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Artificial Intelligence Awareness and Utilization Among Junior High School Science Teachers: A Descriptive Study from the Philippines

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Abstract. The limited adoption of artificial intelligence (AI) tools in education hinders efforts to improve teaching and learning outcomes worldwide. Recognizing this challenge, the study aimed to assess the awareness and utilization of AI tools among junior high school science teachers in Dinalupihan, Bataan. Employing a descriptive cross-sectional quantitative design, data were gathered from 44 science teachers across public and private secondary schools through validated survey instruments. The awareness scale measured both cognitive and performance-related understanding of AI tools, while a utilization survey assessed the extent of AI tool use in instructional practices. Results indicated a high level of cognitive awareness (M = 3.70) but only moderate performance-related awareness (M = 3.34). Despite this, overall utilization of AI tools was low, with ChatGPT and Grammarly emerging as the most commonly used platforms. Non-parametric analyses revealed significant differences in awareness based on teachers' length of service and type of school, suggesting that professional experience and institutional context influence familiarity and use of AI in education. These findings emphasize the need for contextualized professional development and training programs to bridge the gap between AI awareness and practical application, thereby enhancing science teaching and learning experiences.
Keywords: Artificial intelligence, AI awareness, AI utilization, Teacher readiness

Introduction

Artificial intelligence (AI) is rapidly transforming many fields of society, including the educational landscape, offering new possibilities for personalized learning, instructional efficiency, and curriculum innovation. Defined as a set of technologies that simulate human cognition, decision-making, and learning (Stryker & Kavlakoglu, 2024), AI is increasingly recognized as a catalyst for achieving inclusive and quality education, particularly in alignment with sustainable development goal 4, emphasizing the need for sustained capacity-building to maximize its impact on academic learning (Hosseini et al., 2025). However, despite its potential, the integration of AI into classroom practice, especially in science education, remains uneven and underexplored.

Science education presents unique challenges due to its abstract concepts, high cognitive demands, and frequent reliance on visualization and experimentation (Millar, 2024). AI tools such as intelligent tutoring systems, adaptive learning platforms, and generative content applications have shown potential to enhance student engagement and

comprehension in science subjects (Almasri, 2024). For instance, AI-supported platforms have been linked to improved motivation and active participation among learners. However, global studies reveal that AI use in classrooms is often limited to surface-level tasks such as grammar correction or automated grading, rather than deeper pedagogical integration (Mehdaoui, 2024; Zawacki-Richter et al., 2019).

A critical factor influencing this limited adoption is teacher readiness. Research consistently shows that teachers' awareness, confidence, and pedagogical understanding of AI significantly affect its classroom implementation (Uygun et al., 2024; Giray et al., 2024). In technologically advanced countries like South Korea and Finland, national efforts have focused on developing AI literacy among educators through formal training and curriculum support. Yet, even in these contexts, many teachers report uncertainty about how to align AI tools with instructional goals, citing barriers such as lack of time, technical competence, and institutional support (Casal-Otero et al., 2023).

In the Philippine setting, the Department of Education (DepEd, 2025) has acknowledged AI's potential and launched initiatives such as the Education Center for AI Research (E-CAIR). However, empirical studies suggest that teacher access to digital infrastructure and sustained professional development remains inconsistent across regions, with contextual adaptability playing a critical role in shaping AI integration outcomes (Tetzlaff et al., 2024). A recent multi-method study in Butuan City revealed that while science teachers are experimenting with tools like ChatGPT, Canva, and Google Gemini, many still struggle with content relevance, ethical concerns, and diminished teacher-student interaction, reflecting broader tensions between AI innovation and the entrenched grammar of schooling (Zhao, 2024).

Despite growing international and local interest, there remains a significant gap in understanding how Filipino science teachers perceive and utilize AI tools in their instructional practices. Most existing literature focuses on theoretical frameworks or pilot programs, with limited empirical data on actual classroom usage, especially in junior high school settings.

This study addresses that gap by examining the level of AI awareness and utilization among junior high school science teachers in Dinalupihan, Bataan, a context that reflects both the potential and the challenges of AI integration in developing educational systems. It specifically sought to answer the following research questions: 1) What is the level of awareness of junior high school science teachers regarding AI tools in terms of cognitive and performance aspects?, 2) To what extent do these teachers utilize AI tools in their instructional practices?, and 3) Are there significant differences in AI awareness and utilization when teachers are grouped according to sex, educational attainment, length of service, and type of school?

Methods

This study employed a descriptive quantitative research design, suitable for capturing measurable indicators of junior high school science teachers' awareness and utilization of AI tools in instructional contexts. The study was conducted in Dinalupihan, Bataan, a municipality selected for its diverse mix of public and private secondary schools and logistical accessibility for researcher coordination. A purposive sampling technique was used to identify participants specifically targeting junior high school science teachers with active classroom experience and exposure to technology integration. This non-probability method ensured the inclusion of respondents who were directly involved in science instruction and thus most relevant to the study's objectives. Purposive sampling is particularly valued for its clarity in respondent selection and applicability in qualitative research, as it ensures participants are chosen for their ability to provide rich, relevant, and diverse data (Andrade, 2021). Out of sixteen schools invited to participate, eight schools, comprising both public and private institutions, agreed to take part. These schools collectively employed forty-nine science teachers, of whom forty-four completed the survey

and were included in the final analysis. The sample size met the minimum requirement calculated using an online sample size calculator, based on a 5% margin of error and 95% confidence level. Teachers who declined participation were respectfully excluded, in accordance with ethical principles such as voluntary participation and the right to withdraw without consequence.

Table 1. Demographic profile of high school science teachers in Dinalupihan, Bataan

	Frequency *(n=44)*	Percentage
Sex		
Male	9	20.45
Female	35	79.55
Highest Educational Attainment (HEA)	34	77.23
Bachelor's Degree	10	22.72
Masters'/Doctorate Degree		
Length of Service (LS)	12	27.27
11 or more years	14	31.82
6 to 10 years	18	40.91
1 to 5 years		
School Category (SC)	12	27.27
Private	32	72.73
Public		

A purposive sampling technique was employed to ensure that only junior high school science teachers with relevant classroom experience were included. This non-probability sampling method was selected to allow for the inclusion of teachers directly engaged with science instruction and familiar with technology integration challenges. Teachers who declined participation were excluded in observance of ethical principles, including the right to refuse participation without consequence. Two survey instruments were used. The first, adapted from Ferikoğlu and Akgün (2022), measured science teachers' awareness of AI. It covered cognitive and performance-related dimensions of AI awareness relevant to instruction.

Prior to data collection, approval was secured from the Department of Education (DepEd) – Schools Division Office of Bataan. After obtaining school-level permissions, printed survey forms were distributed to the selected respondents. A one-week period was allotted for completion, and responses were manually retrieved by the researchers. All participants were informed of the study's purpose, assured of confidentiality, and given the right to withdraw without penalty.

All collected data were encoded and processed using Jamovi version 4.2, a statistical software platform designed for user-friendly analysis. The following procedures were applied: Descriptive statistics (frequency, percentage, mean, and standard deviation) were used to summarize demographic profiles and responses to Likert-scale items. Given the ordinal nature of the data and the use of purposive sampling, non-parametric inferential tests were employed: The Mann–Whitney U test was used to examine differences between two independent groups (e.g., sex, school type). The Kruskal–Wallis H test was applied to compare responses across three or more groups (e.g., length of service, educational attainment). When Kruskal–Wallis results indicated significant differences, post hoc pairwise comparisons were conducted using the dwass-steel-critchlow-fligner (DSCF)

method to identify specific group differences. Statistical significance was determined at the 0.05 level, ensuring rigor in interpreting group comparisons and patterns of AI awareness and utilization.

Results and Discussion

The results are presented thematically according to the study's research questions, beginning with an analysis of science teachers' awareness of AI, followed by their utilization of AI tools, and concluding with statistical comparisons based on demographic profiles.

Level of AI awareness among science teachers

The first research question explored the extent of junior high school science teachers' awareness of artificial intelligence. The results are organized into cognitive and performance-related indicators to capture both knowledge-based and functional dimensions of awareness.

Table 2. Artificial intelligence awareness of science teachers

Awareness on Artificial Intelligence	Mean	SD	Verbal Interpretation
Cognitive Factors			
1. I have sufficient knowledge of AI programs and applications.	3.77	0.64	Agree
2. I have sufficient knowledge of the roles of the faculty member in the application of AI in teaching.	3.64	0.61	Agree
3. I have knowledge of the basics of designing and implementing lessons using AI programs and applications.	3.80	0.63	Agree
4. I have knowledge of methods of evaluating student assignments implemented by AI applications.	3.39	0.76	Agree
Composite mean	**3.70**	**0.49**	**Agree**
Performance Factors			
5. I can create various files using AI applications.	3.70	0.76	Agree
6. I can design course content using AI applications.	3.55	0.73	Agree
7. I can summarize long texts using AI applications.	3.66	0.68	Agree
8. I can respond to students' inquiries through the use of chatbots.	3.02	0.95	Neutral
9. I can convert written texts in the course into audio files using AI (sound making) applications.	3.09	1.03	Neutral
10. I can use AI applications based on suspense, challenge, and scientific competition in the educational process.	3.36	0.78	Neutral
11. I can convert printed images or text into editable text files using AI applications.	3.34	0.89	Neutral

12. I can turn written texts into educational films using AI applications.	3.00	0.89	Neutral
Composite mean	**3.34**	**0.57**	**Neutral**

Legend: 1.00 – 1.79 = Strongly Disagree; 1.80 – 2.59 = Disagree; 2.60 – 3.39 = Neutral; 3.40 – 4.19 = Agree; 4.20 – 5.00 = Strongly Agree

As shown in Table 2, science teachers demonstrated a high level of cognitive awareness of AI, with a composite mean of 3.70 (SD = 0.49). All four indicators under this dimension received "Agree" responses, suggesting confidence in understanding the role of AI in instructional design and assessment. This finding aligns with recent research emphasizing that teachers possess foundational cognitive understanding of AI's potential in education, particularly in supporting knowledge construction and pedagogical practices (Alarabi et al., 2025). In contrast, Chounta et al. (2021) identified limited teacher knowledge about AI's practical support capabilities despite recognition of its educational potential. The performance-related awareness composite mean was 3.34 (SD = 0.57), interpreted neutrally, indicating teachers' limited familiarity with advanced AI functions beyond basic tasks. Specifically, lower scores on performance indicators such as chatbot use, text-to-audio conversion, and educational film creation reflect this gap, consistent with findings that educators mainly engage with basic AI functions due to limited exposure and training (Tripathi et al., 2025; Almasri, 2024). Moreover, practical knowledge and hands-on familiarity significantly influence AI integration in teaching practices, often lagging behind cognitive awareness (Güneyli, 2024). This disparity highlights the need for enhanced professional development targeting advanced AI applications in education to bridge the gap between theoretical understanding and practical application.

Utilization of AI tools among science teachers

The second research question focused on the extent to which junior high school science teachers utilize artificial intelligence tools in their instructional practices. Table 3 presents the frequency of use for specific AI platforms, grouped into four categories: lesson planning and content creation, chatbots, assessment generators, and student output checkers. These results offer insights into which tools are more commonly adopted and where gaps in usage remain.

Table 3. Utilization of artificial intelligence tools of science teachers

AI Tools	Mean	SD	Verbal Interpretation	Rank
Lesson Planner and Content Creator				
Curipod	1.30	0.63	Never	11.5
Diffit	1.16	0.43	Never	13
MagicSchool.ai	1.57	1.04	Never	5
Education Copilot	1.55	0.85	Never	6
Eduaide.ai	1.45	0.93	Never	9.5
Khanmigo	1.52	0.90	Never	7.5
Copy.ai	1.45	0.90	Never	9.5
Pop AI	1.30	0.59	Never	11.5
Tutor AI	1.52	1.00	Never	7.5
Mentimeter	2.18	1.32	Rarely	2
Adobe Express with Firefly	1.66	0.94	Never	4
Canva Classroom Magic	2.95	1.29	Sometimes	1
Brisk Teaching	1.68	1.14	Never	3

Chatbots				
BingChat	1.36	0.69	Never	5
ChatGPT	4.07	0.97	Often	1
Perplexity	1.48	0.90	Never	4
Google bard	1.91	1.27	Rarely	2
Pi	1.30	0.63	Never	7
Hello History	1.34	0.75	Never	6
ChatPDF	1.73	1.06	Never	3
Quiz/Assessment Generator				
Question Well	1.45	0.85	Never	3
Formative AI	1.55	0.90	Never	2
Quizziz AI	2.80	1.30	Sometimes	1
Conker	1.32	0.67	Never	4
Twee	1.30	0.67	Never	5
Student's Output Checker				
Gradescope	1.23	0.57	Never	6
Turnitin	1.77	1.22	Never	2
Galaxy.ai	1.30	0.63	Never	5
MagicSchool.ai	1.73	1.13	Never	3
got Feedback by got learning	1.32	0.74	Never	4
Grammarly	3.41	1.37	Often	1

Legend: 1.00 – 1.79 = Never; 1.80 – 2.59 = Rarely; 2.60 – 3.39 = Sometimes; 3.40 – 4.19 = Often; 4.20 – 5.00 = Always

The utilization of AI tools was examined across four functional domains: lesson planning and content creation, chatbots, quiz and assessment generators, and student output checkers. While a small number of platforms were reported as used "Often" or "Sometimes," most AI tools listed in the survey were marked as "Never" utilized. This uneven pattern suggests that teachers are gravitating toward only a few widely known or accessible tools, reflecting selective adoption rather than widespread AI integration. These findings align with those reported by Krypa et al. (2024), who observed that despite growing interest in AI, actual classroom use remains concentrated around a limited set of familiar platforms. Similarly, Makune (2025) highlights that significant gaps exist in the knowledge and application of AI tools by teachers in their practice.The following subsections discuss the utilization patterns and their implications.

Lesson Planner and Content Creator

Utilization in this category was generally low. Twelve out of thirteen listed tools received mean scores corresponding to "never" or "rarely." Only *canva classroom magic* was rated within the "sometimes" range (M = 2.95, SD = 1.29), making it the most frequently used tool in this group. Other tools such as *Diffit* (M = 1.16), *Curipod* (M = 1.30), and *PopAI* (M = 1.30) were among the least utilized. This pattern suggests that while teachers may be aware of these platforms, practical application remains limited. Limited access to AI tools and insufficient teacher preparation remain significant barriers to adoption in educational settings (Almasri, 2024; Cai, 2025). These challenges are consistent with findings by Zhang and Chen (2023), who systematically reviewed difficulties in K-12 AI integration, and Kumar et al. (2024), who highlighted that organizational support and resources are critical to overcoming barriers to AI adoption in schools.

Chatbots

Among the chatbot platforms, *ChatGPT* was distinctly more utilized than others, receiving a mean score of 4.07 (SD = 0.97), classified under the "Often" category. All remaining tools in this group, including G*oogle bard* (M = 1.91), *ChatPDF* (M = 1.73), and *Pi* (M = 1.30), were rated as "Never" or "Rarely" used. This pattern indicates that respondents are familiar with and confident in using *ChatGPT*, possibly due to its accessibility, interface design, and broad applicability across instructional tasks. The preference for ChatGPT over other chatbot platforms among educators can be attributed to its accessible interface, instructional versatility, and consistent performance, as evidenced by Schei et al. (2024) and further supported by Maheshwari et al. (2024), who identified familiarity and practical classroom utility as key factors driving its widespread adoption. Their study also noted that alternative chatbots were less adopted, often due to limited awareness or perceived complexity. However, Labadze et al. (2024), highlighted a growing interest in alternative AI chatbots, noting that platforms such as Claude and Eduaide.AI are gaining attention for their specialized features and integration capabilities, suggesting potential for broader diversification in educational chatbot use.

Quiz/Assessment Generator

Utilization in this category also remained low overall. *Quizziz AI* was the only tool rated as "Sometimes" used (M = 2.80, SD = 1.30), with the rest falling within the "Never" category. The higher utilization of *Quizziz AI* may be attributed to its gamified format and familiarity among teachers. Sandu et al. (2024) found that such platforms enhance student engagement through interactive assessment features. However, the limited use of other quiz-generating tools suggests a narrow preference for established platforms and limited awareness of available alternatives. This is in line with Smith et al. (2022) who highlighted the concern in reliability and fairness of AI-powered assessments of teachers integrating AI in assessment. They encounter difficulties in adapting to new technologies, particularly when these systems lack transparency or clear guidelines on how decisions are made.

Checking Student's Output

Among the listed tools, only *Grammarly* received a rating in the "Often" category (M = 3.41, SD = 1.37). This indicates regular use of the application to check grammar, spelling, and clarity in student work. Other tools such as *Turnitin* (M = 1.77), *MagicSchool.ai* (M = 1.73), and *Gradescope* (M = 1.23) were rated as "Never" or "Rarely" used. The popularity of *Grammarly* likely reflects its widespread availability and ease of use, especially in English language writing tasks. Llausas et al. (2024), in a review of automated writing evaluation tools, concluded that *Grammarly* effectively supports writing improvement, particularly among learners of English as a second or foreign language.

Summary of Findings

Taken as a whole, the results indicate selective and uneven use of AI tools among science teachers. The majority of applications across all categories were rated as "Never" used, pointing to a limited degree of practical integration in classroom activities. The few tools that received higher ratings—such as *Canva Classroom Magic*, *ChatGPT*, *Quizziz AI*, and *Grammarly*—tend to be platforms that are widely publicized, user-friendly, and readily accessible. These findings aligned with the study of Dellelo et al. (2024), who emphasize that educators tend to adopt AI tools they find familiar and immediately useful, reinforcing the selective usage trend seen in this study. Thus, the findings suggest a strong reliance on familiar technologies and highlight the importance of structured exposure to a broader range of AI tools relevant to science education.

Test of Significant Differences in Science Teacher's Awareness on AI

Table 4. Significant difference in science teacher's awareness on artificial intelligence based on demographic profile

Awareness	Grouping variable	Mdn	IQR	Test used	Test statistic	p-value
Cognitive	*Sex*					
	Female	3.75	0.63	Mann-Whitney U	116.50	0.228
	Male	4.00	0.25			
	HEA					
	Bachelor's Degree	3.88	0.50	Mann-Whitney U	104.00	0.061
	Masters'/Doctorate Degree	3.50	0.63			
	LS					
	11 and above	3.75	0.56	Kruskal-Wallis H	8.40	*0.015
	6 to 10	3.50	0.44			
	1 to 5	4.00	0.44			
	SC					
	Private	4.00	0.56	Mann-Whitney U	90.00	*0.006
	Public	3.50	0.81			
Performance						
	Sex					
	Female	3.13	0.75	Mann-Whitney U	151.00	0.859
	Male	3.13	1.13			
	HEA					
	Bachelor's Degree	3.38	1.00	Mann-Whitney U	100.50	0.050
	Masters'/Doctorate Degree	3.06	0.31			
	Length of Service					
	11 and above	3.25	0.81	Kruskal-Wallis H	5.30	0.070
	6 to 10	3.00	0.31			
	1 to 5	3.44	0.97			
	Type of School					
	Private	3.38	1.00	Mann-Whitney U	155.00	0.329
	Public	3.13	0.75			

Note: *Significant at α = .05

Table 4 presents the results of non-parametric tests examining whether science teachers' levels of AI awareness—both cognitive and performance-related—differ significantly according to sex, highest educational attainment, length of service, and school type.

In terms of cognitive awareness, no statistically significant differences were observed between male and female teachers (U = 116.50, p = 0.228), nor between those with bachelor's and post-baccalaureate degrees (U = 104.00, p = 0.061). However, length of service emerged as a significant factor (H = 8.40, p = 0.015). Post-hoc pairwise comparisons using the Dwass–steel–critchlow–fligner (DSCF) test revealed that teachers with 1 to 5 years of experience had significantly higher cognitive awareness than those with 6 to 10 years (p = 0.028) and 11 years or more (p = 0.034). Research consistently shows that younger or early-career teachers are more receptive to digital innovations in the classroom (Filiz et al., 2025; Alnasib, 2023). Furthermore, statistical tests confirmed significant differences by experience level, showing early-career teachers outperforming their senior counterparts in cognitive awareness (Karthikeyan & Parthibayan, 2025).

Additionally, school type showed a significant difference, with science teachers in private schools reporting higher cognitive awareness than those in public schools (U = 90.00, p = 0.006). This is supported by Sarra et al. (2025), who found that teachers' beliefs and integration of digital tools varied by school type, with private school teachers reporting greater confidence and autonomy in using technology to support learning. This may reflect institutional disparities in training access, technology investment, or autonomy in pedagogical practices. However, these findings are in contrast with the study of Guneyli et al. (2024), stating that sociodemographic-like types of schools (public or private) have no significant effect on the overall awareness of artificial intelligence. This implies that awareness of AI among educators is influenced more by other factors, such as individual initiatives, institutional resources, or professional development opportunities, rather than the institutional classification of their schools. Thus, it suggests a more universal approach to AI awareness, where factors beyond school type are prioritized in shaping educators' understanding of AI.

As for performance awareness, no statistically significant differences were found by sex (U = 151.00, p = 0.859), school type (U = 155.00, p = 0.329), or length of service (H = 5.30, p = 0.070). It was supported by the study of Leonillo (2025) stating that no significant differences emerged in AI-driven teaching efficiency between sexes. However, the difference between teachers with bachelor's and post-baccalaureate degrees approached significance (U = 100.50, p = 0.050). Interestingly, teachers with only a bachelor's degree reported higher performance awareness. While unexpected, this result may stem from a self-directed orientation among early-career teachers toward exploring available AI tools, in contrast to those with more traditional postgraduate training, who may exhibit hesitancy toward newer technologies (Aryani, 2025). These findings highlight the importance of considering both individual and institutional contexts in designing AI training and support programs for science educators.

Conclusion

The findings of this study reveal that junior high school science teachers in Dinalupihan, Bataan exhibit moderate to high cognitive awareness of AI tools but have limited performance-related awareness, as demonstrated by their restricted utilization mostly to popular platforms like ChatGPT and Grammarly. The study also identifies significant differences in AI awareness and use based on length of service and school type, with early-career and private school teachers showing greater familiarity and engagement. These results directly address the research questions by highlighting both the current state of AI awareness and utilization among the teachers and the disparities influenced by demographic and institutional factors. Consequently, this underscores the urgent need for targeted professional development programs that enhance not only access but also practical competence in AI applications, tailored to the diverse contexts of junior high science educators in developing educational environments.

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