considerations

The study was conducted in accordance with the ethical guidelines of Merchant Marine Academy of Caraga, Incorporated. Prior to data collection, respondents were informed about the purpose of the study, the voluntary nature of participation, the confidentiality of their responses, and their right to decline or withdraw from the study at any time without penalty. Approval to conduct the study was obtained from the Research Director and the School President of Merchant Marine Academy of Caraga, Incorporated before the administration of the survey. No personally identifiable information was collected during the study. All responses were treated confidentially and stored securely, with access limited to the researcher. Data were analyzed and reported only in aggregate form to protect respondents' identities and privacy throughout the conduct of the study.

3. Results

Based on the data, female respondents were fifty-four-point one percent (54.1%) and forty-five-point nine percent (45.9%) are male. In terms of year level, majority are second year students (59.5%), followed by third year students (26.5%) and lastly first year students (14%). This indicates that the respondents are predominantly made up of second-year students.

Table 1. Participants' Demographic Profile

Sex	Frequency	Percentage
Female	190	54.10
Male	161	45.90
Total	351	100

Year Level of Students	Frequency	Percentage
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First Year	49	14.00
Second Year	209	59.50
Third Year	93	26.50
Total	351	100

Program of Students	Frequency	Percentage
B.S Marine Engineering	25	7.10
B.S. Entrepreneurship	24	6.80
B.S. Marine Transportation	68	19.40
B.S. Psychology	86	24.50
B.S. Tourism Management	38	10.80
Bachelor of Physical Education	93	26.50
Bachelor of Tech-Vocational Education	17	4.80
Total	351	100

Time spent on Academic tasks using AI daily	Frequency	Percentage
1 - 2 hours	85	24.20
3 - 4 hours	8	2.30
Less than 1 hour	255	72.60
More than 4 hours	3	0.90
Total	351	100

Majority of the participants came from the Bachelor of Physical Education with twenty-six-point five percent (26.5%), followed by B.S. Psychology (24.5%), then B.S. Marine Transportation (19.4%), B.S. Marine Engineering (7.1%) and Bachelor of Tech-Vocational Education (4.8%). The daily spent time of students' using AI for academic tasks daily, less than an hour a day with seventy-two-point six percent (72.6%), this data showed that most of the students use AI tools for academic task shortly. Twenty-four-point two percent (24.2%), spend 1 - 2 hours daily using AI, while only two-point three percent (2.3%) report using AI for 3 - 4 hours. Lastly, zero-point nine percent (0.9%) of respondents use AI for more than 4 hours daily.

Table 2. Participants' AI Use in Academic Tasks

Indicators	Weighted Mean	SD	Verbal Description
In the past 4 weeks, I used AI to brainstorm ideas or outlines for assignments.	3.60	0.839	Agree
I used AI to draft substantial portions of assignments that I submitted.	3.32	0.809	Neutral

I used AI to rewrite or paraphrase text for my assignments.	3.36	0.922	Neutral
I used AI to summarize readings or lecture content for coursework.	3.47	0.943	Agree
Using AI helped me complete assignments faster.	3.48	0.913	Agree
When I used AI, I was less likely to review and revise my work carefully.	3.22	0.917	Neutral
I submitted AI-assisted work without fully understanding the underlying material.	2.79	1.09	Neutral
I used AI for parts of assignments that I could complete independently.	3.17	0.937	Neutral
Without AI assistance, I found it difficult to complete certain academic tasks.	3.11	0.969	Neutral
My academic outputs felt less original when I relied heavily on AI-generated content.	3.29	0.980	Neutral
Grand Mean	3.28	0.834	Neutral

Table 2 presents respondents' reported AI use for academic tasks. The highest level of agreement was observed for the statement "In the past four weeks, I used AI to brainstorm ideas or outlines for assignments" ($M = 3.60$, $SD = 0.839$), followed by "Using AI helped me complete assignments faster" ($M = 3.48$, $SD = 0.913$) and "I used AI to summarize readings or lecture content for coursework" ($M = 3.47$, $SD = 0.943$), all of which were interpreted as Agree. The remaining indicators obtained Neutral levels of agreement, with the lowest mean observed for "I submitted AI-assisted work without fully understanding the underlying material" ($M = 2.79$, $SD = 1.09$). The overall grand mean of 3.28 ($SD = 0.834$) indicates a neutral level of agreement regarding respondents' reported use of AI for academic tasks. These findings are consistent with Zhao et al. (2024), who reported that students commonly used AI for brainstorming and summarizing academic materials while demonstrating more cautious use of AI for complex academic writing tasks. Similarly, the predominantly neutral responses observed in the present study suggest that respondents neither strongly agreed nor strongly disagreed with several statements describing AI-related academic practices. In contrast, Vieriu and Petrea (2025) reported greater reliance on AI among students with more extensive experience using AI tools, indicating that patterns of AI use may differ across educational contexts and learner characteristics.

Table 3. Participants' AI use and Study Habits

Indicators	Weighted Mean	SD	Verbal Description
In the past 4 weeks, I spend fewer hours studying when I use AI to help complete assignments.	3.26	0.886	Neutral
When I use AI-generated summaries, I am less likely to review the full lesson materials.	3.27	0.940	Neutral
I take fewer personal notes because I rely on AI to summarize or record key points.	3.14	0.991	Neutral

I set fewer study goals when I expect AI to help with major parts of my coursework.	3.12	0.956	Neutral
Overall, my study routine has become less consistent since I began using AI tools frequently.	3.11	0.945	Neutral
I rely on AI explanations instead of trying to work through difficult concepts on my own.	3.09	0.919	Neutral
Using AI for academic tasks makes it harder for me to concentrate during independent study.	3.17	0.963	Neutral
I plan my study schedule less when I rely on AI to complete assignments.	3.07	0.952	Neutral
Before quizzes/exams, I rely on AI outputs more than my class notes or readings.	2.92	1.05	Neutral
I feel less motivated to study without AI assistance.	2.91	1.01	Neutral
Grand Mean	3.11	0.961	Neutral

Table 3 presents respondents' levels of agreement regarding AI-related study habits. All indicators were interpreted as Neutral, with weighted means ranging from 2.91 to 3.27. The highest level of agreement was observed for the statement "When I use AI-generated summaries, I am less likely to review the full lesson materials" ($M = 3.27$, $SD = 0.940$), followed by "In the past four weeks, I spend fewer hours studying when I use AI to help complete assignments" ($M = 3.26$, $SD = 0.886$). The lowest level of agreement was recorded for "I feel less motivated to study without AI assistance" ($M = 2.91$, $SD = 1.01$). The overall grand mean of 3.11 ($SD = 0.961$) indicates a neutral level of agreement regarding AI-related study habits. These findings are consistent with Liu et al. (2021), who likewise reported that students expressed varied perceptions regarding AI-related learning behaviors. In contrast, Johnson and Lee (2020) reported stronger agreement that AI supported students' study practices and academic performance. The neutral responses observed in the present study suggest that respondents neither agreed nor disagreed with many of the statements describing AI-related study habits, indicating that perceptions of AI-assisted study behaviors may vary across educational contexts and learner experiences.

Table 4. Participants' AI use and Classroom Engagement

Indicators	Weighted Mean	SD	Verbal Description
When I rely on AI for coursework, I contribute less during class discussions.	2.94	1.00	Neutral
Using AI for coursework is associated with lower confidence in sharing my ideas in class.	3.02	0.991	Neutral
When I rely on AI, I participate less in group activities (e.g., group tasks, group discussions).	2.87	1.03	Neutral
When I use AI, I am less likely to ask questions during class.	3.02	0.978	Neutral
When I use AI, I feel less need to clarify concepts during class.	3.01	0.967	Neutral
I rely on AI rather than asking classmates for help.	2.97	1.00	Neutral
I rely on AI rather than asking the teacher/instructor for help.	2.88	1.06	Neutral

I use AI instead of doing my own preparation (e.g., reading/reviewing) before class discussions.	2.86	1.04	Neutral
I find it harder to contribute to discussions when I have not prepared without AI.	2.82	1.03	Neutral
When I use AI frequently, I feel less engaged during class activities.	2.95	1.03	Neutral
Grand Mean	2.93	1.01	Neutral

Table 4 presents respondents' levels of agreement regarding AI-related classroom engagement. All indicators were interpreted as Neutral, with weighted means ranging from 2.82 to 3.02. The highest levels of agreement were observed for the statements "Using AI for coursework is associated with lower confidence in sharing my ideas in class" ($M = 3.02$, $SD = 0.991$) and "When I use AI, I am less likely to ask questions during class" ($M = 3.02$, $SD = 0.978$). The lowest level of agreement was obtained for "I find it harder to contribute to discussions when I have not prepared without AI" ($M = 2.82$, $SD = 1.03$). The overall grand mean of 2.93 ($SD = 1.01$) indicates a neutral level of agreement regarding AI-related classroom engagement.

These findings differ from those reported by Arslan et al. (2024), who found that students generally expressed positive perceptions of AI-assisted learning and reported greater classroom participation and engagement when AI tools were incorporated into learning activities. Similarly, Maamor et al. (2024) reported that students perceived AI as supporting classroom participation, confidence, and collaboration during academic activities. In contrast, the respondents in the present study expressed neutral levels of agreement across all classroom engagement indicators, suggesting that they neither agreed nor disagreed that AI use was associated with changes in their classroom engagement. These differences may reflect variations in educational settings, patterns of AI use, and respondents' academic experiences.

Table 5. Participants' AI use and Academic Output Quality

Indicators	Weighted Mean	SD	Verbal Description
When I rely heavily on AI, my assignments provide less detailed explanation and supporting evidence.	3.04	0.921	Neutral
AI-assisted writing makes my work feel less personal.	3.07	0.911	Neutral
When I rely on AI, I find it harder to explain or defend my work in class.	3.09	0.933	Neutral
When I use AI for research tasks, I use fewer or weaker sources in my assignments.	2.95	0.916	Neutral
When I rely on AI for writing, my arguments are less coherent and well-structured.	3.09	0.932	Neutral
When I rely on AI-generated content, my assignments include fewer original examples or ideas.	3.06	0.922	Neutral
I sometimes submit AI-assisted work without fully understanding the content.	3.06	1.03	Neutral
After using AI, I feel less confident that my work meets course standards.	3.08	0.895	Neutral
I use AI in ways that reduce how much of the work is my own.	3.18		Neutral

		0.946	
When I rely on AI, my assignments are more likely to contain inaccuracies or weak reasoning.	3.14	0.914	Neutral
Grand Mean	3.08	0.839	Neutral

Table 5 presents respondents' levels of agreement regarding AI-related academic output quality. All indicators were interpreted as Neutral, with weighted means ranging from 2.95 to 3.18. The highest level of agreement was observed for the statement "I use AI in ways that reduce how much of the work is my own" ($M = 3.18$, $SD = 0.946$), followed by "When I rely on AI, my assignments are more likely to contain inaccuracies or weak reasoning" ($M = 3.14$, $SD = 0.914$). The lowest level of agreement was obtained for "When I use AI for research tasks, I use fewer or weaker sources in my assignments" ($M = 2.95$, $SD = 0.916$). The overall grand mean of 3.08 ($SD = 0.839$) indicates a neutral level of agreement regarding AI-related academic output quality.

These findings are consistent with Marzuki et al. (2023), who reported that students expressed mixed perceptions regarding the use of AI in academic writing and the quality of academic work. In contrast, Vieriu and Petrea (2025) found stronger agreement that AI supported students' academic writing and task completion, particularly among students with greater experience using AI tools. The predominantly neutral responses observed in the present study suggest that respondents neither agreed nor disagreed with statements describing AI-related academic output quality, indicating that perceptions may vary across educational settings, patterns of AI use, and students' prior experience with AI technologies.

Table 6. Summary of Students' AI use and Academic Behavior

Indicators	Grand Means	Verbal Description
AI Tools for Academic Task	3.28	Neutral
AI use and Study Habits	3.11	Neutral
AI use and Classroom Engagement	2.93	Neutral
AI use and Academic Output Quality	3.08	Neutral
Overall Grand Mean	3.08	Neutral

Table 6 presents the summary of respondents' levels of agreement regarding AI use for academic tasks, AI-related study habits, AI-related classroom engagement, and AI-related academic output quality. All four dimensions obtained Neutral verbal descriptions, with grand means ranging from 2.93 to 3.28. The highest grand mean was observed for AI Use for Academic Tasks ($M = 3.28$), while AI-Related Classroom Engagement obtained the lowest grand mean ($M = 2.93$). The overall grand mean of 3.08 indicates a neutral level of agreement across the four dimensions examined. These findings are consistent with Tamayo et al. (2025), who reported that students generally expressed balanced perceptions regarding the use of AI in academic settings. Similarly, the predominantly neutral levels of agreement observed in the present study suggest that respondents neither agreed nor disagreed with many of the statements describing AI-related academic behaviors. In contrast, Khairuddin et al. (2024)

reported stronger agreement that AI supported students' academic performance and classroom participation. These contrasting findings suggest that students' reported perceptions of AI-related academic behaviors may vary across educational contexts, patterns of AI use, and learner characteristics.

Table 7. Test of Significant difference when students are grouped by Sex in their Academic Behavior and AI use.

Dependent Variable	t-Value	df	p-Value	Mean Difference	Conclusion	Decision on Ho
AI Tools for Academic Tasks	-2.90	349	0.004	-0.216	Significant	Rejected
AI Use and Study Habits	-5.28	349	< .001	-0.442	Significant	Rejected
AI Use and Classroom Engagement	-4.30	349	< .001	-0.393	Significant	Rejected
AI Use and Academic Output Quality	-4.06	349	< .001	-0.343	Significant	Rejected

Note: P < .05 significant at 0.05 alpha

Table 7 presents the results of the independent-samples t-test examining differences in respondents' scores according to sex. Statistically significant differences were observed across all four dimensions of the questionnaire, including AI Use for Academic Tasks ($t = -2.90$, $p = .004$), AI-Related Study Habits ($t = -5.28$, $p < .001$), AI-Related Classroom Engagement ($t = -4.30$, $p < .001$), and AI-Related Academic Output Quality ($t = -4.06$, $p < .001$). These findings indicate that respondents' scores differed significantly according to sex. Based on the observed mean differences, male respondents obtained significantly higher mean scores than female respondents across the four dimensions of the questionnaire. These findings are consistent with Venkatesh et al. (2000), who reported that male users generally demonstrated greater acceptance of emerging technologies when they perceived them to be useful. In contrast, Yau and Cheng (2012) suggested that female students may exhibit technology-related attitudes and competencies comparable to those of male students. The differing findings across studies suggest that respondents' reported AI-related academic behaviors may vary according to educational context, learner characteristics, and patterns of technology use.

Table 8. Test of Significant difference on Hours Spent on AI-Related Academic Behaviors of students

Independent Variable	F-Value	df1	df2	p-Value	Conclusion	Decision On Ho
AI Tools for Academic Task	3.97	3	7.92	0.053	Not Significant	Accepted
AI Use and Study Habits	1.29	3	7.81	0.345	Not Significant	Accepted
AI Use and Classroom Engagement	1.33	3	7.82	0.334	Not Significant	Accepted
AI Use and Academic Output Quality	1.14	3	7.95	0.391	Not Significant	Accepted

Note: P < .05 significant at 0.05 alpha

Table 8 presents the results of the one-way analysis of variance (ANOVA) examining differences in respondents' scores according to daily time spent using AI for academic tasks. No statistically significant differences were observed

across the four questionnaire dimensions, including AI Use for Academic Tasks ($F(3, 7.92) = 3.97, p = .053$), AI-Related Study Habits ($F(3, 7.81) = 1.29, p = .345$), AI-Related Classroom Engagement ($F(3, 7.82) = 1.33, p = .334$), and AI-Related Academic Output Quality ($F(3, 7.95) = 1.14, p = .391$). These findings indicate that respondents' scores on the four dimensions did not differ significantly according to their reported daily time spent using AI for academic tasks.

These findings are consistent with Bond et al. (2021), who reported that the amount of time students spent using educational technologies was not necessarily associated with differences in reported learning behaviors. In contrast, Gjermeni and Prodani (2024) reported that students with greater AI exposure demonstrated higher levels of engagement with AI-supported learning activities. The differing findings may reflect variations in educational settings, patterns of AI use, and respondent characteristics. It should also be noted that the groups representing respondents who reported using AI for three to four hours ($n = 8$) and more than four hours per day ($n = 3$) were substantially smaller than the remaining groups. Therefore, findings related to daily AI-use duration should be interpreted with caution.

Table 9. Test on Significant difference of Students year level and AI-Related Academic Behaviors

Independent Variable	F-Value	df1	df2	p-Value	Conclusion	Decision on Ho
AI Tools for Academic Task	8.33	2	121	< .001	Significant	Rejected
AI Use and Study Habits	17.12	2	118	< .001	Significant	Rejected
AI Use and Classroom Engagement	14.73	2	115	< .001	Significant	Rejected
AI Use and Academic Output Quality	12.55	2	118	< .001	Significant	Rejected

Note: $P < .05$ significant at 0.05 alpha

Table 9 presents the results of the one-way analysis of variance (ANOVA) examining differences in respondents' scores according to year level. Statistically significant differences were observed across all four questionnaire dimensions, including AI Use for Academic Tasks ($F = 8.33, p < .001$), AI-Related Study Habits ($F = 17.12, p < .001$), AI-Related Classroom Engagement ($F = 14.73, p < .001$), and AI-Related Academic Output Quality ($F = 12.55, p < .001$). These findings indicate that respondents' scores on the four dimensions differed significantly according to year level.

The specific year-level groups responsible for these differences were subsequently identified through post hoc analysis. These findings are consistent with Law et al. (2023), who reported that students at different academic levels demonstrated varying patterns of AI-related academic practices. In contrast, Chan (2023) found no significant differences in students' AI-related perceptions and practices according to year level. The contrasting findings across studies suggest that respondents' reported AI-related academic behaviors may vary depending on educational context, curriculum requirements, and students' academic experiences.

Table 10. Post-Hoc Tukey Test Results

AI use for Academic Task	Mean Difference	p-Value	Conclusion
First Year vs. Second Year	0.0706	0.792	Not Significant
First Year vs. Third Year	-0.307	0.031	Significant
Second Year vs. Third Year	-0.377	< .001	Significant
AI use and Study Habits			
First Year vs. Second Year	-0.0324	0.962	Not Significant
First Year vs. Third Year	-0.61	< .001	Significant
Second Year vs. Third Year	-0.577	< .001	Significant
AI Use and Classroom Engagement			
First Year vs. Second Year	-0.00621	0.999	Not Significant
First Year vs. Third Year	-0.609	< .001	Significant
Second Year vs. Third Year	-0.603	< .001	Significant
AI Use and Academic Output Quality			
First Year vs. Second Year	0.094	0.726	Not Significant
First Year vs. Third Year	-0.429	0.005	Significant
Second Year vs. Third Year	-0.523	< .001	Significant

Table 10 presents the results of Tukey's Honestly Significant Difference (HSD) post hoc test to identify the specific year-level groups that differed significantly across the four questionnaire dimensions.

For AI Use for Academic Tasks, statistically significant differences were observed between First Year and Third Year respondents (Mean Difference = -0.307 , $p = .031$) and between Second Year and Third Year respondents (Mean Difference = -0.377 , $p < .001$). No statistically significant difference was found between First Year and Second Year respondents (Mean Difference = 0.0706 , $p = .792$).

For AI-Related Study Habits, significant differences were likewise observed between First Year and Third Year respondents (Mean Difference = -0.610 , $p < .001$) and between Second Year and Third Year respondents (Mean Difference = -0.577 , $p < .001$), whereas no significant difference was identified between First Year and Second Year respondents (Mean Difference = -0.0324 , $p = .962$).

Similar results were obtained for AI-Related Classroom Engagement, where First Year and Third Year respondents (Mean Difference = -0.609 , $p < .001$) and Second Year and Third Year respondents (Mean Difference = -0.603 , $p < .001$) differed significantly. No statistically significant difference was observed between First Year and Second Year respondents (Mean Difference = -0.006 , $p = .999$).

For AI-Related Academic Output Quality, statistically significant differences were found between First Year and Third Year respondents (Mean

Difference = -0.429 , $p = .005$) and between Second Year and Third Year respondents (Mean Difference = -0.523 , $p < .001$). The comparison between First Year and Second Year respondents was not statistically significant (Mean Difference = 0.094 , $p = .726$).

Overall, the post hoc analysis indicates that the statistically significant differences observed in the ANOVA were consistently attributable to comparisons involving Third Year respondents, whereas First Year and Second Year respondents did not differ significantly across the four questionnaire dimensions. These findings suggest that Third Year respondents obtained higher mean scores on the AI-related academic behavior measures than respondents in the lower year levels.

These findings are consistent with Zhai (2022), who reported differences in students' AI-related academic practices across year levels. In contrast, Baidoo-Anu and Owusu Ansah (2023) found no significant differences in students' AI-related practices according to year level. The contrasting findings suggest that respondents' reported AI-related academic behaviors may vary across educational contexts, curriculum requirements, and learning experiences.

Table 11. Factor Loadings of the Adapted Questionnaire

Factor 1	Estimate	SE	Z	p
In the past 4 weeks, I used AI to brainstorm ideas or outlines for assignments.	0.533	0.0415	12.8	<.001
I used AI to draft substantial portions of assignments that I submitted.	0.606	0.0377	16.1	<.001
I used AI to rewrite or paraphrase text for my assignments.	0.689	0.0429	16.1	<.001
I used AI to summarize readings or lecture content for coursework.	0.631	0.0458	13.8	<.001
Using AI helped me complete assignments faster.	0.722	0.0415	17.4	<.001
When I used AI, I was less likely to review and revise my work carefully.	0.702	0.0422	16.6	<.001
I submitted AI-assisted work without fully understanding the underlying material.	0.673	0.0547	12.3	<.001
I used AI for parts of assignments that I could complete independently.	0.755	0.0421	17.9	<.001
Without AI assistance, I found it difficult to complete certain academic tasks.	0.725	0.0452	16.0	<.001
My academic outputs felt less original when I relied heavily on AI-generated content.	0.670	0.0471	14.2	<.001
Factor 2				
In the past 4 weeks, I spend fewer hours studying when I use AI to help complete assignments.	0.645	0.0411	15.7	<.001
When I use AI-generated summaries, I am less likely to review the full lesson materials.	0.721	0.0426	16.9	<.001
I take fewer personal notes because I rely on AI to summarize or record key points.	0.823	0.0432	19.1	<.001
I set fewer study goals when I expect AI to help with major parts of my coursework.	0.814	0.0411	19.8	<.001
Overall, my study routine has become less consistent since I began using AI tools frequently.	0.844	0.0393	21.4	<.001
I rely on AI explanations instead of trying to work through difficult concepts on my own.	0.796	0.0391	20.4	<.001
Using AI for academic tasks makes it harder for me to concentrate during independent study.	0.757	0.0432	17.5	<.001

I plan my study schedule less when I rely on AI to complete assignments.	0.826	0.0404	20.4	<.001
Before quizzes/exams, I rely on AI outputs more than my class notes or readings.	0.861	0.0460	18.7	<.001
Factor 3				
I feel less motivated to study without AI assistance.	0.845	0.0435	19.4	<.001
When I rely on AI for coursework, I contribute less during class discussions.	0.829	0.0438	18.9	<.001
Using AI for coursework is associated with lower confidence in sharing my ideas in class.	0.816	0.0434	18.8	<.001
When I rely on AI, I participate less in group activities (e.g., group tasks, group discussions).	0.871	0.0443	19.7	<.001
When I use AI, I am less likely to ask questions during class.	0.835	0.0419	19.9	<.001
When I use AI, I feel less need to clarify concepts during class.	0.836	0.0411	20.3	<.001
I rely on AI rather than asking classmates for help.	0.835	0.0437	19.1	<.001
I rely on AI rather than asking the teacher/instructor for help.	0.900	0.0455	19.8	<.001
I use AI instead of doing my own preparation (e.g., reading/reviewing) before class discussions.	0.891	0.0445	20.0	<.001
Factor 4				
I find it harder to contribute to discussions when I have not prepared without AI.	0.893	0.0438	20.4	<.001
When I use AI frequently, I feel less engaged during class activities.	0.856	0.0450	19.0	<.001
When I rely heavily on AI, my assignments provide less detailed explanation and supporting evidence.	0.790	0.0393	20.1	<.001
AI-assisted writing makes my work feel less personal.	0.715	0.0408	17.5	<.001
When I rely on AI, I find it harder to explain or defend my work in class.	0.802	0.0398	20.2	<.001
When I use AI for research tasks, I use fewer or weaker sources in my assignments.	0.783	0.0392	19.9	<.001
When I rely on AI for writing, my arguments are less coherent and well-structured.	0.804	0.0396	20.3	<.001
When I rely on AI-generated content, my assignments include fewer original examples or ideas.	0.797	0.0392	20.3	<.001
I sometimes submit AI-assisted work without fully understanding the content.	0.886	0.0442	20.0	<.001
After using AI, I feel less confident that my work meets course standards.	0.772	0.0381	20.3	<.001
I use AI in ways that reduce how much of the work is my own.	0.780	0.0414	18.8	<.001
When I rely on AI, my assignments are more likely to contain inaccuracies or weak reasoning.	0.765	0.0396	19.3	<.001

Table 11 presents the results of the Exploratory Factor Analysis (EFA) conducted to examine the construct validity of the adapted questionnaire. The analysis supported a four-factor structure corresponding to the study constructs: AI Use for Academic Tasks, AI-Related Study Habits, AI-Related Classroom Engagement, and AI-Related Academic Output Quality. All questionnaire items demonstrated statistically significant factor loadings ($p < .001$), with standardized loading estimates ranging from 0.533 to 0.900, indicating satisfactory associations between the items and their respective latent constructs.

The factor loading estimates suggest that the questionnaire items adequately represented their intended dimensions. Standard errors were relatively small, indicating stable parameter estimates, while all Z-values exceeded the critical value of 1.96, demonstrating that the factor loadings were statistically different from zero. Collectively, these findings provide evidence supporting the

construct validity of the adapted questionnaire and indicate that the instrument is appropriate for assessing respondents' reported AI use for academic tasks, AI-related study habits, classroom engagement, and academic output quality.

Table 12. Scale Reliability Statistics

Factor	Cronbach's α	McDonald's ω
AI use in Academic Task	0.913	0.916
AI use and Study Habits	0.945	0.956
AI use and Classroom Participation	0.942	0.962
Academic Work Quality and AI Use	0.932	0.962

Table 12 presents the internal consistency reliability of the adapted questionnaire. The Cronbach's alpha coefficients ranged from 0.913 to 0.945, while McDonald's omega coefficients ranged from 0.916 to 0.962 across the four constructs. These values indicate excellent internal consistency reliability, suggesting that the items within each construct consistently measured the intended dimension. Collectively, the reliability estimates provide evidence supporting the internal consistency of the adapted questionnaire for assessing AI use for academic tasks, AI-related study habits, AI-related classroom engagement, and AI-related academic output quality.

4. Conclusions

This study examined college students' reported use of artificial intelligence (AI) for academic tasks and their reported AI-related study habits, classroom engagement, and academic output quality. Overall, respondents demonstrated neutral levels of agreement across the four dimensions, suggesting that they neither agreed nor disagreed with many of the statements describing AI-related academic behaviors. Statistically significant differences were observed according to sex and year level, indicating that respondents' scores on the four questionnaire dimensions varied across these demographic groups. In contrast, no statistically significant differences were found according to daily time spent using AI for academic tasks. These findings should be interpreted as differences in respondents' reported scores rather than evidence of causal relationships or actual differences in AI use or dependence. The adapted questionnaire demonstrated high preliminary internal-consistency estimates based on Cronbach's alpha and McDonald's omega, while the exploratory factor analysis provided preliminary evidence supporting its four-factor structure. However, the dimensional structure of the instrument requires further refinement and independent validation, including confirmatory factor analysis using a separate sample.

5. Recommendations

Based on the findings of the study, the following recommendations are proposed: Higher education institutions should implement AI literacy programs that promote the responsible, ethical, and critical use of generative AI for academic tasks. Institutions should establish clear guidelines on the disclosure of

AI-assisted academic work to promote academic integrity and responsible AI use. Faculty members are encouraged to design authentic assessment strategies, such as oral presentations, process documentation, reflective journals, or oral defenses, to complement AI-assisted learning while ensuring students demonstrate their own understanding. Professional development programs should be provided to faculty members to strengthen their capacity to integrate AI responsibly into teaching, learning, and assessment practices. Academic programs should develop discipline-specific guidelines for appropriate AI use, recognizing that AI applications and ethical considerations may differ across fields of study. Learning activities should emphasize the critical evaluation of AI-generated content, enabling students to verify information, identify inaccuracies, and apply independent judgment when using AI-assisted outputs. Future studies should validate the adapted questionnaire using Confirmatory Factor Analysis (CFA) and an independent sample, include participants from multiple higher education institutions, incorporate objective academic performance indicators, and employ longitudinal research designs to strengthen the generalizability and psychometric evidence of the instrument.

6. Limitations of the Study

This study has several limitations that should be considered when interpreting the findings. First, the study relied on self-reported responses, which may be influenced by social desirability and recall bias. Second, its cross-sectional descriptive-comparative design precludes causal inferences; thus, the findings describe respondents' reported perceptions rather than cause-and-effect relationships. Third, the study was conducted in one private higher education institution, with unequal representation across academic programs and year levels, limiting the generalizability of the findings. In addition, the very small number of respondents in the higher AI-use duration groups may have reduced the stability of group comparisons. The study also relied solely on self-reported perceptions and did not include objective measures of academic performance, classroom engagement, or academic output quality. Although the adapted instrument demonstrated acceptable construct validity and internal consistency, the same sample was used for exploratory factor analysis and substantive analyses, confirmatory factor analysis using an independent sample was not conducted, and the instrument development and adaptation procedures were not comprehensively documented. Furthermore, potential construct overlaps, and response bias associated with negatively worded items cannot be completely ruled out. These limitations should be considered when interpreting the findings and generalizing them to other educational settings. Future studies should employ multi-institutional and longitudinal designs, include objective academic indicators, and further validate the instrument using independent samples.

Supplementary Details

Author Contributions: Don Cahilog, as the sole author, contributed to all aspects of the research, including conceptualization, methodology, instrument development and validation, data collection, formal analysis, interpretation of

results, writing of the original manuscript, review and editing, and overall supervision of the research process.

Funding: This research received no external funding.

Informed Consent Statement: Informed consent was obtained from all respondents involved in the study.

Conflicts of Interest: The authors declare no conflict of interest.

Disclosure Statement: The author discloses the use of Jamovi for the statistical analysis, particularly inferential statistics; Consensus for literature searching and synthesis; and Google Search for locating relevant information and scholarly resources. These tools were used solely to support the research process, while the interpretation of findings, conclusions, and final manuscript content remain the responsibility of the author.

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Cite as: Cahilog, D. (2026). Development and Initial Validation of a Survey on College Students' Academic Use of Artificial Intelligence and Its Association with Study Habits, Classroom Engagement, and Academic Output Quality. *International Journal of Multidisciplinary Studies in Higher Education*, 3(3), 109–130. <https://doi.org/10.70847/741246>