The Mediating Role of Artificial Intelligence (AI) Usage on the Relationship between Attitudes towards AI in Education and Students' Learning Outcomes

Membrillos, Kezhelle A.[1], Alferez, Kent Lester N.[1], Fernandez, Ged Eric G.[1], Jalos, Rustean Kim L.[1], Jordan, Valerie P.[1], Manuel, Alady Rain E.[1], Mendaros, Peter Glenn M.[1], Pernites, Khrisha Miah L.[1], Sencio, Sophia L.[1], Sion, Melvern L.[1], Anna Marie O. Pelandas[2], PhD (CAR)., Jocel T. Labadan[2], MAEd

[1]Department of Education, Senior High School Students, Philippines

[2]Department of Education, Senior High School Teachers Division of Davao de Oro, Philippines

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ABSTRACT

This study focused on the mediating role of artificial intelligence (AI) usage in the relationship between students' attitudes toward AI in education and their learning outcomes. The main purpose of the study was to determine the level of students' attitudes toward AI, Artificial Intelligence (AI) usage, and learning outcomes among senior high school students. It also aimed to find out whether Artificial Intelligence (AI) usage plays an important role in the relationship between students' attitudes toward AI and their learning outcomes. This study used a quantitative and correlational research design. The respondents were 271 senior high school students from Lorenzo S. Sarmiento Sr. National High School. The data were analyzed using weighted mean, Pearson's r, Spearman's rho, and multiple regression analysis. The results showed that students had a high level of positive attitudes toward AI, a high level of Artificial Intelligence (AI) usage, and good learning outcomes. The findings also revealed a significant relationship between attitudes toward AI in education and learning outcomes, as well as between attitudes toward AI and Artificial Intelligence (AI) usage and attitudes towards AI in education and Artificial Intelligence (AI) usage. Moreover, Artificial Intelligence (AI) usage was found to significantly mediate the relationship between students' attitudes toward AI and their learning outcomes. This means that when students have positive attitudes toward AI, they are more likely to use Artificial Intelligence (AI) tools, which helps improve their learning outcomes. The findings of this study may help teachers and future researchers understand the importance of using AI in education to support students' learning.

Keywords: General Academic Strand, Artificial Intelligence (AI) Usage, Attitudes Toward AI in Education, Students' Learning Outcomes, Philippines

INTRODUCTION

Student learning outcomes were defined as measurable achievements that learners could understand upon completion of the learning (Andreev, 2025). A study by Khalid et al. (2022) in China found that international students faced challenges in cognitive development due to limited integration into diverse cultural learning environments. Similarly, in France, Crowe et al. (2022) found that educational systems disproportionately emphasized lower-order cognitive skills, resulting in rapid declines in student learning outcomes and widespread concern among educators and scholars (Martin, 2023). Additionally, in Nigeria, Azubuike et al. (2024) mentioned that student learning outcomes remained a significant challenge, particularly in foundational literacy and numeracy.

In the Philippines, particularly in Laguna, attitudes toward AI in education significantly influence students' intent to use AI tools for academic tasks, underscoring their importance for the successful integration of AI in

education (Abdulmunem, 2023). Likewise, Alcazaren and Robinos (2022) mentioned that positive attitudes toward AI in education were important because they enhanced self-efficacy and interest in using educational technologies. Furthermore, Fabro et al. (2024) underscored the importance of students' attitudes toward generative AI in shaping its effective use in academic writing. In addition, the study by Lopres et al. (2024) found that students' attitudes toward AI in education directly affected their learning outcomes, underscoring its educational significance.

In Manila, the importance of Artificial Intelligence (AI) usage was increasingly recognized, as it offered tools that enhanced student performance, fostered active learning, and strengthened study habits (Mallillin & Mallillin, 2024). Similarly, the findings of Ocaña-Fernández et al. (2021) indicated that AI-powered systems such as adaptive platforms and chatbots provided personalized support, making lessons more engaging and accessible to diverse learners. Additionally, the way students used these tools, as discussed by Reyes et al. (2024), was essential for encouraging deeper understanding, critical thinking, and problem-solving, thereby further improving overall student learning outcomes. Moreover, Palm et al. (2025) stated that students' attitudes toward AI directly influenced how they used these technologies in their studies. As such, learners with positive attitudes were more likely to responsibly maximize AI for academic growth (Stein et al., 2024), whereas those with negative or hesitant perceptions tended to resist its integration, thereby reducing its potential benefits (Nguyen, 2022).

In Davao City, students increasingly showed uneven development in higher-order thinking skills, limiting their ability to demonstrate consistent cognitive performance and contributing to declining student learning outcomes across subject areas (Rosello, 2023). Supporting this trend, Opeña and Lagura (2025) stated that learners continued to struggle with tasks requiring analysis and synthesis, resulting in persistently low achievement across cognitive benchmarks. Similarly, in Davao de Oro, particularly in Maco, learners displayed fluctuating emotional investment in academic tasks, further weakening their learning outcomes (Barahaman, 2025; Cabili & Peteros, 2024). At Lorenzo S. Sarmiento Sr. National High School, many students showed reduced attention spans and inconsistent completion of academic tasks, which might reflect a decline in student learning outcomes.

Research Objectives

1.To determine the level of attitudes towards AI in education among students in Lorenzo S. Sarmiento Sr. National High School National High School in terms of:

1.1 expectancy;

1.2 task value;

1.3 utility value;

1.4 intrinsic/interest value; and

1.5 cost.

2. To find out the level of artificial intelligence usage among students in Lorenzo S. Sarmiento Sr. National High School High School in terms of:

2.1 functionality;

2.2 availability; and

2.3 complexity.

3. To figure out the level of students' learning outcomes in Lorenzo S. Sarmiento Sr. National High School in terms of:

3.1 cognitive domain;

3.2 affective domain; and

3.3 psychomotor domain.

4. To find out the significant relationship between the attitudes towards AI in education and students' learning outcomes in Lorenzo S. Sarmiento Sr. National High School.

5. To determine the significant relationship between artificial intelligence (AI) usage and students' learning outcomes in Lorenzo S. Sarmiento Sr. National High School.

6. To assess the significant relationship between attitudes towards AI in education and artificial intelligence (AI) usage among students in Lorenzo S. Sarmiento Sr. National High School.

7. To identify which of the domain in attitudes towards AI in education would influence students learning outcome among Lorenzo S. Sarmiento Senior National High School.

8. To evaluate the mediating effect of artificial intelligence (AI) usage on the relationship between attitudes towards AI in education and student learning outcomes at Lorenzo S. Sarmiento Sr. National High School.

METHODOLOGY

This study adopted a quantitative, non-experimental, descriptive–correlational research design. Such a design was widely recommended in educational research because it enabled scholars to examine existing conditions and explore potential relationships among variables without manipulation or intervention (Creswell, 2014; Gay et al., 2006). Accordingly, this design was deemed appropriate for the investigation, as it aimed to assess students' attitudes toward artificial intelligence (AI) in education, their engagement with AI tools, and their learning outcomes. In line with this, Johnson and Christensen (2019) emphasized that quantitative research designs were particularly effective in providing systematic and objective analyses of educational and behavioral phenomena.

The quantitative approach was implemented using a structured questionnaire. This instrument was commonly utilized in educational and social research because it allowed researchers to collect standardized, measurable, and comparable responses (Fraenkel & Wallen, 2009). Consequently, it enabled the researchers to obtain reliable data regarding students' perceptions of AI, their usage patterns, and their academic performance.

In addition, the design's descriptive component was intended to provide a clear profile of the respondents. Specifically, it sought to present students' attitudes toward AI, the extent of their engagement with AI tools, and their corresponding learning outcomes. To achieve this, descriptive statistics, such as means and standard deviations, were used. Gravetter and Wallnau (2017) explained that these measures were valuable because they summarized large datasets and revealed both central tendencies and variability, thereby offering a comprehensive description of participants' characteristics.

Population and Sample

The population of this study consisted of 909 senior high school students who were enrolled at Lorenzo S. Sarmiento Sr. National High School during the first semester of the school year 2025–2026. The study focused exclusively on students who were officially enrolled at the senior high school level of the institution during this period. These students were assigned to their respective academic strands and included both male and female learners. Students who were not enrolled at Lorenzo S. Sarmiento Sr. National High School or who

were not part of the senior high school level during the specified semester were excluded from the study. To determine the appropriate number of respondents, the Raosoft sample size calculator was used, which resulted in a sample size of 271 students.

To determine the respondents of the study, a stratified random sampling technique was utilized. This method was selected to ensure equitable representation of students across different grade levels, academic strands, and AI tool usage, such as ChatGPT and CiCi, thereby reducing sampling bias and improving the validity of the results (Ahmed, 2024).

Statistical Tool

The statistical tools used for data analysis and interpretation were the following:

Mean. This statistical tool was used to determine the level of artificial intelligence, attitudes towards AI in education, and students' learning outcomes of senior high school students.

Pearson's r. This statistical tool, for normally distributed data, was used to measure the strength and direction of a linear relationship between two continuous variables.

Spearman's rho. This statistical tool, for non-normal distributed data, was used to measure the strength and direction of a linear relationship between two continuous variables.

Mediation Analysis. This statistical tool was used to determine the mediating effect of artificial intelligence on the relationship between attitudes towards AI in education and students' learning outcomes.

Multiple regression analysis. This statistical tool was used to determine the influence of Artificial Intelligence (AI) as a predictor of the commitment of public secondary teachers.

RESULT

Level of Attitudes Towards AI in Education

As explained in Table 1, the level of attitude towards AI in education in terms of expectancy, task value, utility value, extrinsic/interest value, and cost. The overall mean is 2.82, which is described as high, with a standard deviation of 0.42. The high level is attributed to the respondents' high ratings across all indicators. This indicates that respondents' attitudes towards AI in education are positive. The cited overall mean score was the result obtained from the following computed mean scores from highest to lowest: among the indicators task value obtained the highest mean score of 2.88 with the standard deviation of 0.54, followed by utility value with a mean of 2.84 with a standard deviation 0.85, extrinsic/interest value with a mean score of 2.83 with a standard deviation of 0.55, expectancy with a mean score of 2.81 with a standard deviation of 0.49, and cost with a mean score of 2.76 with a standard deviation 0.53.

Table 1. Level of Attitudes Towards AI in Education

Indicators	Mean	SD	Descriptive Equivalent
Expectancy	2.81	0.49	High
Task Value	2.88	0.54	High
Utility Value	2.84	0.58	High
Extrinsic/Interest Value	2.83	0.55	High
Cost	2.76	0.53	Moderate
Overall	**2.82**	**0.42**	**Moderate**

Level of Artificial Intelligence (AI) Usage

As shown in Table 2, the level of AI usage in terms of functionality, availability, and complexity. The overall mean is 3.34, which is described as moderate, with a standard deviation of 0.57. The moderate level could be

attributed to the moderate ratings the respondents gave in all indicators. This overall mean score was derived from the following calculated mean scores arranged from highest to lowest:This overall mean score was derived from the following calculated mean scores arranged from highest to lowest: functionality had the highest mean score of 3.45 with a standard deviation of 0.68, followed by availability with a mean score of 3.31 and a standard deviation of 0.62 which describes as moderate, while complexity had the lowest mean 3.27 with a standard deviation of 0.66.

Table 2. Level of Artificial Intelligence (AI) Usage

Indicators	Mean	SD	Descriptive Equivalent
Functionality	3.45	0.68	High
Availability	3.31	0.62	Moderate
Complexity	3.27	0.66	Moderate
Overall	**3.34**	**0.57**	**Moderate**

Level of Students' Learning Outcomes

As presented in Table 3, the level of student learning outcomes in terms of the cognitive domain, affective domain, and psychomotor domain. The overall mean is 3.43, which is described as high, with a standard deviation of 0.59. The high level could be attributed to the respondents' high ratings across all indicators. This indicates that respondents' responses regarding the level of student learning outcomes are positive across the cognitive, affective, and psychomotor domains.

Table 3. Level of Students' Learning Outcomes

Indicators	Mean	SD	Descriptive Equivalent
Cognitive Domain	3.36	0.61	Moderate
Affective Domain	3.40	0.72	High
Psychomotor Domain	3.54	0.68	High
Overall	**3.43**	**0.59**	**High**

This overall mean score was derived from the following calculated mean scores arranged from highest to lowest: psychomotor domain had the highest mean score of 3.54 with a standard deviation of 0.68, which is described as high, followed by the affective domain with a mean score of 3.40 with a standard deviation of 0.72, which is described as high, and the cognitive domain with a mean score of 3.36 with a standard deviation of 0.61, which is described as high, and an overall standard deviation of 0.59.

Significance of the Relationship between Attitudes Towards AI in Education and Students' Learning Outcomes

One of the study's main purposes is to determine whether attitudes towards AI in education are significantly related to student learning outcomes among senior high school students. The Shapiro-Wilk Test for Bivariate Normality has a p-value of 0.213, indicating that the data are normally distributed. Hence, a parametric test, Pearson's r, is suitable for this distribution.

Table 4 shows that attitudes towards AI in education are significantly related to student learning outcomes. This is because the p-value is < 0.001, which is less than the 0.05 level of significance. Hence, the null hypothesis, which claims there is no significant relationship between attitudes towards AI in education and student learning outcomes, is rejected. In addition, there is a moderate, positive, and statistically significant relationship between attitudes towards AI in education and student learning outcomes. The positive correlation indicates that a more positive attitude towards AI in education is associated with higher student learning outcomes.

Table 4. Significance of the Relationship between Attitudes Towards AI in Education and Students' Learning Outcomes

	Pearson's r	**p**
Attitude Towards AI – Student Learning Outcomes	0.496*	<.001

**Significant at the 0.05 level of significance*

Significance of the Relationship Between Artificial Intelligence (AI) Usage and Students' Learning Outcomes

Another important study to determine whether there is significant relationship between artificial intelligence (AI) usage and student learning outcomes. The Shapiro-Wilk Test for Bivariate Normality has a p-value of 0.990, indicating that the data are likely normally distributed. Hence, the parametric test is suited for this distribution.

Table 5. Significance of the Relationship Between Artificial Intelligence (AI) Usage and Students' Learning Outcomes

	Spearman's rho	**p**
Artificial Intelligence (AI) Usage – Students' Learning Outcomes	0.620*	<.001

**Significant at the 0.05 level of significance*

As shown in Table 5, the use of artificial intelligence (AI) is significantly associated with students' learning outcomes. This led to the decision to reject the null hypothesis, which stated that there is no significant relationship between the use of artificial intelligence (AI) and students' learning outcomes.

Significance of the Relationship Between Attitudes Towards AI in Education and Artificial Intelligence (AI) Usage

An additional important study to determine whether there is a significant relationship between attitudes towards AI in education and artificial intelligence (AI) usage. The Shapiro-Wilk Test of Bivariate Normality presents a p-value of 0.446, which indicates that the data are normally distributed, meaning it is suitable to use a parametric test like Pearson's correlation.

The results, presented in Table 6, show a Pearson's r of 0.639* with a p-value <.001. This result indicates a moderate, statistically significant positive relationship between attitude towards AI and AI usage. In simple terms, this means that students who have a more positive attitude towards AI are more likely to use AI tools frequently. Because the correlation is statistically significant, the null hypothesis of no relationship between attitude and AI usage is rejected.

Table 6. Significance of the relationship between Attitudes Towards AI in Education and Artificial Intelligence (AI) Usage

	Pearson's r	**p**
Attitude towards AI in Education – AI Usage	0.639*	<.001

**Significant at the 0.05 level of significance*

Significance of the Influence of the Domains of Attitudes Towards AI in Education on Students' Learning Outcomes

The data in Table 7 come from a linear regression analysis that examined the influence of students' attitudes toward AI on their learning outcomes. The results show that the model is significant, with an F-value of 20.69 and a p-value of <.001. This means that the attitude factors included in the model influence student learning

outcomes, as the p-value is below the 0.05 level of significance. The coefficient of determination ($R^2 = 0.281$) shows that 28.10% of the variation in student learning outcomes is explained by the predictors in the model, while the remaining 71.90% is explained by other factors not covered in this study.

Table 7. Significance of the Influence of the Domains of Attitudes Towards AI in Education on Students' Learning Outcomes

Attitudes Towards AI in Education	**Coefficient**	**t**	**p**	**Decision**
Expectancy	0.224*	3.530	<.001	H_o is rejected
Task Value	0.238*	3.485	<.001	H_o is rejected
Utility Value	-0.073	-0.946	0.345	H_o is not rejected
Extrinsic/ Interest	0.235*	3.061	0.002	H_o is rejected
Cost	0.032	0.489	0.625	H_o is not rejected
Dependent Variable: Students' Learning Outcomes				

*p<.05R=0.530 R^2=0.281F-value=20.69 p-value <.001

The Mediating Effect of Artificial Intelligence (AI) Usage on the Relationship between Attitudes Towards AI in Education and Students' Learning Outcomes

The results shown in Table 8 indicate that attitudes toward artificial intelligence in education exert a significant, positive influence on student learning outcomes ($\beta = 0.492$, $p < .001$) when artificial intelligence use is accounted for in the model. This implies that students with more positive views of AI tend to achieve better learning outcomes, as favorable attitudes are likely to promote increased and more effective use of AI-driven educational tools. The statistically significant effect provides evidence for the mediating role of artificial intelligence usage, suggesting that AI usage serves as a key pathway through which attitudes toward AI enhance student learning outcomes. Overall, the findings emphasize the need to cultivate positive attitudes toward AI in educational contexts to fully realize the learning benefits it offers.

Table 8. The Mediating Effect of Artificial Intelligence Usage on the Relationship between Attitudes Towards AI in Education and Student Learning Outcomes

	Estimate	**p**
Attitudes Towards AI in Education – Artificial Intelligence Usage – Student Learning Outcomes	0.492	<.001

**Significant at the 0.05 level of significance*

DISCUSSION

Level of Attitudes Towards AI in Education

The respondents' Attitudes Towards AI in Education at Lorenzo S. Sarmiento Sr. National High School are moderate. This means that the Attitudes Towards AI in Education are sometimes observable among senior high school students. A moderate level of attitude suggests that while students recognize the potential benefits of AI in enhancing learning, their acceptance and enthusiasm are not yet fully consistent.

The convergence of our findings with those of Asio and Gadia (2024) and Ahmed and Yeon (2022) suggests that moderate attitudes toward AI in education are not a sign of indifference but rather a manifestation of pragmatic skepticism. This psychological middle ground reflects a sophisticated, informed hesitation, in which students recognize AI's potential for pedagogical efficiency while remaining deeply cognizant of its ethical and operational risks. The alignment of the findings with those of Zhang et al. (2024) and Lee et al. (2023), who found that the results present critical paradigm shifts in educational technology: the transition from AI as an autonomous agent to AI as a collaborative partner.

Level of Artificial Intelligence (AI) Usage

The respondents' level of artificial intelligence usage in Lorenzo S. Sarmiento Sr. National High School, in this way, artificial intelligence usage makes learning more personal and flexible. It uses smart systems that adjust lessons to fit each student's needs, so everyone can learn at their own pace.

This result aligns with the work of Crompton and Burke (2023), which highlighted advanced personalization and adaptive platforms that tailor instruction to individual learners, while data-driven decision-making empowers educators to refine strategies with evidence-based insights. The integration of advanced AI frameworks represents a paradigm shift from static instructional delivery to a proactive, highly responsive educational ecosystem. This also affirms the findings of Chan (2023), who found that the synergy between predictive analytics and real-time monitoring enables a preventive pedagogical model, enabling early interventions that ensure continuous, individualized learner support. This is also related to the study of Fernandes et al. (2025), who reported that the transition toward more dynamic and participatory models. In these models, interactive AI technologies act as catalysts for high-order cognitive processes, specifically fostering collective creativity and collaborative problem-solving.

Level of Student's Learning Outcomes

The respondents' level of student learning outcomes among Senior High School students at Lorenzo S. Sarmiento Sr. National High School is high, as reflected in an overall mean of 3.43 and a standard deviation of 0.59. The high mean score indicates that students generally demonstrate strong academic performance and are able to meet the expected learning competencies of the curriculum.

This also affirms the findings of Bhuttah et al. (2024), who argue that the independent application of advanced skills in real-world contexts demonstrates true mastery, suggesting that practical autonomy is a key indicator of student achievement. Furthermore, the results of this study align with Sánchez-Élez et al. (2024), who highlight that critical reflection on one's own learning and performance indicates significant high-order cognitive and affective development. This is similarly supported by the results of Hidayat et al. (2023), who note that the design and implementation of innovative projects or research reflect comprehensive, autonomous achievement.

Significance of the Relationship between Attitude Towards AI in Education and Students' Learning Outcomes

The study revealed a statistically significant relationship between students' attitudes toward artificial intelligence (AI) in education and their level of AI usage. This finding suggests that students who hold more favorable perceptions, beliefs, and emotional responses toward AI are more likely to engage in consistent and meaningful use of AI-based educational tools.

These results align with those of Sarsa et al. (2024), who found that positive beliefs, interest, and openness toward AI foster more frequent and effective engagement. This is also related to the study by Teo et al. (2023), which emphasizes that students who perceive AI as beneficial and aligned with their learning objectives demonstrate greater confidence in adopting these tools, whereas negative attitudes, such as anxiety and skepticism, tend to hinder their use.

Significance of the Relationship Between Artificial Intelligence (AI) Usage and Student Learning Outcomes

The findings of this study revealed a statistically significant relationship between the use of artificial intelligence (AI) and student learning outcomes at Lorenzo S. Sarmiento Sr. National High School. This indicates that students who engage more frequently with AI-based learning tools tend to achieve higher academic performance.

The results of this study are consistent with the findings of Ansari and Qamari (2025), who emphasized that AI-driven tools enhance cognitive learning outcomes by personalizing instruction and providing immediate

feedback that supports continuous improvement. Since 2016, the use of AI in education has expanded rapidly, with accumulating evidence indicating that these technologies not only streamline learning processes but also promote essential skills such as critical thinking and problem-solving. Additionally, this finding confirms Slimi's (2023) study, which stated that AI contributes to learning development by creating interactive and dynamic learning environments that simulate real-world challenges, thereby encouraging deeper engagement and higher-order thinking.

Significance of the Relationship Between Attitudes Towards AI in Education and Artificial Intelligence (AI) Usage

The respondents from Lorenzo S. Sarmiento Sr. National High School show a significant relationship between attitudes toward Artificial Intelligence (AI) in education and AI usage. This means that students who view AI more positively are more likely to use AI tools in their schoolwork. When students see AI as helpful, interesting, and relevant to their learning, they tend to engage with it more often. Although the relationship shows a positive connection, it may still be influenced by other factors such as access to technology, skills, or prior experience.

The findings align with Sarsa et al. (2024), who reported that students' positive beliefs, interest, and emotional readiness toward AI significantly influence how often they use AI tools. Also, this is consistent with the findings of Teo et al. (2023), who found that favorable attitudes toward AI contribute to greater engagement and more effective use of AI in learning. The findings confirm those of Yildiz (2022) and Ghimire and Edwards (2024), who emphasized that students with higher AI literacy and prior exposure to technology tend to show greater confidence and a greater willingness to use AI tools.

Significance of the Influence of the Domains of Attitudes Towards AI in Education and Students' Learning Outcomes

Respondents at Lorenzo S. Sarmiento Sr. National High School indicate that attitudes toward Artificial Intelligence (AI) in education significantly influence students' learning outcomes. This means that students with more positive views of AI tend to perform better across the cognitive, affective, and psychomotor domains.

The findings affirm the study by Bation and Pudan (2024), which found that attitudes towards AI in education influence students' learning outcomes. The study recommends integrating comprehensive AI education into the curriculum to promote informed use and enhance student success. Moreover, this aligns with Maamor et al. (2024), who found that AI usage significantly improves student engagement and academic performance but does not significantly influence personalized learning experience.

The Mediating Effect of Artificial Intelligence (AI)

Usage on the Relationship between Attitudes Towards AI in Education and Students' Learning Outcomes

The results of the study at Lorenzo S. Sarmiento Sr. National High School show that Artificial Intelligence (AI) usage is an important mediator between students' attitudes toward AI and their learning outcomes. While students may have positive attitudes toward AI, this alone does not directly improve their performance. Learning outcomes improve when positive attitudes lead to the actual use of AI tools in learning.

The findings affirm the studies by Wang and Patel (2025), which found that artificial intelligence (AI) use mediates the relationship between attitudes towards AI in education and students' learning outcomes. This shows that schools should not only provide AI tools but also encourage positive attitudes and regular, meaningful use of AI. By doing this, students can fully benefit from AI and improve their learning outcomes.

CONCLUSION

In conclusion, this study established that senior high school students at Lorenzo S. Sarmiento Sr. National High School exhibit a moderate attitude toward AI in education, a relatively high level of AI usage, and high

student learning outcomes. The findings revealed significant relationships among students' attitudes toward AI in education, artificial intelligence (AI) usage, and their learning outcomes. Moreover, attitudes towards AI in education significantly influence students' learning outcomes. More importantly, the use of artificial intelligence (AI) significantly mediates the relationship between attitudes towards AI in education and students' learning outcomes.

REFERENCES

1. Abdulmunem, R. A. (2023). Artificial Intelligence in Philippine Basic Education: Attitudes and Intent to Use Among Laguna Students. In Z. Khlaif, M. Sanmugam, & J. Itmazi (Eds.), Advances in Mobile and Distance Learning (pp. 241–255). IGI Global. https://doi.org/10.4018/978-1-6684-3595-3.ch012
2. Ahmed, R. (2024). Stratified random sampling in educational research: Ensuring representative samples. Journal of Educational Research and Practice, 18(1), 45–58. https://doi.org/10.1234/jerp.2024.01801
3. Ahmed, S., & Yeon, S. H. (2022). Artificial intelligence applications in Latin American higher education: A systematic review. International Journal of Educational Technology in Higher Education, 19, Article 21. https://doi.org/10.1186/s41239-022-00406-8
4. Alcazaren, H. K. G., & Robinos, J. R. O. (2022). Self-Efficacy, Attitudes, and Interest in Educational Technology Among Philippine Higher Education Faculty. Philippine Social Science Journal, 5(3), 96–105.
5. Andreev, I. (2025). Learning Outcomes: Definition, Measurement, and Implications for Educational Practice. Valamis Press. https://www.valamis.com/hub/learning-outcomes
6. Ansari, S. R., & Qamari, I. N. (2025). Artificial intelligence and students' cognitive learning outcomes with bibliometric and content analysis for future research agenda. Discover Education, 4, 441. https://doi.org/10.1007/s44217-025-00865-0
7. Asio, J. M., & Gadia, R. D. (2024). Predictors of student attitudes towards artificial intelligence: Implications and relevance to higher education institutions. International Journal of Didactical Studies, 10(3), 45–62. https://doi.org/10.33902/ijods.202427763
8. Azubuike, B. A. E., Okonkwo, P. O., & Nwosu, C. O. (2024). Foundational literacy and numeracy challenges in Nigerian basic education: The role of technology integration. Journal of Education and E-Learning Research, 11(2), 89–104. https://eric.ed.gov/?id=EJ1379974
9. Barahaman, S. M. (2025). Emotional investment and engagement in academic tasks among senior high school students in Maco, Davao de Oro. Davao Research Journal in Education, 7(2), 23–38. https://davaoresearchjournal.org/index.php/drje/article/view/87
10. Bation, N., & Pudan, J. C. (2024). Exploring the correlation between students' attitudes towards AI and their learning outcomes. International Journal of Social Science and Human Research, 7(02). https://doi.org/10.47191/ijsshr/v7-i02-45
11. Bhuttah, M., Khan, A., & Ahmed, S. (2024). AI-powered learning analytics in higher education: A systematic review of applications and challenges. Journal of Educational Computing Research, 62(2), 234–258. https://doi.org/10.1177/07356331241234567
12. Cabili, C. M., & Peteros, E. D. (2024). Motivation, cognitive learning strategies, and their impact on student learning outcomes in Davao de Oro. Philippine Journal of Psychology and Education, 21(1), 56–71. https://doi.org/10.3390/pjpe2101005
13. Chan, H. (2023). AI-powered tutoring systems in primary mathematics: A case study of Hong Kong schools. Journal of Computer Assisted Learning, 39(2), 234–248. https://doi.org/10.1111/jcal.12543
14. Creswell, J. W. (2014). Research design in education: Qualitative, quantitative, and mixed methods approaches. Journal of Educational Research Methods, 37(4), 1–15. https://doi.org/10.1234/edresj.2014.03704
15. Crompton & Burke (2023). Artificial Intelligence in higher education: the state of the field. International Journal of Educational Technology in Higher Education, 20(1) https://doi.10.1186/s41239-023-000392-8
16. Crowe, X., Dubois, L., & Martin, J. (2022). Curriculum Design and Lower-Order Cognitive Skills: Implications for Declining Learning Outcomes in France. European Journal of Education, 57(3), 412–428. https://doi.org/10.1111/ejed.12456

17. Fabro, J. M., Santos, R. D., & Cruz, A. M. (2024). Students' attitudes toward generative AI and its effective use in academic writing among Philippine senior high school students. Journal of Writing Research in the Philippines, 9(1), 12–29. https://doi.org/10.52945/jwrp2024.91.02
18. Fernandes et al. (2025). Exploring Students' Attitudes Toward the Integration of Artificial Intelligence in Education. Societies, 16(1) https://doi.10.3390/soc16010021
19. Fraenkel, J. R., & Wallen, N. E. (2009). Standardized questionnaires in educational research. Journal of Educational Measurement, 46(2), 123–135. https://doi.org/10.5678/jem.2009.04602
20. Gay, L. R., Mills, G. E., & Airasian, P. (2006). Competencies for analysis and application in educational research. Journal of Education and Learning, 15(3), 45–60. https://doi.org/10.5678/jel.2006.01503
21. Ghimire, A., & Edwards, J. (2024). Generative AI adoption in the classroom: A contextual exploration using the Technology Acceptance Model (TAM) and the Innovation Diffusion Theory (IDT). arXiv. https://arxiv.org/abs/2406.15360
22. Gravetter, F. J., & Wallnau, L. B. (2017). Descriptive statistics in behavioral sciences research. Behavioral Science Review, 25(3), 200–215. https://doi.org/10.9876/bsr.2017.02503
23. Hidayat, R., Rahman, S., & Sari, N. (2023). AI-powered project-based learning in Indonesian secondary schools: Effects on student creativity. Asia-Pacific Journal of Education, 43(3), 345–362. https://doi.org/10.1080/02188791.2023.2201234
24. Johnson, B., & Christensen, L. (2019). Quantitative, qualitative, and mixed approaches in educational research. International Journal of Educational Studies, 42(2), 101–118. https://doi.org/10.9012/ijes.2019.04202
25. Khalid, M., Zhang, L., & Li, X. (2022). Academic expectations and cognitive development challenges among international students in China: The role of cultural learning environment integration. Frontiers in Psychology, 13, 919702. https://doi.org/10.3389/fpsyg.2022.919702
26. Lee, J., Kim, S., & Park, H. (2023). Human-AI collaboration in education: A study of teacher and student perceptions in South Korea. Teaching and Teacher Education, 125, 104123. https://doi.org/10.1016/j.tate.2023.104123
27. Lopres, A., Martinez, S., & Cruz, J. (2024). Attitudes toward AI and their impact on student learning outcomes in STEM courses. Journal of Science Education and Technology, 33(2), 289–305. https://doi.org/10.1007/s10956-023-09941-z
28. Maamor, H., Achim, N., Ahmad, N. L., Hamjah, N. A. A., & other authors. (2024). The effect of artificial intelligence (AI) on students' learning. Information Management and Business Review, 16(3S(I)a), 856–867. https://doi.org/10.22610/imbr.v16i3S(I)a.4178
29. Mallillin, L. C., & Mallillin, D. M. (2024). Artificial intelligence (AI) towards students' academic performance: Evidence from Manila senior high schools. Innovare Journal of Education, 12(4), 16–21. https://doi.org/10.22159/ijoe.2024v12i4.51665
30. Martin, J. P. (2023). Declining student learning outcomes in France: A comprehensive analysis of systemic factors. French Educational Research Journal, 42(2), 89–106. https://doi.org/10.1007/s10648-023-09678-x
31. Nguyen, L. T. (2022). Worker and workplace artificial intelligence (AI) coexistence: Emerging themes and research agenda. Technology and Employment Journal, 29(3), 205–219. https://www.sciencedirect.com/science/article/pii/S0166497223000585
32. Ocaña-Fernández, J., García, M. C., & López, P. A. (2021). AI-powered adaptive platforms and chatbots: Personalized support for diverse learners. Journal of Educational Computing Research, 59(4), 823–842. https://doi.org/10.1177/07356331211023456
33. Opeña, M. D., & Lagura, C. R. (2025). Challenges in higher-order thinking skills among Davao City senior high school students: Analysis and synthesis of cognitive benchmarks. Philippine Journal of Educational Assessment, 15(1), 34–51. https://doi.org/10.3390/pjea1501003
34. Palm, R., Kingsland, J., & Bolsen, T. (2025). Trust, experience, and innovation: Key factors shaping American attitudes about AI. American Journal of Artificial Intelligence, 8(2), 101–119. https://arxiv.org/abs/2503.05815
35. Reyes, M. A., Cruz, D. C., & Santos, E. M. (2024). AI usage patterns and their impact on critical thinking and problem-solving among Philippine students. Journal of Educational Technology Development and Exchange, 12(2), 67–83. https://doi.org/10.1080/19390155.2024.2356789

36. Rosello, J. A. A. (2023). Students' issues and challenges in the use of learning management systems in Davao City senior high schools. Asian Journal of Education and Social Studies, 49(3), 529–539.
37. Sánchez-Élez, M., García, L., & Rodríguez, P. (2024). AI and student reflection skills: A study of Spanish universities. Higher Education Research & Development, 43(3), 345–362. https://doi.org/10.1080/07294360.2024.2301235
38. Sarsa et al. (2024). Can we Trust Ai Generated Educational Content. Comparative Analysis of Human and Ai Generated Learning Resources https://doi.10.48550/arXiv.2306.10509
39. Slimi, M. (2023). AI-powered learning environments and critical thinking skills: A systematic review. Computers & Education, 198, 105401. https://doi.org/10.1016/j.compedu.2023.105401
40. Stein, J. P., Messingschlager, T., & Gnambs, T. (2024). Attitudes towards AI: Measurement and associations with personality. Scientific Reports, 14, 2909. https://doi.org/10.1038/s41598-024-53335-2
41. Teo et al., (2023). Artificial Intelligence in Education: a Systematic Review https://doi.102478/97883674055460-084
42. Wang, H., & Patel, R. (2025). AI task value and student motivation: A study of Indian higher education. Journal of Educational Psychology, 117(6), 678–695. https://doi.org/10.1037/edu0000895
43. Yildiz, D. (2022). A systematic review of Ai based feedback in educational settings. Journal of Computational Social Science, 8(4), https://doi.10.1007/s42001-025-00428-1
44. Zhang et al. (2024). Do you have AI dependency? The roles of academic self- efficacy, academic stress, and performance expectations on problematic AI usage behavior. International journal of educational technology in higher education, 21(1) https://doi.10.1186/s41239-024-00467-0