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Teaching in the AI Era: Investigating the Link Between AI Literacy and AI-based Teaching in Basic Education Using TPACK

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Abstract: *This study investigated the relationship between teachers' AI literacy and their integration of AI in instructional practices within Basic Education in Pampanga. Using a descriptive correlational research design, the study involved 150 teacher-respondents selected through purposive and snowball sampling. An adapted and validated instrument was used to measure four dimensions of AI literacy: Use & Apply AI, Know & Understand AI, Detect AI, and AI Ethics. It also assessed AI-based teaching using the TPACK framework, covering Technological Knowledge (TK), Technological Content Knowledge (TCK), Technological Pedagogical Knowledge (TPK), and Technological Pedagogical and Content Knowledge (TPACK). Findings revealed that teachers demonstrated a generally high level of AI literacy and effective use of AI in pedagogy and content delivery. Statistical analysis showed a highly significant positive correlation between AI literacy and AI-based teaching, indicating that higher literacy levels correspond to more robust integration of AI tools in education. The study recommends continuous professional development focused on ethical, functional, and pedagogical aspects of AI to enhance teaching quality. It also highlights the need for institutional support and future research to expand the scope and depth of AI's role in education.*

Keywords: AI Literacy; TPACK; Basic Education; AI Integration; Teacher Professional Development

INTRODUCTION

The rapid development of Artificial Intelligence (AI) is changing many areas of people's lives, especially in education. AI has the potential to completely change how teachers teach and how students learn. As AI becomes a bigger part of the tools and programs used in schools, it is important for teachers to learn the basics about AI. This understanding, called AI Literacy, is becoming a requirement every educator needs to properly utilize.

Artificial Intelligence (AI) literacy has emerged as a key educational foundation because professionals in diverse fields are increasingly dependent on AI technologies in their practice (Ndungu, 2024). To counter this move, the demand for teachers to build professional knowledge on the integration of AI has been on the rise (Sperling et al., 2024), However, a few teachers are uncertain on how AI functions that limits their ability to integrate it effectively into teaching practices (Celik et al., 2022; Chounta et al., 2021; Chiu & Chai, 2021; Hwang et al., 2020). As Du et al. (2024) note, teachers must not only understand AI themselves but also equip the next generation with the ability to work with this transformative technology.

AI in education is regarded as a highly technical and multidisciplinary field (Hwang et al., 2020), but there are still

many teachers who lack both foundational literacy and pedagogical strategies to fully leverage its benefits. In the Philippine context, teachers are expected to keep upgrading constantly to integrate content, adapt with emerging tools, and deliver quality learning experiences (Kim et al., 2021). While AI provides numerous advantages to teaching and learning, ethical and societal aspects remain underexplored within local educational contexts (Akgun & Greenhow, 2022). Holmes and Fadel (2019) claim that understanding teachers' views and experiences is vital to the successful integration of AI in classrooms.

The research seeks to explore the correlation between the AI literacy of teachers and their capacity to integrate AI tools in higher education based on the Technological Pedagogical Content Knowledge or TPACK framework. Through the identification of the current readiness and capacity of teachers, the study serves to inform professional development initiatives and policy recommendations. As Marr (2021) observes, preparing teachers with AI literacy and technological competence is critical for optimizing the educational value of AI. Rollins (2024) also points out the necessity of core AI knowledge.

This study aims to be a resource for policymakers, school administrators, and teachers themselves, providing practical recommendations for bridging the AI research gap. Solving this problem is central to transforming the Philippine education system and making AI-enriched teaching and learning accessible to everyone. By correlating teachers' AI literacy levels with their adaptation of AI tools, this research provides actionable strategies for bridging the technological divide in education.

Review of Related Literature

Artificial Intelligence Literacy

Chiu et al. (2024) defines literacy as being about knowing (what skills), whereas competence is about using that information in a helpful way (confidence, how well). Sperling et al. (2024) mentioned that AI literacy has lately risen in today's education, boosting demands for professional knowledge among teachers. AI education in K-12 schools is a worldwide trend, however planning and implementing AI education is difficult (Chiu et al., 2024).

AI self-competence is being able to explain how AI technologies are utilized in work environments and how they impact society (Asio, 2024). While most educators are unaware of how AI works and cannot fully utilize AI in education, there is an essential need to examine teachers' aspirations to learn AI and related determinants to promote their AI learning. Nonetheless, teachers are therefore responsible for teaching the future generation about AI; hence, it is imperative that they do not only utilize it but must also understand it (Du et al., 2024). The increasing significance of AI in K-12 education has made it necessary for educators to have the abilities needed to properly teach young children about AI (Luckin et al., 2022; Wang et al., 2023). Young children must be educated about the potential of AI, and adults in higher education and beyond must possess at least a basic knowledge of AI in order to use the technology efficiently (Laupichler et al., 2022).

Artificial intelligence can help students with a variety of academic problems. Students of English as a foreign language (EFL) may improve their written work by using AI programs that create human-like prose. Hong Kong secondary school students used AI writing tools to create stories including their own words as well as AI-generated ones (Woo et al., 2024). Ahmad et al. (2021) stated that AI applications resolve barriers that hinder access to education and learning. Introducing AI into education signifies an important change from traditional teaching approaches, providing tailored learning and assistance for a variety of educational needs.

In the Philippines, the impact of AI on higher education is both inspiring and motivating. Incorporating AI into this setting requires taking into account the country's distinct technical, economic, and educational circumstances (Jala, 2025). Future educators must be knowledgeable in AI ideas, safety and security, ethics, and proper use of Al (Chan & Colloton, 2024). Research into Al literacy and teacher education curricula in the Philippines is still fairly new, although not significantly underexplored (Balahadia et al., 2023; Evangelista et al., 2023; Giray et al., 2024; Hatmanto et al., 2024). It appears that the Philippines' current teacher education program is not enough to meet these needs for its future graduates (Espinosa et al., 2023; Second Congressional Commission on Education, 2024; World Bank, 2022). Accordingly, ethical considerations in Al implementation in the Philippine educational system should be addressed through collaboration among educators, policymakers, and stakeholders, and such a step is necessary and applicable to the Philippine Al situation in terms of its education sector (Lumanlan et al,. 2025).

AI in Education

A key aspect of Artificial Intelligence in education is its ability to offer customized learning experiences. Adaptive learning systems utilize AI algorithms to assess student performance and adapt educational material to specific needs, making sure that learners are provided with personalized instruction at their own pace. Research has shown the role of AI-based educational tools in increasing engagement and academic performance (Chen, 2020).

A recent survey reveals that children aged 10 years-above are already familiar with using Generative AI tools. In many cases, students surpass educators in their familiarity with using AI to accomplish schoolwork or supporting studies inside and outside the classroom according to the UK Department for Education (2025). Reports show the impact of AI in enhancing efficiency and creativity in teaching. The key benefits of Generative AI include saving time spent on working hours by automating tasks. Creation of topics and activities is simplified with AI's assistance (UK Department for Education, 2025).

AI-enabled applications bear a strong potential to revolutionize education by predicting learning achievement through algorithms on analyzed learners' data. Tonbuloğlu (2023) stated that AI applications can provide predicted patterns of student behavior that identify students at risk of failure and suggest intervention to aid them. Educators view the silver lining on AI's capacity to assist teachers with labor-intensive tasks by automation. Auto graders, an AI-embedded application, have been used as assessment tools to check written assessments in disciplines that require mathematical computations (Holmes & Tuomi, 2022). Harry (2023) presented the benefits of incorporating AI in education as means of enhancing the self-learning pace of students by offering instant feedback on learning progress and providing language practice and academic guidance by interactive simulation of human conversation by AI chatbots. Alongside these studies, the application of AI in education calls for a national AI policy strategy which opts for using AI responsibly for productive use, and limit the abuse and destructive use. A study inferred that AI policy strategies must give attention on application of AI support in teaching, learning, and school administration (Schiff, 2021).

At the AI Pinas Research and Development Conference, the Philippines has the potential to be an AI data hub being a beacon of digitalization. The AI industry bridges the gap in education between AI skills of teaching workforce such as the development of Department of Trade and Industry (DTI) National AI Roadmap, as well as the continuous evaluation of AI initiatives to assess its impact and future investments in AI education according to DepEd Order Number 24, Series of 2022 (Estrellado, 2023; Adaptation of Basic Education Development plan 2030, 2022; DTI, 2024)

Adapting AI in Teaching

Understanding how educators adapt AI is critical to its successful implementation. Bakhadirov and Alasgarova (2023) indicated that the reason for the investigation is the ability to advance knowledge of how teachers' AI adaptation is influenced by traits, institutional support, and technological perspectives in educational environments. Their findings revealed that younger teachers are generally more inclined to embrace AI. Surprisingly, neither individual creativity nor openness of experiences played a significant role in the AI adaptation for instruction.

Nevertheless, several challenges remain. While AI holds great potential of enhancing the learning experience and school administration. Even with the current power of AI, prediction of the life of students is still difficult, thus requiring school's intervention. Centralization of AI education power poses discrimination toward marginalized sectors. This implies that AI in education must be extensively scrutinized to prepare future education from struggles in implementing AI (Selwyn, 2022).

Still, many teachers who have adapted AI into their teaching strategies report promising outcomes. They feel that using AI in the classroom gives them greater confidence and worth, which makes them quite happy about giving their students high-quality learning possibilities. This shows that there is a significant commitment to using AI technology to improve instruction resulting in improved educational results and better equipping pupils for success in the world that is becoming more digital (Umali, 2024).

Equipping teachers with AI tools

As technology tools advance, endless training is important for a better familiarity with such tools. In the rapidly changing landscape of education, the integration of AI serves as a transformative border that holds massive potential for reshaping traditional teaching methodologies (Adlawan, 2024). As AI rises far and wide in society, its acceptance in educational frameworks entails a fundamental shift in pedagogical models to adequately utilize its transformative capabilities (Bacco, 2023).

Empowering teachers with AI literacy and technological fluency is important for the full range of benefits AI offers in education (Marr, 2021). Thus, comprehensive professional development actions are essential to prepare teachers with competencies needed to grasp AI effectively (Samuel, 2023). Training to equip teachers for AI integration must be taken and should be broad and fair, addressing generalized limitations on connection to access and secure equal opportunities for all teachers (Bacco, 2023). Fostering collaborative ecosystems where teachers can share their best morals and engage in integrative communication is necessary for driving AI integration forward (Langreo, 2024).

However, AI is currently a trending topic, and limited research has been conducted on how it is being implemented in higher education in the Philippines. Introducing these technologies can be intimidating for educators, and this fear is understandable. As Pop Automation (2023) points out, the main challenge is not issues like plagiarism or unmotivated students but rather the fear of unfamiliar tools and changes.

The above-stated literature presented the need to explore the contemporary application of AI understanding in the context of education and teacher utilization which motivated the researchers to conduct the study. In line with this, the objective of this study is to explore the correlation between the level of teacher's understanding of AI and how they transfer this knowledge in practical applications of adapting AI in teaching.

Conceptual Framework

The figure represents the conceptual framework of the study that illustrates the relationship between the influence of teachers' AI literacy and adaptation of AI in teaching. The independent variable is the Teacher's AI literacy level that includes five (5) competencies: Use & Apply AI; Know & Understand AI; Detect AI; AI Ethics; Create AI (Ayson et al., 2025). The researchers sought to understand its relationship to

the adaptation of AI in teaching basic education that serves as the dependent variable that consisted of four (4) competencies represented by the Technological Knowledge (TK), Technological Pedagogical Knowledge (TPK), Technological Content Knowledge (TCK), and Technological Pedagogical and Content Knowledge (Alieto et al., 2024).

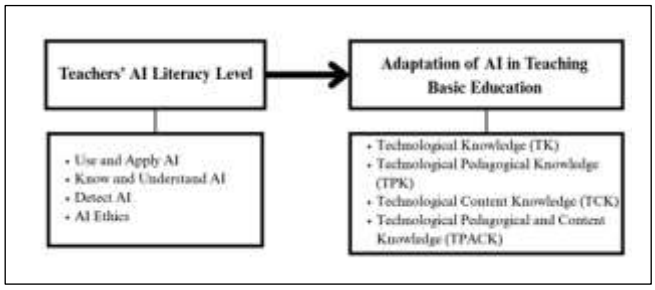

Fig. 1. *Relationship between teachers' AI literacy level to adapting AI in teaching*

Statements of the Problem

The objective of this study was to determine how the ability of teachers to adapt AI in teaching was influenced by their level of AI literacy. In accordance with this, the purpose of this study was to explore the correlation between the Level of AI Literacy and AI-based Teaching among teachers in selected schools of Basic Education in Pampanga.

Specifically, it aimed to provide answers to the following questions:

1. What is the level of AI literacy among teachers in terms of:

    1.1. Use & Apply AI;
    1.2. Know & Understand AI;
    1.3. Detect AI; and,
    1.4. AI Ethics?

2. What is the extent of using AI-based teaching in terms of:

    2.1 Technological Knowledge (TK);
    2.2. Technological Content Knowledge (TCK);
    2.3 Technological Pedagogical Knowledge (TPK); and
    2.4 Technological Pedagogical and Content Knowledge (TPACK)?

3. Is there a significant relationship between teachers' AI literacy level and their AI-based teaching?

Hypothesis

This study aimed to investigate the relationship between teachers' AI literacy level and level of AI-based teaching, and the proposed hypotheses are the following:

H_0: There is no significant relationship between teachers' AI literacy level and of AI-based teaching.

H_1: There is a significant relationship between teachers' AI literacy level and the AI-based teaching.

METHOD

Research Design

This study used the descriptive-correlational design in investigating teachers' AI literacy level and how they adapted AI-based in teaching. Creswell (2012) stated that correlation tries to explain how a variable predicts the outcome of another variable, and presents the degree of change that a variable associates to another. Descriptive approach indicates investigation of the existing phenomenon or data sets. This study describes the degree of AI literacy of teachers and it investigates its influence to AI-based teaching of elementary school teachers.

Respondents

According to Fox (2024), most statisticians recommend that a sample size of 100 is the smallest to obtain significant results. A sampling frame of 200 was used to determine and identify the respondents and computed using GPower tool that stated a minimum of 132 respondents to achieve a significant data. This frame consisted of a complete roster of all available teachers in select schools under Basic Education. The sampling frame helped ensure that the sample was representative of the teacher population in the district, and minimize sampling bias (Villegas, 2022). The respondents of the study were a hundred-fifty (150) teacher-respondents of the elementary schools in Pampanga, selected through snowball and purposive sampling. Snowball sampling, typically a small number of participants who meet the inclusion criteria are invited to participate in the study (Parker et al., 2019). Purposive sampling, being a non-probability sampling technique, involves the selection of respondents based on specific characteristics tied to the research purposes and study objectives (Prior et al., 2020). Teacher selection would be based on clear inclusion and exclusion criteria to help the sample cater to the study's research purposes effectively (Inclusion and Exclusion Criteria - Systematic Reviews - LibGuides, 2024).

The inclusion criteria ensured that the participating teachers possessed the desired characteristics necessary to contribute substantial information. These conditions were: (a) currently employed and teaching basic education in Pampanga, (b) having at least three years of teaching experience incorporating ICT in instruction, and (c) have used AI at least three times for personalized learning support. These criteria aimed to gather information from teachers who were actively working within the specified district to understand the attitudes and behavior of teachers toward AI. The teacher-respondents must have a grasp in using technology in classroom instruction and is knowledgeable in using and the concepts of generative AI.

Table 1: Demographics of the Teacher-Respondents

Demographics	n	%
Gender		
Male	18	87.85%
Female	132	12.15%
Total	**150**	**100%**
Years of service		
1 to 3 years	29	21.33%
4 to 10 years	47	31.33%
More than 10 years	67	47.33%
Total	**150**	**100%**
Public School	128	85.33%
Private School	22	14.33%
Total	**150**	**100%**

Table 1 describes that most of the respondents is saturated by 124 public school teachers. The respondents consisted of 29 teachers with 1 to 3 years of teaching experience, 47 teachers with 4 to 10 teaching experience, and 67 teachers are more than 10 years in service.

Instrument

The study utilized a structured survey questionnaire as the primary data collection instrument. The questionnaire was designed to measure the relationship between the Level of AI Literacy and AI-based Teaching. It was divided into several sections to capture demographic information, the level of AI literacy, and the extent of AI integration in instructional practices. The researchers adapted the questionnaire from the study of Ayson et al. (2025). It consisted of four (4) domains: Use & Apply AI; Know & Understand AI; Detect AI; and AI Ethics. In exploring the factors influencing adaptation of AI in education and to assess the employability of AI, another structured survey questionnaire was also adapted including four (4) domains in intelligence to integrate AI: Technological Knowledge (TK), Technological Pedagogical Knowledge (TPK), Technological Content Knowledge (TCK), and Technological Pedagogical and Content Knowledge (TPACK) (Alieto et al., 2024).

Prior to the formal data gathering, the survey questionnaires were validated by three experts on educational technology to validate the efficacy of the instrument (Yusoff, 2019). These experts possessed relevant credentials, including published research, academic background, and professional contributions to educational technology. The validation procedure included item content validity index (I-CVI). Among the 40 benchmark questions, the validators concluded 36 benchmark items with 1.0 computed I-CVI. While 4 benchmark items scored 2.0 in the computation of the I-CVI. The acceptable CVI values with three to five experts should be 1 (Polit et al., 2007). Furthermore, minor revisions with the grammar and item structure were applied in compliance to the validators' comments and suggestions. Meanwhile, 4 benchmark items were removed due to unrelated to the context to the respondents. In all, 37 items were used for the survey questionnaire. The pilot testing conducted with the teachers of the selected school under basic education prior to the formal data gathering included a small group of respondents selected to ensure the reliability and validity of the research instrument. The sample consisted of forty (40) elementary school teachers of different local. Yurdugül (2008), as cited by Bonett (2015) suggests the minimum sample size of 30 for Cronbach alpha is sufficient. The pilot testing provided an internal consistency using Cronbach's alpha with benchmark under AI literacy where: 5 items of the domain 1 (a=0.949); 4 items in domain 2 (a=0.941); 2 items of domain 3 (a=0.937), and 2 items of domain 4 (a=0.926). Reliability testing of benchmark items under AI adaptation were: 5 items of domain 1 (a=0.963); 7 items of domain 2 (a=0.958); 4 items of domain 3 (a=0.951), and 8 items of domain 4 (a=0.986). Items scoring 0.7 or higher were considered as reliable measurement instruments (Westcliff University, 2024). As observed, the items garnered 0.9 which generally considered excellent and indicates very high internal consistency.

Data Collection

The researchers sought permission from the Dean of the College of Education at a state university to conduct a study to fulfill their research requirements. After that, they sent formal letters to selected schools under Basic Education to request the approval for data collection. When permission was granted, the researchers aimed to obtain a hundred fifty teacher-respondents. After obtaining approval, the researchers distributed a consent letter to the selected respondents after the researchers obtained consent from the deans, allowing them to participate in the study and understand the expected tasks. The survey questionnaire was administered through Google Forms after consent was obtained.

Ethical Considerations

The respondents received a detailed briefing and key information about the purpose of the study. This process is aligned with the Belmont Report's principle of respecting respondents' rights by giving them enough information to make an informed decision. The principle of beneficence from the Belmont Report (1979). guided the researchers in minimizing potential harm and ensuring that the study provided benefits to the respondents. Participation in the study was entirely voluntary and based on informed consent. To protect the privacy and confidentiality of respondents all information was handled strictly in accordance with Republic Act 10173, commonly known as the Data Privacy Act. The researchers ensured anonymity by not disclosing the names or identifying details of any respondents, thereby promoting the ethical integrity of the study.

Data Analysis

The statistical tools used to analyze and interpret the results included descriptive statistics that measured teachers' understanding of AI and their level of familiarity, and inferential analysis, that examined the relationship between

teachers' AI literacy levels and their proficiency in AI adaptation.

Table 2: Mean Range, and Interpretation.

POINT	MEAN RANGE	DESCRIPTIO	INTERPRETATION
1	1.00 – 1.74	Rarely	Very Low
2	1.75 - 2.49	Sometimes	Low
3	2.50 – 3.24	Often	High
4	3.25 – 4.00	Always	Very High

Table 2 indicates the mean range and interpretation used as basis for the levels analyzed through descriptive statistics of AI literacy level and AI-based teaching where the mean range displays equal interval of 0.75 as follows: 1.00-1.74 =Very Low; 1.75-2.49 = Low; 2.50-3.24 = High; 3.25-4.00 = Very High. This method enhances the clarity of reporting and communicating the findings which is popular in educational and social science research (Boone & Boone, 2012).

Table 3: Pearson Correlation Coefficient.

Pearson Correlation Coefficient (r) Value	Strength	Direction
Greater than 0.5	Strong	Positive
Between 0.3 and 0.5	Moderate	Positive
Between 0 and 0.3	Weak	Positive
0	None	None
Between 0 and -0.3	Weak	Negative
Between -0.3 and -0.5	Moderate	Negative
Less than -0.5	Strong	Negative

Pearson correlation coefficient interprets the strength and direction about the two variables' relationship of correlation coefficient (r) value as indicated on table 3: greater than 0.5 = strong and positive; between 0.3 and 0.5 = moderate and positive; between 0 and 0.3 = weak and positive; 0 = none; between 0 and -0.3 = weak and negative; between -0.3 and -0.5 moderate and negative; and less than -0.5 = strong and negative. This inferential analysis is descriptive statistics as it summarizes data relationship in a linear and numerical form. Pearson correlation coefficient is popularly used in correlation coefficient (Turney, 2024)

RESULTS AND DISCUSSION

This chapter presents the results and discussion that were analyzed through the gathered quantitative data as aligned on the research questions of this study.

Level of AI Literacy Among Teachers

The following results presented the findings on the stage of AI literacy among teachers, based on the data collected. The analysis explored their knowledge, attitudes, and perspectives competencies related to artificial intelligence in education. These results helped bridge the gap between technological advancements and educational preparedness, offering insight into how well-equipped educators were to integrate AI into their teaching practices.

Use & Apply AI

Table 4 depicts that teachers have a high level of literacy in using and applying AI, with a grand mean of 2.77 and standard deviation of 0.83.

Table 4: Descriptive Analysis of Respondents' Level in Using & Applying AI.

Using and Applying AI	M	SD	Description
1. I can operate AI applications in everyday life.	2.79	0.98	High
2. I can use AI applications to make my everyday life easier.	2.69	1.01	High
3. In everyday life, I can interact with AI in a way that makes my tasks easier.	2.75	0.93	High
4. In everyday life, I can collaborate easily with AI applications.	2.64	0.94	High
5. I can easily communicate with artificial intelligence in everyday life.	2.96	0.88	High
Grand Mean	**2.77**	**0.83**	**High Level**

The highest level describes that teachers can easily communicate with artificial intelligence in everyday life (item 5, M = 2.96; SD = 0.88), and obtained a high level. Followed by item 1 with a mean of 2.79 (SD = 0.98) it was noted that the teachers can operate AI applications in everyday life. Item 3, presents that respondents can interact with AI every day in a way that makes their tasks easier (M = 2.75; SD = 0.93).

This suggests that teachers have a high level of ability in using and applying AI. This also means that teachers use AI mostly on a daily basis in accomplishing tasks. In supporting this, AI has motivated the ease of living by saving time and labor through automation. It provided a great impact by helping with people's responsibilities in many professions and fields (Kumar et al., 2022).

Meanwhile, the lowest mean was observed in item 4 with mean of 2.64 (SD =0.94), shows that the respondents can collaborate easily with AI applications. Followed by item 2 which presented a mean of 2.69 (SD = 1.01), in which AI applications made the everyday life of the respondents easier. These items still interpret a high level of literacy; this implies that teachers are well familiar of using AI in accomplishing tasks and efficient working.

Know & Understand AI

Table 5 describes that teachers are well versed in the concepts of AI and the capacity on the extent of its usage, with a grand mean of 3.09 and a standard deviation of 0.78, interpreted as "High Level".

Table 5: Descriptive Analysis of Respondents' Level of Knowledge and Understanding of AI.

Know & Understand AI	M	SD	Description
1. I know the most important concepts of the topic "artificial intelligence."	2.97	0.89	High
2. I can assess the limitations and opportunities of using an AI.	3.08	0.89	High
3. I can assess the advantages and disadvantages in using artificial intelligence.	3.20	0.88	High
4. I can imagine possible future uses of AI in classroom instruction and ease of working with grades and reports.	3.10	0.89	High
Grand Mean	**3.09**	**0.78**	**High Level**

Item 3 recorded the highest level which states that teachers assess the advantages and disadvantages in using AI (M =3.20, SD =0.88). Subsequently, they can also imagine the possible future uses of AI in classroom instruction alongside with the efficiency in working with grades and reports (M =3.10, SD =0.89). Respondents also display in item 2 that respondents often assess the limitations and opportunities in using AI (M =3.08, SD =0.89). Furthermore, the data highlights that demonstrated ability to assess both opportunities and limitations aligns with UNESCO's advocacy for a human-centered approach to AI in education, ensuring inclusion and equity while leveraging AI for innovation (UNESCO, 2025).

Concurrently, item 1 scored the lowest with a statement of I know the most important concepts of AI (M = 2.97; SD = 0.89) still interpreted as "High level", implying that teachers grasp how the concept of AI machine learning works.

Detect AI

Table 6 provided that teachers are AI literate in discerning devices and applications that are embedded or produced with an AI, with a mean of 2.93 and standard deviation of 0.79 that interprets "High level" of literacy.

Table 6: Descriptive Analysis of Respondents' Level in Detecting AI.

Detect AI	M	SD	Description
1. I can tell if I am dealing with an AI-based application.	2.88	0.90	High
2. I can distinguish devices that use AI from devices that do not.	2.82	0.84	High
Grand Mean	**2.93**	**0.76**	**High Level**

Item 1 revealed the highest that the statement "Can often tell when they are dealing with an AI-based application", (M =2.88; SD =0.90). Furthermore, item 2, in the increasing AI-based tools available online, they often distinguish devices that use AI from devices that do not (M = 2.82; SD = 0.84).

This table summarizes the respondents' high level of understanding of detecting AI-embedded tools. These results are supported by existing research highlighting the evolving landscape of AI detection capabilities. Studies have shown that while AI-generated content and devices have become increasingly sophisticated, user awareness and detection skills can be cultivated to recognize AI's distinctive characteristics. For instance, research underscores that although automated AI content detectors face challenges and limitations in reliability, especially with advanced models like GPT-4, human judgment and contextual understanding remain valuable for discerning AI involvement in applications and devices. This aligns with findings emphasizing the importance of domain-specific knowledge and exposure to AI behaviors, which enhance detection accuracy and reduce misclassification risks (Seigle, 2023).

AI Ethics

Summarized on table 7 are teacher's consideration of ethical evaluation in using AI is highly exercised prior to its utilization in classroom instruction, with a grand mean of 2.88 and standard deviation of 0.85, interpreted as "High level".

Table 7: Descriptive Analysis of Respondents' Ethics in AI.

AI Ethics	M	SD	Description
1. I can incorporate ethical considerations when deciding whether to use data provided by an AI.	2.95	0.89	High
2. I can analyze AI-based applications for their ethical implications.	2.80	0.88	High
Grand Mean	**2.88**	**0.85**	**High Level**

Notably, item 1 showed a highest mean stating "I can incorporate ethical considerations when deciding whether to use data provided by an AI" (M =2.95, SD = 0.89). Along with this, item 2, scoring closely, tells they often analyze AI-based applications for their ethical implications (M=2.80; SD=0.88).

This points to a high level of AI ethics among teachers. Studies have highlighted that ethical reflection on AI comprises recognizing responsibilities like transparency, fairness, privacy, and non-maleficence, alongside the capability to judge AI applications' appropriateness to avoid harm and discrimination (Stihec, 2024).

Competence in AI Integration in Teaching

The results below illustrate the findings on the stage of AI Integration in teaching based on the data collected. This analysis explores on into teachers understanding, attitudes and competencies concerning the application of AI in education settings. The understanding gained whether they know how to use AI, advancements in technology with the readiness of the

educational sector, and shedding light on how prepared teachers are to incorporate AI into their instructional methodologies

AI Adaptation on Technological Knowledge (TK)

Table 8 reveals that teachers can adapt on technological knowledge, with a grand mean of 2.83 and a standard deviation of 0.79 interpreted as "High Level."

Table 8: Descriptive Analysis of AI Adaptation on Technological Knowledge.

Indicators	M	SD	Description
1. I know how to interact with AI-based tools in daily life.	2.89	0.85	High
2. I know how to execute some tasks with AI-based tools.	2.88	0.87	High
3. I understand the basic functionalities and capabilities of various AI-based tools used in education.	2.90	0.85	High
4. I have sufficient knowledge to use AI-based tools.	2.76	0.86	High
5. I am familiar with AI-based tools and their technical capacities.	2.73	0.89	High
Grand Mean	**2.83**	**0.79**	**High Level**

The statement “I understand the basic functionalities and capabilities of various AI-based tools used in education” revealed the highest level (item 3, M = 2.90; SD = 0.85), consecutively, item 1 states that the teachers know how to interact with AI-based tools in daily life (M =2.89SD = 0.85). Item 2 closely followed with the statement “I know how to execute some tasks with AI-based tools” (M = 2.88; SD = 0.87).

The survey results indicated a lowest rating in item 5 with statement “I am familiar with AI-based tools and their technical capacities” (M =2.73, SD =0.89), then item 4 which approves that teachers have sufficient knowledge to use AI-based tools (M= 2.73, SD =0.85).

These results suggest the integration of using technological knowledge in AI-based tools. Technological Knowledge addresses the knowledge to communicate with AI-based tools and to apply basic functionalities of AI-based tools. The component seeks to assess teachers' level of familiarization with the technical capabilities of AI-based tools (Nazaretsky et al., 2022; Sohn & Kwon, 2020).

AI Adaptation Technological and Pedagogical Knowledge (TPK)

Table 9 shows the descriptive analysis of AI Adaptation on Technological and Pedagogical Knowledge with a grand mean of 2.79 and a standard deviation of 0.79, interpreted as “High Level”. This implies that respondents have the effectiveness feedback from AI-based tools of teaching and learning.

Table 9: Descriptive Analysis of AI Adaptation on Technological and Pedagogical Knowledge

AI Adaptation on Technological and Pedagogical Knowledge (TPK)	M	SD	Description
1. I can understand the pedagogical contribution of AI-based tools to my teaching field.	2.81	0.84	High
2. I can assess the effectiveness of feedback from AI-based tools for teaching and learning.	2.99	0.82	High
3. I am comfortable using AI tools to promote active learning, critical thinking, and problem-solving skills in students.	2.76	0.94	High
4. I know how to use AI-based tools to monitor students' learning.	2.65	0.92	High
5. I understand how to use AI tools to differentiate teaching strategies and to provide for the diverse needs of students and their learning styles.	2.85	0.92	High
6. I am comfortable using data collected from AI tools to inform my teaching and personalize learning pathways for students.	2.69	0.89	High
7. I have the knowledge to select AI-based tools to sustain students' motivation.	2.79	0.90	High
Grand Mean	**2.79**	**0.79**	**High Level**

The highest result was found in the statement “I can assess the effectiveness of feedback from AI-based tools for teaching and learning” (Item 2, M=2.99, SD=0.82), followed closely by “I understand how to use AI tools to differentiate teaching strategies and to provide for the diverse needs of students and their learning styles” (Item 5, M=2.85, SD=0.92). These responses emphasize that AI tools can help the respondents in integrated Technological Pedagogical Knowledge.

Hallmen et al. (2025) state that AI-generated feedback proved efficacy in teacher education by enhancing communication and reflective behavior. An important

component of TPK, pedagogical decision-making, was supported by the accurate and individualized feedback offered by AI tools in their research of aspiring teachers. As also stated by Çelik, Yıldız, and Göktaş (2024) assert that a solid understanding of Technological Pedagogical Knowledge (TPK) is essential for driving the incorporation of AI in education. According to their research, teachers' total effectiveness in AI-TPACK (Technological Pedagogical and Content Knowledge) is greatly impacted by AI-TPK. This implies that when teachers have strong pedagogical practices that are in line with the technologies they utilize, feedback from AI-based solutions is more effective.

AI Adaptation on Technological and Content Knowledge (TCK)

Table 10 gleaned that teachers are adept of AI's application searching and mastering content for instruction, with a grand mean of 2.76 and standard deviation of 0.87, that translates "High level".

Table 10: Descriptive Analysis of AI Adaptation on Technological and Content Knowledge (TCK).

AI Adaptation on Technological and Content Knowledge (TCK)	M	SD	Description
1. I can use AI-based tools to search for educational material in my teaching field.	2.87	0.93	High
2. I am aware of various AI-based tools which are used by professionals in my teaching field.	2.78	0.94	High
3. I can use AI-based tools to better understand the contents of my teaching field and adapt it to the level of the students.	2.79	0.93	High
4. I know how to utilize my field-specific AI-based tools.	2.60	0.94	High
Grand Mean	**2.76**	**0.87**	**High Level**

The highest mean was found in the statement, "I can use AI-based tools to search for educational material in my teaching field" (Item 1, M = 2.87, SD =0.93), indicating that teachers feel most comfortable using AI to locate instructional-relevant content. This was followed by "I am aware of various AI-based tools which are used by professionals in my teaching field" (Item 2, M = 2.78, SD = 0.94). Meanwhile, the third statement, "I can use AI- based tools to better understand the contents in my teaching field and adapt it to the level of the students" (Item 3, M = 2.79, SD = 0.93), reflects teachers' ability to connect AI tools with instructional needs. The lowest mean was found in the item "I know how to utilize my field-specific AI based tools" (Item 4, M = 2.60, SD = 0.94), suggesting a need for further capacity building in field-specific AI application.

These findings imply that while teachers demonstrate familiarity and comfort with general AI-based tools, there remains a gap in their ability to fully integrate field-specific AI applications. In support of this Edwards et al. (2018), stating that teachers with deeper AI knowledge are more capable of choosing appropriate AI tools for teaching. As emphasized by Popenici and Kerr (2017), such knowledge enables educators to personalize learning and deliver timely feedback.

AI Adaptation on Technological Pedagogical Content Knowledge (TPACK)

Table 11 detailed the capacity of teachers of utilizing AI towards TPACK which corresponds with a positive attitude and implies that teachers are mostly integrating the framework into their teaching practices, with a grand mean of 2.70 and a standard deviation of 0.84, interpreted as "High level".

Table 11: Descriptive Analysis of AI Adaptation on Technological Pedagogical Content Knowledge (TPACK).

AI Adaptation on Technological Pedagogical Content Knowledge (TPACK)	M	SD	Description
1. In teaching my field, I know how to use different AI-based tools for adaptive feedback.	2.65	0.92	High
2. In teaching my field, I know how to use different AI-based tools for personalized learning.	2.76	0.94	High
3. I can design engaging and effective learning activities with the help of AI.	2.71	0.94	High
4. I can integrate AI tools within a broader pedagogical framework.	2.68	0.88	High
5. I can teach a subject using AI-based tools with diverse teaching strategies.	2.75	0.93	High
6. I can teach lessons that appropriately combine my teaching content, AI-based tools, and teaching strategies.	2.68	0.91	High
7. I am willing to motivate my colleagues in the integration of AI-based tools into our teaching field.	2.65	0.90	High
Grand Mean	**2.70**	**0.84**	**High Level**

The highest mean was found in item 2 that states "In teaching my field, I know how to use different AI-based tools for personalized learning" (M = 2.76; SD = 0.94). Followed by item 5 tells teachers also indicates they teach a subject using AI-based tools with diverse teaching strategies (M = 2.75; SD = 0.93). Meanwhile, item 3, "I can design engaging and effective learning activities with the help of AI" showed a high mean of 2.71 (SD = 0.94) and was rated as "High". With a mean of 2.68 (SD; 0.91) from item 4, respondents showed that they teach lessons that appropriately combine with teaching content, AI-based tools, and teaching strategies. This closely followed by item 6, teachers integrate AI tools within a broader pedagogical framework (M = 2.68; SD = 0.88). Lastly, the lowest mean is presented in item 1 presents that teachers in their field know how to use different AI-based tools for adaptive feedback (M = 2.65; SD = 0.92), alongside with 7, states the "I am willing to motivate my colleagues in the integration of AI-based tools into our teaching files" (M =2.65, SD = 0.90).

TPACK is a vital facet of teachers' professional development. Teachers in education should have enough knowledge as well as expertise and skills to try new technologies and integrate into their teaching practices (AI-Adwan et al., 2021).

Link Between AI Literacy Level to the Level of AI Adaptation in Teaching

Table 12 shows the Correlation between Teachers' AI Literacy Level and Level of AI Adaptation in Teaching analyzed from the responses in AI literacy levels and AI-based teaching through Pearson correlation coefficient.

Table 12: Correlation between Teachers' AI Literacy Level and Level of AI Adaptation in Teaching.

	AI Integration		
	r	**p-value**	**Interpretation**
AI Literacy	**0.898**	**0.000**	**Strong Positive Correlation**
			Highly Significant

To evaluate the hypothesis, Pearson correlations were computed between the teachers' AI literacy level and the level of AI adaptation in teaching. Table 10 implies that for all of the study's variables means that there is a highly significant relationship between AI literacy and AI integration, with a p value of less than 0.01. Furthermore, the relationship is Strong Positive, with a value of r = 0.898. In line with this, the analysis suggests the rejection of the null hypothesis. This relationship implicitly suggests that when AI literacy increases, the proficiency of AI integration in teaching also increases, and vice versa. Therefore, increasing teachers AI literacy contributes to opportunities that AI will be used to better student learning and instruction delivery, rather than AI taking over teachers' responsibility. In addition to the current Information, Communication, and Technology (ICT) tools, AI offer various strategies to complement instruction such as intelligent tutoring systems (ITS), educational games, automatic assessments, smart content, and personalized learning (Fitria, 2021)

Link Between Domains of AI Literacy Level to the Domains of AI-Based Teaching

Table 13 shows the corresponding correlation of the domains of AI literacy level to the domains of AI-Based Teaching using Pearson correlation coefficient.

Table 13: Correlation between Domains of AI Literacy Level and Domains of AI-Based Teaching.

		Domains Under AI Literacy Level			
		Use and Apply AI	**Know and Understand AI**	**Detect AI**	**AI Ethics**
Domains Under AI-Based Teaching	**Technological Knowledge**	.748**	.808**	.855**	.817**
	Technological Pedagogical Knowledge	.789**	.778**	.776**	.740**
	Technological Content Knowledge	.744**	.770**	.770**	.724**
	Technological Pedagogical and Content Knowledge	.741**	.763**	.786**	.756**

Note: ** Correlation is significant at the 0.01 level (2-tailed).

The correlation between the variable AI literacy level consists of four domains: Use and Apply AI; Know and Understand AI; Detect AI; and AI Ethics, and the variable AI-Based Teaching consisting of four domains: Technological Knowledge; Technological Pedagogical Knowledge; Technological Content Knowledge; and Technological, Pedagogical, and Content Knowledge indicates a highly significant relationship and strong positive correlation across all variables ($p < 0.01$) as reflected in table 11.

In particular, Technological Knowledge noted a highest correlation with Know and Understand AI (r = 0.808), Detect AI (r = 0.855), and AI Ethics (r = 0.817), suggests that greater knowledge and confidence in the ability of operating AI reflects the connection to the increase in proficiency of applying AI in crafting instructions for teaching. This implies that supporting teachers to learn AI is advantageous to provide education to students while fitting various learning styles, and AI helps with the flexibility in adapting to different modality as supported by individual tutoring system it offers through chatbots and AI embedded applications. Holmes (2022) emphasized that due to the unpredictable development of technology and further innovations ushering rapid changes in the environment it is necessary to be competent and welcome these developments.

CONCLUSIONS, LIMITATIONS, AND RECOMMENDATIONS

This chapter presents the conclusions, limitations and recommendations of the study in exploring the correlation between the level of AI literacy and AI-based teaching of teachers, particularly in teaching basic education.

Conclusions

Relative to the research questions of the study, the conclusions outlined below were drawn:

1. The survey was conducted among the basic education teachers in Pampanga. The results indicated that the teachers embody a high level of literacy in AI through evaluation of four (4) AI literacy dimensions, namely: use and apply AI; know and understand AI; detect AI, and AI ethics.

1.1. Use and Apply AI. The indicators in this domain presented a high level of familiarity with operating AI to assist in accomplishing teacher tasks, and communicating with AI regularly, which recorded a mean of 2.76 and 2.96, respectively.

1.2. Know and understand. This domain revealed that teachers have a high level of understanding and openness toward AI. The indicator "I can assess the advantages and disadvantages of using AI" in particular collected a mean of 3.20.

1.3. Detect AI. Teachers displayed a high level of aptitude in detecting AI. They often understand if they are dealing with an AI–based application, as well as, distinguish devices that are embedded with AI.

1.4. AI Ethics. Teachers often evaluate AI by incorporating ethical considerations in using data provided by AI applications. They also usually consider whether using AI will be harmful and regard ethics when dealing with these applications.

2. Along with the survey conducted, the teachers demonstrated a generally high level of proficiency in integrating AI in aspects of teaching pedagogy, namely: Technological Knowledge (TK); Technological Content Knowledge (TCK); Technological Pedagogical Knowledge (TPK); and Technological Pedagogical and Content Knowledge (TPACK).

2.1. Technological Knowledge. In the integration of AI in teaching, the teachers demonstrate a high level of understanding in applying AI tools in education. The teachers are found to interact with AI tools regularly and often benefit from assistance in executing tasks.

2.2. Technological Pedagogical Knowledge. Concerning the science and art of teaching, it is often observed that teachers assess the efficacy of feedback for teaching and learning provided by AI. This indicator gained a mean of 2.99 (SD=0.82). Teachers acknowledge that AI is often useful in providing differentiated learning and providing instructions that could fit diverse learning styles (M=2.85; SD=0.92).

2.3. Technological Content Knowledge. In the scarcity of learning materials, the teachers often use AI to search for educational resources to support in teaching their subjects (M=2.87; SD=0.93). It is often practiced that teachers take advantage of AI to use it as a tutor to better understand the content of the subject and adapt it to the level of the students. This manner of using AI is widely observed and normalized in this profession (M=2.79; SD=94).

2.4. Technological Pedagogical and Content Knowledge. Generally, the teachers know how to use AI in crafting holistic instructions tailored to students' learning (M=2.76; SD=0.94). Teachers are competent to teach with diverse teaching strategies, effective and engaging learning activities that are designed by teachers assisted by AI. Integrating AI in teaching is implemented with a positive attitude, and encouraged to utilize AI in a broader pedagogical framework.

3. The correlation between the level of AI literacy and AI-based teaching pushed the rejection of the null hypothesis. There is a highly significant relationship between the teachers' AI literacy and AI integration. The relationship proved that when AI Literacy increases, the proficiency of AI integration in teaching also increases, presenting a positive correlation. The correlation concluded that domain of technological knowledge under AI-based teaching is greatly influenced by AI literacy of knowing AI, ethics in AI, and ability to discern or detect AI. Improvement of these domains predicts a strong relationship to a wider potential of using AI in teaching.

Limitations

The following limitations were uncovered during the process of conducting the study:

1. The study used self-report survey questionnaires where teachers assessed themselves. Their answers might be influenced by personal bias, and they might not do it in the classroom.

2. The respondents were limited to basic education teachers in Pampanga, where the generalizability of the results may be restricted to other educational levels or regions. The researchers were hindered by time restrictions and logistics that hindered a broader sampling of schools and more diverse contexts.

3. The quantitative design of the instrument, with an emphasis on closed-ended questions, constrained in-depth exploration of why and how teachers incorporate AI.

4. Due to the evolving nature of AI technologies, the results may need to be updated over time to stay relevant.

5. System-wide adoption of AI was not measured, since existing use of AI within classrooms seemed to be

primarily individual or peer-driven, as opposed to system-driven.

Recommendations

Based on the conclusions, the following recommendations were drawn:

1. To guarantee responsible and well-informed use, offer targeted training modules, seminars, or workshops for each area of AI literacy, particularly in recognizing AI and ethical use. Create measurement tools to assess AI literacy beyond self-report, such as performance-based measures and classroom observations.
2. Incorporate AI-specific content into professional development courses aligned with the TPACK framework to facilitate pedagogically sound use of AI. Foster joint lesson planning among teachers to investigate context-relevant applications of AI in teaching pedagogy and content.
3. Educational leaders and policymakers need to focus on improving teachers' AI literacy as a strategic intervention to facilitate successful AI adaptation. AI integration policies need to be put in place, and institutional support provided to complement individual efforts and amplify AI applications.
4. Future studies must broaden geographically and by education level to confirm and generalize findings.
5. Real classroom implementation experimental studies are invited to evaluate the effects on instructional effectiveness and student performance.
6. Developers need to produce intuitive, user-friendly AI tools appropriate to the educational setting, with teachers' direct involvement.
7. To measure the overall educational effect, examine the impact of AI-supported teaching on student learning behaviors, participation, and achievement.
8. Future researchers must conduct Qualitative methodology, which may be utilized to deeply explore teachers' understanding, experiences, and attitudes towards AI in education. This approach helps produce rich, contextual findings that can inform AI literacy training programs and guide effective AI adoption in classrooms.

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