Journal for Educators, Teachers and Trainers
The PROFESIOLab electronic, peer-reviewed, open-access Magazine

ISSN 1989-9572

DOI: 10.48047/jett.2025.16.06.10

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Journal for Educators, Teachers and Trainers, Vol.16 (6)

https://jett.labosfor.com/

Date of reception: 02 June 2025

Date of revision: 01 July 2025

Date of acceptance: 05 Aug 2025

Elicel D. Baylon1*Leomar S. Galicia2,* (2025). TEACHERS' UTILIZATION OF AI, PEDAGOGICAL PRACTICES AND STUDENTS' COLLABORATIVE LEARNING.
Journal for Educators, Teachers and Trainers, Vol.16 (6) 152-173

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TEACHERS' UTILIZATION OF AI, PEDAGOGICAL PRACTICES AND STUDENTS' COLLABORATIVE LEARNING

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Abstract

Teachers are increasingly utilizing AI in various ways, such as conducting research, generating lesson plans, summarizing information, and creating classroom materials. This adoption of AI by teachers is seen as having a positive impact on the future of education, though some challenges remain. Teachers' utilization of AI in education is growing, with many using the technology for tasks such as research, generating lesson plans, summarizing information, and creating classroom materials. Additionally, AI is changing how students learn, with AI-integrated tools becoming a bigger part of the school experience. This study determines teachers' utilization of artificial intelligence (AI), pedagogical practices, and students' collaborative learning in three private higher education institutions (HEIs) in the City of Dasmarinas, Cavite, Philippines. The researchers used correlation study to know the relation among the teachers' utilization of AI and their pedagogical practices and how it facilitates collaborative learning among students. The findings of the study revealed that teacher-respondents highly utilized and perceived AI as highly beneficial and effective in their roles as educators. They strongly agree that AI technologies have the potential to improve educational outcomes and support educators in various ways. Moreover, they believe in the positive impact and importance of collaborative learning for students. On the other hand, the level of utilization of AI increases when they tend to adapt it on their pedagogical practices. Moreover, the integration of AI technologies in education impacts on how teachers approach teaching and learning processes. More so, there is no strong association between the use of AI technologies by teachers and the collaborative learning outcomes of students. This is because other factors or variables may be influencing the level of collaborative learning among students, independent of the utilization of AI by teachers.

Keywords: Artificial Intelligence, pedagogical practices, collaborative learning

Introduction

In the era of rapid technological progression, Artificial Intelligence (AI) has emerged as a transformative force that permeates various domains of human activity, including education. It has been a topic of growing interest and investigation in various fields, including higher education. Artificial intelligence applications are important in the fields of life, but they are more important for educational institutions and universities, which represent a great necessity that cannot be dispensed with, as universities today are no longer limited to education, but rather have become an essential part of the system of sustainable development in societies, as it stresses (Morín, 2018) the mission of universities today exceeded the traditional function of preserving heritage, identity and education. Rather, universities today are required to keep pace with technological development through the creation of new methods of education and teaching.

In the context of education, AI has significant implications for teaching and learning. With the increasing use of technology in education, universities and other educational institutions are expected to keep up with the technological trends and provide students with the necessary skills to succeed in the digital age. AI can assist teachers in automating administrative tasks, providing personalized learning experiences, and facilitating data-driven decision-making. Furthermore, AI can help students learn more effectively by providing instant feedback, adjusting the difficulty level of learning materials, and identifying student learning styles.

Teachers play a crucial role in the effective integration of AI into education. However, there are challenges to the successful adoption of AI in schools, such as the lack of pedagogical knowledge and skills among AI developers and the profit-oriented focus of most current AI applications in education. Teachers' perspectives and experiences are essential for the successful implementation of AI in teaching and learning environments. Therefore, it's essential to understand their views, expectations, and the advantages and challenges of AI-based teaching from their perspective.

The significance of AI in education lies in its potential to transform traditional teaching and learning methods, facilitate collaborative learning, and provide teachers with the tools they need to deliver effective and personalized instruction. This introduction outlines the importance of AI in education, its applications, and the impact of AI on higher education, specifically in the context of collaborative learning and teacher's perspectives.

With AI, teachers/instructors can identify the learning styles and hard points of students and provide new avenues of teaching and support to students. (Majid, 2022). The influence of AI also permeates teaching methods, fostering more personalized and inclusive educational environments that can be accessed by learners everywhere. AI-based tools like Intelligent tutoring systems enable differentiated instruction and individualized attention, tackling the long-standing issue of student-teacher ratio in classrooms (Pal, 2023)

Hence, technology-supported pedagogical knowledge has specific knowledge and skills that teachers need to learn that help them to use technology to design materials, deliver instructions, or engage students to achieve the learning goals in specific academic domains. The knowledge about technology-related classroom management: knowledge giving teachers insight into students' reaction in a tech-infused learning environment. (Tirri,et.al. 2020)

In the context of Philippine education, University of the Philippines mentioned the need for AI to be primarily for the “public good" and to benefit Filipinos by “fostering inclusive economic growth, sustainable development, political empowerment and enhanced well-being." (Chi, 2023). There is no turning back, as the utilization of Artificial Intelligence (AI) into the Philippine educational system has catapulted scholarly discourses on the line. As the Philippine government's catapulted the National AI Roadmap and the establishment of the National Centre

for AI Research (N-CAIR), demonstrate the country's commitment to embracing AI technology as strategic directions which expected the education to tailor its curricula.

However, despite the numerous studies conducted about Integration of AI in education, limited studies were conducted that link the teachers' utilization of AI, pedagogical practices and student's collaborative learning in higher education institutions in a Philippine city.

Thus, this study aimed to determine the teachers' utilization of AI, pedagogical practices and student's collaborative learning and eventually, this study will serve as guide to higher education leaders as to the teachers' the importance of technology-supported pedagogical knowledge that help them to use technology to design materials, deliver instructions, or engage students to achieve the learning goals in specific academic domains. Likewise, it could provide data to fellow teachers on how to assist in automating administrative tasks, providing personalized learning experiences, and facilitating data-driven decision-making to achieve the goals of the institution.

Methods

Research Design. The researchers utilized a quantitative approach, specifically the descriptive-correlational design of research with the utilization of a survey questionnaire as the main tool for data gathering. This design is appropriate for collecting information without changing the environment (i.e., nothing is manipulated). It is used to obtain information concerning the current status of the phenomena, to describe what exists with respect to variables or conditions in a situation and investigate the relationship between variables (Polka, 2018). The study specifically determined the association between the teachers' utilization of AI and their pedagogical practices and how it facilitated collaborative learning among students.

Population of the Study. The participants of the study were the selected instructors from three higher education institutions in the City of Dasmariñas, Cavite, Philippines. Pre-selection criteria were based on the initial survey as to whether the respondents were using or integrating AI in the classroom or if they use it as part of teaching. This is to ensure that the respondents were reliable source of data in terms of utilization of AI, their pedagogical practices and how it facilitated students' collaborative learning.

Specifically, the respondents of the study composed of one hundred twenty-one (121) teachers from the selected private higher education institutions (PHEIs). There were sixty-six (66) teachers from the 1st HEI, seventy (70) from the 2nd HEI, and sixty-four (64) from the 3rd HEI. The total population from three HEIs was 200. Using the Raosoft calculator with 95% level of confidence and a 5% margin of error, the sample size of 121 was calculated and proportionally allocated to the three HEIs.

Instrument. The researcher utilized an adopted questionnaire from the author Acielo (2023), with her research entitled "AI in Higher Education Institutions: Its Utilization and Effect to Pedagogical Practices. The instrument used was composed of three parts. The first part is the level of utilization of teachers in AI; second is the pedagogical practices of the teacher-respondents when using AI in the classroom and the last part is the impact of AI on students' collaborative learning. The research

fully adopted the questionnaire of the above author, with the author's approval, for the purpose of the present investigation. To describe the level of utilization of AI tools by teachers and the level of collaborative learning among students, a 4-point scale was used as follows with 4 (3.25-4.00) as very high; 3(2.50-3.24) as high; 2(1.75-2.49) as low and 1(1.00-1.74) as very low. For describing, a 4-point scale was also used but with strongly agree, agree, disagree and strong disagree, respectively as verbal interpretations. 29

Data Gathering Procedure. For this descriptive-correlational research study, the questionnaire was thought as the best data-gathering tool. Prior to data gathering, the researcher secured a written permit from the administrators of the selected higher education institutions to conduct the study through the Human Resource Office. Ethics clearance was also obtained from the institutional ethics review board of the University of Perpetual Help System Laguna.

The questionnaires were sent to the respondents online with the use of Google Forms. The respondents were assured of the privacy and confidentiality of information about their identities. The respondents answered the survey questionnaire via google forms voluntarily and privately. Thereafter, the data were encoded in Excel format for statistical treatment and initial analysis.

Statistical Treatment. The following statistical tests were used in the study using the IBM Statistical Package for the Social Sciences (SPSS) Version 23: Weighted mean was used to describe the a) level of utilization of artificial intelligence b) pedagogical practices while using AI and c) students' level of collaborative learning as assessed by the respondents while the Pearson's Correlation Coefficient was used to determine the relationship between the a) level of utilization of artificial intelligence and pedagogical practices while using AI b) level of utilization of artificial intelligence and students' level of collaborative learning and c) pedagogical practices while using AI and students' level of collaborative learning.

Results and Discussion. This study determined the teachers' level of utilization of artificial intelligence, their pedagogical practices and level of student collaborative learning. Relationship between these variables was also determined along with the predictive power of utilization of artificial intelligence and pedagogical practices on student collaborative learning.

Table 1. Level of utilization of artificial intelligence

Indicators	Weighted Mean	Verbal Interpretation	Rank
1. teaching students the basic and advanced skills and assessing their present skill level, creating a guided instructional experience that helps them become proficient.	3.88	Very High	6
2. analyzing and interpreting data, enabling students to make better-informed decisions.	3.83	Very High	9

3.	plagiarism detection to maintain the academic integrity in the classroom.	3.93	Very High	1
4.	learning management systems for automating content management, tracking learner progress, and managing grades.	3.87	Very High	7
5.	classroom and student behavior management to streamline administrative tasks, gain insights into student progress and behavior, and deliver personalized instruction tailored to individual needs.	3.79	Very High	10
6.	gamification to enhance the student engagement and to provide an immersive learning experience for students.	3.85	Very High	8
7.	measuring the examination integrity as it can assist in identifying and preventing dishonest behaviors.	3.92	Very High	3
8.	Creating and supplementing content, which is through AI-powered platforms, teachers can curate a range of educational resources.	3.90	Very High	5
9.	personalizing instructions according to each student's needs.	3.92	Very High	3
10.	creating and innovating content for convenient preaching and learning.	3.92	Very High	3
	Overall Weighted Mean	3.88	Very High	

As shown in Table 1, the teacher's utilization of AI in their classroom discussions is very high with the overall weighted mean of 3.88. Specifically, results showed that AI is utilized for plagiarism detection tools to uphold academic integrity within classrooms ($\bar{x}$=3.93). Moreover, the respondents highly utilize AI in personalizing instructions according to each student's needs, creating and innovating content for convenient preaching and learning and measuring the examination integrity as it can assist in identifying and preventing dishonest behaviors ($\bar{x}$=3.92). Moreover, it was revealed that the respondents highly utilized the AI in creating and supplementing content, which is through AI-powered platforms, teachers can curate a range of educational resources ($\bar{x}$=3.90), in teaching students the basic and advanced skills and assessing their present skill level, creating a guided instructional experience that helps them become proficient (3.88), in learning management systems for automating content management, tracking learner progress, and managing grades ($\bar{x}$=3.87), in gamification to enhance the student engagement ($\bar{x}$=3.85) and in analyzing and interpreting classroom data ($\bar{x}$=3.83).Additionally, they also highly utilized it in classroom and student behavior management to streamline administrative tasks, gain insights into

student progress and behavior, and deliver personalized instruction tailored to individual needs ($\bar{x}$=3.79).

It can be inferred from the above findings that the respondents highly utilized AI in their classroom discussions, suggesting that they are highly supportive or affirming of the use of artificial intelligence in their teaching practices or educational contexts. This further connotes that they perceive AI as highly beneficial, effective, or necessary in their roles as educators. The findings of this study were supported by Hamilton (2023) in her published article in Forbes that 60% of educators use AI in their classrooms. The survey found that younger teachers are more likely to adopt these tools, with respondents under 26 reporting the highest usage rates. Teachers use AI-powered educational games more often than any other AI tools, but adaptive learning platforms and automated grading and feedback systems are also popular. Likewise, it is also supported in the study of Aldahwan, et.al. (2020) stating that AI has become a component of computers which can be taken as action support, evaluation of student and learning material. AI and related e-learning technologies play an important role in delivering intelligence-based e-learning systems and behavior-based in some instances. To integrate intelligence into learning management systems to improve the behavior of learners, different cultures, learning styles and different teaching styles are required. Techniques such as integrating intelligence. natural language processing will help LMS, where in-depth search strategies can be used to create content that illustrates a learner's actions.

However, it is contradictory to H´ebert et al., (2021) saying that it is possible to find some teachers who will jettison a new method of teaching with the new technologies and continue teaching with the old method that they are familiar with. Teachers' restiveness toward new technologies and techniques may stymie the attempt to use technology during teaching.

Table 2. Respondents' Pedagogical Practices while using Artificial Intelligence

Indicators	Weighted Mean	Verbal Interpretation	Rank
1. Using AI, I let my students focus on real-world problems and challenges using problem-solving, decision-making and investigative skills.	3.89	Strongly Agree	4
2. Encourage interactive learning using AI technologies like Chatbots	3.85	Strongly Agree	9
3. Engage students in validating the AI-generated information for syllabus-related content	3.89	Strongly Agree	4

4. Ask students to identify mistakes in AI-generated answers to syllabus-related questions.	3.93	Strongly Agree	1
5. Ask students to suggest alternative approaches to solving problems	3.87	Strongly Agree	7.5
6. Gamification is being utilized as it involves creativity and student choice, which increases engagement	3.89	Strongly Agree	4
7. I can create lessons, activities, assessments, prompts for discussion, and presentations simply by providing a short prompt with keywords using AI.	3.87	Strongly Agree	7.5
8. Collaborative learning using AI by identifying potential study groups, matching students with similar learning styles, or recommending collaborative projects based on individual strengths.	3.89	Strongly Agree	4
9. Integrate discussions about AI ethics, bias, and responsible use into the curriculum to prepare students for the ethical challenges associated with AI technologies.	3.84	Strongly Agree	10
10. Language learning apps often use AI algorithms to personalize lesson plans based on individual progress.	3.89	Strongly Agree	4
Overall Weighted Mean	**3.88**	**Strongly Agree**	

As shown in Table 2, there was a strong agreement among the respondents that they integrate the use of AI in their pedagogical practices. Specifically, the recognize that they integrate AI in asking the students to identify mistakes in AI-generated answers to syllabus-related questions ($\bar{x}$=3.93). They also utilize AI on letting their students focus on real-world problems and challenges using problem-solving, decision-making and investigative skills, in engaging students in validating the AI-generated information for syllabus-related content, in gamification that involves creativity and student choice, in collaborative learning or recommending collaborative projects based on individual strengths, and in language learning apps often use AI algorithms to personalize lesson plans based on individual progress ($\bar{x}$=3.89).

Likewise, AI is integrated in their pedagogical practices with respect to alternative approaches to solving problems, and in creating lessons, activities, assessments, prompts for discussion, and presentations simply by providing a short prompt with keywords using AI

($\overline{x}$=3.87). Moreover, AI is also highly utilized in their pedagogical approach when they encourage interactive learning using AI technologies like Chatbots ($\overline{x}$=3.85). Finally, the respondents integrated discussions about AI ethics, bias, and responsible use into the curriculum to prepare students for the ethical challenges associated with AI technologies ($\overline{x}$=3.84).

Above results imply that the respondents have a favorable perspective of how AI can improve their pedagogical practices, implying their high level of confidence in the ability of AI to enhance teaching and learning experiences. They believe that AI technologies have the potential to improve educational outcomes and support educators in various ways.

The findings support the study by Cano (2021) stating that the integration of artificial intelligence within education should be approached from a strong pedagogical approach in which not only algorithms should converge, but also emotions and appropriate values. Educators should actively change their way of thinking, explore new forms of combinations between artificial intelligence and teaching, promote the deep integration of technology and teaching, and the innovative development of education and teaching (Guo, et.al. 2019). The reformation of education and teaching in schools will break the time and space restrictions in traditional education, thus form a superhighway of information, promote fair processes in education, and make education and teaching more interesting and reasonable (Zhang, et.al 2019).

Moreover, Liu et al. (2021) argue that the continuous introduction of various artificial intelligence teaching products will restructure the education industry ecology. Education and teaching products that are based on artificial intelligence technology provide artificial intelligence education technology, tools and related services to schools and teachers. The development of artificial intelligence has provided convenience in building an intelligent learning environment, driving the digital education resource environment to an intelligent learning resource environment.

Table 3. Students' Collaborative Learning

Indicators	Weighted Mean	Verbal Interpretation	Rank
1. Students enjoy think-pair-share as it communicates their ideas to peers, consider peer responses, and share that discussion in a way that begins to synthesize an exchange.	3.76	Very High	6
2. Students are able to introduce a specific problem to other students, usually in groups, over an extended period, and require that they understand the problem and begin to propose a response or solution.	3.45	Very High	10
3. Simulations ask students to adopt roles as they perform the work of a problem-solving group.	3.74	Very High	8

4. Small group discussion is an effective strategy as it offers students the chance to interact with peers, to listen, and to teach.	3.71	Very High	9
5. Students enjoy collaborative learning platforms such as Google Classroom, Class123, ClassDojo, Schoology, Canvas, Edmodo, Blackboard and Moodle.	3.81	Very High	2
6. Use AI-driven discussion forums or chatbots to facilitate group discussions on topics related to the lesson.	3.77	Very High	5
7. Implement AI tutoring systems that adapt to individual student needs and provide personalized learning experiences.	3.75	Very High	7
8. Incorporate AI technologies into project-based learning activities where students work together to research, design, and implement solutions to real-world problems.	3.79	Very High	3.5
9. Integrate AI-driven language learning platforms that support collaborative language practice and communication.	3.86	Very High	1
10. Engage students in collaborative storytelling activities where they co-create narratives using AI-generated content	3.79	Very High	3.5
Overall Weighted Mean	3.74	**Very High**	

Table 3 shows the level of student collaborative learning with an overall weighted mean of 3.74 verbally interpreted as very high.

Specifically, the integration of AI-driven language learning platforms that support collaborative language practice and communication obtained the highest weighted mean of $\bar{x}$=3.86. Moreover, there was a strong agreement on enjoyment in the use of collaborative learning platforms such as Google Classroom, Class123, ClassDojo, Schoology, Canvas, Edmodo, Blackboard and Moodle ($\bar{x}$=3.81). The incorporation of AI technologies into project-based learning activities where students work together to research, design, and implement solutions to real-world problems and the engagement of the students in collaborative storytelling activities where they co-create narratives using AI-generated content also showed a very high level of collaborative learning ($\bar{x}$=3.79).

In addition to this, the use AI-driven discussion forums or chatbots to facilitate group discussions on topics related to the lesson fostered a very high level of collaborative learning of the students ($\overline{x}$=3.77) and the students enjoy think-pair-share as it communicates their ideas to peers, consider peer responses, and share that discussion in a way that begins to synthesize an exchange ($\overline{x}$=3.76). Moreover, a very high level of collaborative learning was shown in the implementation of AI tutoring systems that adapts to individual student needs and provide personalized learning experiences strongly agreed by the teacher- respondents that affects the level of collaborative learning of the students ($\overline{x}$=3.75). Simulations ask students to adopt roles as they perform the work of a problem-solving group ($\overline{x}$=3.74) and the small group discussion as an effective strategy to interact with peers, to listen, and to teach ($\overline{x}$=3.71). Finally, results showed that the students were able to introduce a specific problem to other students, usually in groups, over an extended period, and require that they understand the problem and begin to propose a response or solution ($\overline{x}$=3.45)

Hashim (2018) stated that artificial intelligence has already entered the education sector. Implementing artificial intelligence is a strategic and critical factor in educational development. Technology must be embraced in today's education, and teachers must incorporate technology into their students' learning. AI is increasingly permeating the education ecosystem by increasingly interacting and collaborating with students, building, and maintaining social relationships, and offering personalized instruction. This indicates that the educational field has integrated nonhuman agents as collaborative agents serving roles of tutors/teachers, assistants, advisors, and even learning peers (Lee & Kim, 2020).

Moreover, the study of Tan (2022) mentions the AI techniques support collaborative learning while Limna, et.al. (2022) mentioned that AI in education also aims to use AI to facilitate the instruction process (e.g., understanding and facilitating computer-supported collaborative learning through discourse analysis and achieving performance prediction through educational data mining), during which instructors are critical, and their acceptance of AI is vital.

Table 4. Relationship Between the Respondents' Level of Utilization of AI and their Pedagogical Practices

Variables	**Statistical Treatment** (Pearson r)	**p-value**	**Decision**	**Interpretation**
Utilization of AI and Pedagogical practices	.815 (High correlation)	.000*	Null Hypothesis Rejected	Significant

*Significant @ .01

As gleaned in Table 4, for the relationship between the respondents' level of utilization of artificial intelligence and their pedagogical practices while using AI, a Pearson r value of .815 was obtained indicating a high correlation. Meanwhile, the obtained p-value was .000 which was lower than the test of significance at .01, suggesting that there is enough statistical evidence to reject the null hypothesis. This means that the higher the level of utilization of artificial intelligence, the

better the pedagogical practices while using AI. In other words, it implies that as AI is more extensively employed in classroom, the effectiveness of teaching methods improves.

This finding is supported with the study of Ning, et.al. (2024) that says that artificial intelligence is fundamentally transforming the methods of teaching and learning. In the educational process of students and teachers, AI is considered one of the most effective tools, both within and outside the school environment. Teachers, as central figures in the educational system, are presently called upon to improve their competencies, particularly in the use of artificial intelligence for pedagogic 42 purposes, in this digital age.

Moreover, Melo (2023) said that the integration of Artificial Intelligence (AI) into the classroom has the potential to revolutionize the way students learn and teachers teach. AI algorithms can provide students with personalized feedback and recommendations, allowing for a more engaging and effective learning experience. One of the key benefits of incorporating AI into the classroom is the ability to provide students with a more personalized learning experience. AI algorithms can analyze student data and adapt to their learning styles, providing feedback and recommendations that are tailored to their individual needs and abilities. This can help to keep students engaged and motivated and can lead to improved academic performance. Another benefit of incorporating AI into the classroom is the opportunity to deepen students' understanding of this rapidly evolving technology. By incorporating AI into the curriculum, teachers can help students develop a critical perspective on this technology and prepare them for the challenges and opportunities of the digital age. Finally, incorporating AI into the classroom can also help students develop important 21st-century skills, such as problem-solving, critical thinking, and collaboration. These skills are essential for success in the digital age, and they can be developed through hands-on experience with AI tools and applications.

While some studies have found that AI can be effective in language teaching and learning (Ali, 2020), others have noted problems such as slower speed, software issues, and lower utility of feedback messages (Sidana, 2019). The lack of research on best practices for teaching AI in higher education also suggests a need for further investigation (Allen, 2021). The use of AI in education also presents challenges, such as the potential for it to worsen teaching methods. This is a topic of debate, as noted by Braiki (2020), who discusses the controversy surrounding the use of AI in teaching.

Table 5. Relationship Between the Teacher-Respondents' Level of Utilization of AI and Level of Students' Collaborative Learning

Variables	**Statistical Treatment** (Pearson r)	**p-value**	**Decision**	**Interpretation**
Utilization of AI and student collaborative learning	.715 (High correlation)	.000*	Null Hypothesis Rejected	Significant
*Significant @ .01				

For the relationship between the respondents' level of utilization of artificial intelligence and level of students' collaborative learning, a Pearson r value of .715 was obtained indicating a high correlation. Meanwhile, the obtained p-value was .000 which was lower than the test of significance at .01, suggesting that there is enough statistical evidence to reject the null hypothesis.

This means that the higher the level of utilization of artificial intelligence, the higher the level of students' collaborative learning.

The use of artificial intelligence (AI) in education has been shown to have a positive impact on students' collaborative learning. Abbas (2023) both highlight the potential of AI tools, such as intelligent tutoring systems and automated assessment tools, to enhance learning outcomes and engagement. Collaborative activities are important and effective teaching methodologies that enable active learning to improve learning outcomes. By harnessing the power of AI, educators can create dynamic and engaging learning environments that equip students with the skills and knowledge they need to excel in the modern world. However, it's imperative to strike a balance between AI-driven enhancements and the vital human touch that educators provide, ensuring that technology augments, rather than replaces, the human connection at the heart of education.

Additionally, the study of Wang (2021) emphasizes the importance of collaborative tasks and functional characteristics in the choice of AI technology, suggesting that these factors can furthe 44
enhance students' collaborative learning experiences.

However, collaborative online activities do not always improve student performance. Factor that influences the success of collaborative learning is the creation of heterogeneous groups, both in terms of cognitive resources, characteristics, and behaviours (Nijstad et al., 2002, Amendola, 2022),

In addition to this, despite the increased availability of technology in education, prior research, Bice& Tang, (2022) indicates that many teachers are not effectively using technology in ways that promote meaningful student-centered learning. As Prestridge (2017) suggests, teachers often use technology to supplement existing teaching practices and for direct instruction delivery, rather than for fostering constructivist practices and new student-centered learning ways.

Table 6. Relationship Between the Teacher-Respondents' Pedagogical Practices and Level of Students' Collaborative Learning

Variables	**Statistical Treatment** (Pearson r)	**p-value**	**Decision**	**Interpretation**
Pedagogical practices and student collaborative learning	.729 (High correlation)	.000*	Null Hypothesis Rejected	Significant
*Significant @ .01				

For the relationship between the respondents 'pedagogical practices while using AI and their students' collaborative learning, a Pearson r value of .729 was obtained indicating a high correlation. Meanwhile, the obtained p-value was .000 which was lower than the test of significance at .01, suggesting that there is enough statistical evidence to reject the null hypothesis. This means that the better the pedagogical practices while using AI, the higher the level of students' collaborative learning.

Abedi (2023) supports the claim as he reiterated that effective teaching methods underscores the significance of pedagogical approaches in fostering collaborative learning. While AI technologies can complement instructional strategies, the efficacy of collaborative learning often depends on the teacher's ability to facilitate discussions, promote critical thinking, and create a supportive learning environment.

However, findings contradict to the study of Dalalah, 2023 that the use of AI depends on what pedagogical approach to use. The research by Dalalah and Dalalah (2023) shows that the use of AI in various professions, such as medicine, can be harmful by providing erroneous positive or negative test results, leading to delays in caring for health problems or the suggestion of unnecessary procedures or therapies. Such errors can also occur in the use of AI in student assessment. This may explain the opinion of students that "AI cannot replace the teacher", but at the same time they want more AI resources to help them achieve their educational goals (Zou et al., 2020).

Table 7. Regression Analysis of Level of Utilization of Artificial Intelligence on Students' Level of Collaborative Learning

Predictor	Dependent Variable	β	R^2	ANOVA	t	p-value	Decision	Interpretation
Utilization of artificial intelligence	Students' collaborative learning	.715	.511	F=124.210	11.145	.000*	Null Hypothesis Rejected	Significant

*Significant @ .01

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Table 7 shows the predictive power of the level of utilization of artificial intelligence on students' level of collaborative learning. As indicated, utilization of artificial intelligence accounted for 51.10% (F=124.210; t=11.145) of the variability of the dependent variable, with the remaining 48.90% for other factors. Results also showed that for every one-unit increase in the utilization of artificial intelligence, there is .715 increase in students' collaborative learning. Meanwhile, the probability test showed a p-value of .000 which was lower than the significant value of .01,

suggesting that there is enough statistical evidence to reject the null hypothesis. This means that the level of utilization of artificial intelligence significantly predicts students' level of collaborative learning.

The use of artificial intelligence in education, particularly in the context of collaborative learning, has been shown to significantly impact student outcomes. Nalli (2022) and Zacharis (2016) both demonstrate the potential of AI in improving learning outcomes and predicting student performance. Amendola (2022) work specifically highlights the role of AI in forming effective student groups for collaborative activities, while Zacharis uses AI to predict student success in blended learning environments. ChanLin (2012) further supports these findings, showing that students' use of learning strategies, which can be influenced by AI, significantly predicts their online learning achievement. Lastly, Wang (2021) discusses the factors influencing teachers' choice of AI technology, emphasizing the importance of collaborative tasks and functional characteristics. These studies collectively suggest that the level of utilization of AI can indeed predict students' level of collaborative learning.

Table 8
Regression Analysis of Pedagogical Practices while using AI on Students' Level of Collaborative Learning

Predictor	Dependent Variable	β	R^2	ANOVA	t	p-value	Decision	Interpretation
Pedagogical practices while using AI	Students' collaborative learning	.729	.531	F=134.768	11.609	.000*	Null Hypothesis Rejected	Significant

*Significant @ .01

Table 8 shows the predictive power of pedagogical practices while using artificial intelligence on students' level of collaborative learning. As indicated, pedagogical practices accounted for 53.10% (F=134.768; t=11.609) of the variability of the dependent variable, with the remaining 46.90% for other factors. Results also showed that for every one-unit increase in pedagogical practices, there is .729 increase in students' collaborative learning. Meanwhile, the probability test showed a p-value of .000 which was lower than the significant value of .01, suggesting that there is enough statistical evidence to reject the null hypothesis. This means that the pedagogical practices while using artificial intelligence significantly predicts students' level of collaborative learning.

Conclusions and Implications

Artificial intelligence (AI) is transforming the education landscape, offering innovative solutions to improve teaching and learning. AI-powered tools and systems are being integrated into classrooms to enhance student outcomes, increase efficiency, and provide personalized

learning experiences. This study looked into the level of utilization of artificial intelligence, pedagogical practices and level of student collaborative learning based on the perceptions of 121 randomly sampled college instructors from three private higher education institutions (HEIs) in the City of Dasmarinas, Cavite, Philippines. Relationship between these variables was also determined along with the predictive power of utilization of artificial intelligence and pedagogical practices on student collaborative learning.

Based on our findings, it can be concluded that the respondents highly utilized and perceived AI as highly beneficial and effective in their roles as educators. There was also a strong agreement that AI technologies have the potential to improve educational outcomes and support educators in various ways. Moreover, the level of student collaborative learning is very high. Test of relationship showed that the higher the level of utilization of artificial intelligence, the better the pedagogical practices while using AI and the higher the level of utilization of artificial intelligence, the higher the level of students' collaborative learning. Furthermore, the better the pedagogical practices while using AI, the higher the level of students' collaborative learning. Finally, the teachers' level of utilization of artificial intelligence and pedagogical practices are significant predictors of students' level of collaborative learning. Our findings imply that utilizing AI in the classroom can harness its great potentials to enhance teaching and learning, ultimately improving student outcomes and overall learning experience.

Based on the findings, it is recommended for higher education institutions (HEIs) to provide guidelines and regulations for the institution's stakeholders on the proper utilization, implementation and management of AI tools for teaching and learning purposes. School administrators should conduct AI training seminars for university stakeholders, including teaching and non-teaching staff, and students. This proactive initiative aims to equip participants with essential knowledge about AI concepts, tools, and platforms, enhancing their understanding of AI's potential in augmenting educational experiences. Additionally, awareness of ethical considerations related to AI usage, such as data privacy and bias, should be emphasized during the training sessions. College instructors are recommended to promote collaborative learning activities supported by AI tools to facilitate communication, knowledge sharing, and teamwork among students. Leveraging AI-powered collaborative platforms for group projects, virtual discussions, and peer feedback can enhance student collaboration irrespective of physical boundaries. They could also personalize learning content based on individual student learning patterns and knowledge levels. By tailoring educational materials using AI-driven insights, educators can optimize the learning experience, leading to enhanced student engagement and comprehension as well as continuously monitor student performance, engagement, and learning patterns to identify areas for improvement, adjust instructional strategies, and deliver targeted interventions promptly. Finally, future researchers are encouraged to investigate the role of AI in fostering collaborative learning environments, both in physical and online educational settings. Exploring how AI-driven tools and platforms can facilitate peer interaction, knowledge exchange, and teamwork among students would contribute valuable insights to the educational technology landscape.

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