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Interplay of AI Literacy, Readiness-Confidence, and Acceptance among Pre-Service Teachers in Philippine Higher Education: A Gender, Discipline, and Connectivity Perspective

Interacción de la Alfabetización en IA, la Preparación-Confianza y la Aceptación entre Docentes en Formación en la Educación Superior Filipina: Una Perspectiva de Género, Disciplina y Conectividad

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ABSTRACT

This study explores the role of artificial intelligence (AI) in teacher education, focusing on preservice teachers' preparedness for AI integration. It examined the levels of AI literacy, readiness-confidence, and acceptance among preservice teachers in Philippine higher education institutions, and investigated differences across gender, academic discipline, and internet connectivity. Using a cross-sectional survey design, data were collected from 384 preservice teachers through validated instruments that measured AI literacy, readiness-confidence, and acceptance. Analyses included descriptive statistics, independent samples t-tests, and correlation analysis. Findings revealed high readiness-confidence and moderate to high literacy and acceptance levels. Significant differences emerged, with male preservice teachers, STEM students, and those with reliable internet access reporting higher scores, particularly in readiness-confidence. Strong positive correlations among literacy, readiness-confidence, and acceptance underscored their interdependent relationship in shaping preparedness for AI integration. These results emphasize the need for tailored and inclusive AI education and training programs that address demographic and infrastructural disparities. Beyond equipping preservice teachers with skills, preparing them for AI adoption is about shaping the future of education by ensuring that tomorrow's classrooms are led by educators who are competent, confident, and capable of driving innovation, equity, and progress in a rapidly evolving digital age.

Keywords: AI Literacy; Readiness-Confidence; Acceptance; Preservice Teachers; Gender Difference; Academic Discipline; Internet Connectivity.

RESUMEN

Este estudio explora el papel de la inteligencia artificial (IA) en la formación docente, centrándose en la preparación de los futuros profesores para la integración de la IA. Se examinaron los niveles de alfabetización en IA, confianza en la preparación y aceptación entre los futuros docentes en la educación superior filipina, y se investigaron las diferencias según el género, la disciplina académica y la conectividad a internet. Mediante un diseño de encuesta transversal, se recopilaron datos de 384 futuros docentes a través de instrumentos validados que midieron la alfabetización en IA, la confianza en la preparación y la aceptación. Los análisis incluyeron estadísticos descriptivos, pruebas t de muestras independientes y análisis de correlación. Los hallazgos revelaron una alta confianza en la preparación y niveles de alfabetización y aceptación de moderados a altos. Surgieron diferencias significativas: los futuros docentes varones, los estudiantes de STEM y aquellos con acceso confiable a internet obtuvieron puntajes más altos, particularmente en la confianza en

la preparación. Fuertes correlaciones positivas entre alfabetización, confianza en la preparación y aceptación subrayaron su relación interdependiente en la configuración de la preparación para la integración de la IA. Estos resultados enfatizan la necesidad de programas de educación y formación en IA adaptados, inclusivos y sensibles al contexto que aborden las disparidades demográficas e infraestructurales. Más allá de dotar a los futuros docentes de competencias técnicas, prepararlos para la adopción de la IA significa dar forma al futuro de la educación, asegurando que las aulas del mañana estén dirigidas por educadores competentes, seguros de sí mismos y capaces de impulsar la innovación, la equidad y el progreso en una era digital en constante evolución.

Palabras clave: Alfabetización en IA; Confianza en la Preparación; Aceptación; Futuros Docentes; Diferencia de Género; Disciplina Académica; Conectividad a Internet.

INTRODUCTION

Artificial intelligence (AI) is rapidly transforming the educational landscape globally, with significant implications for how future educators are prepared to teach and engage learners in an AI-enhanced environment. [1,2,3,4,5] In the Philippines, higher education institutions responsible for training preservice teachers confront the critical task of equipping aspiring educators with the competencies necessary to integrate AI technologies effectively, ethically, and confidently in their future classrooms. [6,7,8] AI tools are increasingly becoming integral to curriculum design, instructional delivery, and administrative processes, thereby reshaping pedagogical paradigms. Understanding AI literacy, readiness-confidence, and acceptance of AI among preservice teachers is essential to informing teacher education reform and ensuring that these entrants to the profession are well positioned in the emergent digital era. [9,10,11,12]

Current scholarship foregrounds AI literacy as foundational for meaningful AI adoption, encompassing cognitive knowledge of AI concepts, technical skills, and ethical awareness. [13,14,15] Research focusing on Filipino preservice teachers reveals a landscape marked by generally positive attitudes toward AI, juxtaposed with moderate AI literacy levels and a lack of structured, formal training. [14] These findings suggest to utilize it pedagogically. Furthermore, preservice teachers identify key areas such as lesson planning and a dissonance between enthusiasm for AI's potential and actual preparedness curriculum development as the domains where the impact of AI could be most significant; however, they express concerns related to data privacy, job security, and ethical use, underscoring the need for comprehensive AI literacy and ethical instruction embedded within teacher education curricula.

The context of the Philippines presents unique challenges linked to infrastructural disparities, particularly regarding internet access, which is highly variable between urban and rural areas. [16,17,18] Such disparities have consequential effects on preservice teachers' ability to engage with AI tools effectively, influencing both their readiness and acceptance. [19,20] Previous studies affirm that internet reliability is a gatekeeper for digital technology adoption, yet research specifically probing this influence on AI literacy and acceptance among Filipino preservice teachers remains scarce. Beyond infrastructure, sociodemographic factors such as gender and academic discipline may also play a critical role in shaping how preservice teachers develop literacy, confidence, and openness toward AI.

Moreover, the extant literature often examines AI literacy, readiness-confidence, or acceptance in isolation, limiting comprehensive understanding. The complex interrelationships among these constructs, alongside sociodemographic factors such as gender and academic discipline (STEM versus non-STEM), have been underexplored in the Philippine higher education setting. Evidence from the international literature suggests that gender can influence technological confidence and that disciplinary variations affect familiarity with and openness to AI integration. [21,22] However, such intersecting influences remain an empirical gap within the Philippine preservice teacher population.

To address this gap, this study aims to conduct a nuanced comparative analysis of AI literacy, readiness-confidence, and acceptance among preservice teachers in Philippine higher education. By factoring in gender, academic discipline, and internet access reliability, this research seeks to identify the contextual and individual determinants that shape their engagement with AI technologies. The insights generated will be invaluable for guiding the design of targeted teacher education curricula, professional development initiatives, and policy interventions that are responsive to varied learner profiles and infrastructural realities.

In summary, while AI promises to revolutionize educational practices, the readiness of preservice teachers to harness its potential responsibly and effectively remains an urgent imperative. This study endeavors to illuminate critical facets of this readiness among future Filipino educators, contributing to a more inclusive, informed, and strategic integration of AI within the country's educational framework.

LITERATURE REVIEW
Artificial intelligence (AI) literacy

Artificial intelligence (AI) literacy among preservice teachers has increasingly garnered scholarly attention because of the essential role that educators play in shaping future-ready learners within rapidly evolving educational environments. AI literacy is recognized as a multifaceted competency comprising a cognitive understanding of AI concepts, technical skills, attitudes toward AI, and critical ethical awareness essential for the responsible use of AI in classrooms. [14,23] In the context of the Philippines, emerging studies reveal that while preservice teachers generally exhibit positive attitudes toward AI, their actual literacy levels remain moderate, with substantial gaps in formal training and practical experience. [14] This disconnect suggests that, despite enthusiasm, preservice teachers may not yet possess the comprehensive AI competencies required to confidently and effectively integrate AI tools into their future pedagogical practices.

Demographic variables such as gender and age play a significant role in shaping AI literacy and related readiness among preservice teachers. Research has revealed gender disparities in which male preservice teachers often report greater confidence in and familiarity with AI technologies than their female counterparts do, which aligns with the broader trends observed in digital literacy studies globally. [21,22] Age similarly influences familiarity and openness with AI, where younger preservice teachers tend to be more digitally fluent but may still require targeted development of critical ethical and pedagogical dimensions of AI literacy. [14] Internet connectivity further compounds these disparities; with notable variations in reliable access across urban and rural regions of the Philippines, preservice teachers' opportunities to engage with and practice AI tools are uneven, impacting both self-efficacy and the inclination toward digital innovation. These factors collectively underscore the need for differentiated context-sensitive AI literacy programs in teacher education.

Pedagogically, there is a growing shift toward integrating critical-reflective and participatory approaches to nurture AI literacy holistically. Studies recommend embedding AI into teacher education curricula through layered frameworks that address awareness, mechanics, ethical and social implications, and practical applications. [24,25] Pilot interventions demonstrate that combining theoretical grounding with hands-on AI tool experiences significantly enhances preservice teachers' competence and positive disposition toward AI. [26,27,28] However, challenges persist issues such as limited training opportunities, infrastructural deficits, and under addressed gender and connectivity gaps hamper the equitable development of AI literacy. [29,30] Addressing these challenges is critical to preparing a confident, ethically grounded future teaching workforce capable of leveraging AI to enrich learning in diverse Philippine educational contexts.

Artificial intelligence (AI) readiness and confidence

Artificial intelligence (AI) readiness and confidence have become pivotal concepts in higher education as institutions increasingly integrate AI technologies into teaching, learning, and professional functions. Readiness broadly encompasses educators' and students' preparedness in terms of knowledge, skills, attitudes, and motivation to adopt AI tools effectively. [22,31] Confidence, often conceptualized as self-efficacy, reflects individuals' belief in their ability to successfully use AI technologies, strongly predicting both willingness to engage with AI and sustained use. [32,33] Theoretical frameworks such as self-determination theory (SDT), social cognitive career theory (SCCT), and technology acceptance models (TAM) consistently underscore intrinsic motivation, perceived usefulness, and competence as vital antecedents of AI readiness and confidence. [34,35]

Empirical investigations reveal varied levels of AI readiness and confidence among learner groups, disciplines, and regions. For example, Olawade et al. [36] reported alarmingly low AI knowledge among Nigerian nursing students, despite high willingness to train in AI, highlighting the significant gap between motivation and competence. Similarly, Dai et al. [22] demonstrated that AI literacy alone does not suffice to predict readiness: confidence and perceived relevance mediate this relationship, with males generally exhibiting higher AI readiness and confidence scores. Specialized fields further illustrate this pattern: Wang et al. [33] reported a significant positive correlation between AI readiness, self-efficacy, and academic performance among Chinese music students, whereas Maulana et al. [34] reported that AI-based learning elevates accounting graduates' career commitment by reinforcing motivation, literacy, and confidence. These findings underscore that readiness and confidence are dependent not only on knowledge acquisition but also on the affective and motivational dimensions of learner engagement.

For educators, readiness and confidence are equally critical for effective AI integration. Through a survey of nearly 4 000 Estonian teachers, Granström et al. [31] revealed a balanced disposition characterized by openness and awareness of AI benefits that strongly forecasts readiness and the intention to adopt AI tools. However, barriers such as AI-related anxiety and a lack of targeted professional development inhibit actual integration. This resonates with insights from Kohnke et al. [32], who highlight university language instructors' need for tailored professional development that builds specific AI pedagogical skills and confidence. Among preservice teachers, Ayanwale et al. [21] argued that positive attitudes, low anxiety, and self-transcendent goals are significant predictors of readiness and engagement with AI learning, mediating their confidence. Özer-Altınkaya

et al.[37] similarly document preservice English language teachers' favorable attitudes toward AI, tempered by expressed needs for training and support to increase confidence. Furthermore, Sun et al.[35] demonstrated that four interrelated constructs—technological pedagogical content knowledge (TPACK), perceived ease of use, perceived usefulness, and self-efficacy—jointly influence preservice STEM teachers' willingness to incorporate AI, with confidence acting as a fulcrum for readiness and adoption.

Generally, the literatures highlight several recurrent themes: readiness is a multifaceted construct encompassing knowledge, attitudes, motivation, and perceived relevance; confidence or self-efficacy is a crucial mediator bridging AI literacy and sustained engagement; and professional development and institutional support are vital for cultivating both readiness and confidence, especially in domains with pronounced skill gaps or anxiety. Additionally, gender and contextual factors, including infrastructural disparities such as internet access, modulate these dimensions, underscoring the need for nuanced, inclusive strategies in higher education. These insights call for higher education policies and teacher education programs that prioritize AI literacy embedded with ethical reflection, tailor training to build confidence, and ensure equitable access to digital resources, thereby fostering a future-ready, confident academic workforce.

Artificial intelligence (AI) acceptance

Artificial intelligence (AI) acceptance among preservice teachers in higher education is a critical area of investigation, as these future educators are pivotal for successfully integrating AI technologies in classrooms and learning environments. Acceptance reflects not only the willingness to use AI tools but also the positive attitudes and behavioral intentions that underpin actual adoption. Contemporary research predominantly employs established models such as the Technology Acceptance Model (TAM) and the Unified Theory of Acceptance and Use of Technology (UTAUT) to dissect the nuanced factors influencing acceptance within educational contexts. [38,39] These models elucidate key determinants, such as perceived usefulness, perceived ease of use, attitudes, behavioral intentions, social influence, and facilitating conditions, providing a robust theoretical foundation for analyzing AI adoption among preservice teachers. [40,41]

Recent empirical studies have revealed the complexity and variability of AI acceptance among preservice teachers across diverse disciplines and cultural contexts. Perceived usefulness and ease of use remain dominant predictors, strongly influencing favorable attitudes and intentions to employ AI in educational settings. [42,43] Moreover, intrinsic motivation, hedonic factors such as enjoyment, and habitual use shape engagement, as documented among trainee teachers involved in AI-supported educational interventions and nursing students adopting AI technologies. [40,44] Psychological constructs such as technological self-efficacy and a sense of coherence further mediate acceptance attitudes by enhancing confidence and reducing anxiety related to AI adoption. [45] Ethical perception and trust have emerged as pivotal, particularly in domains requiring high-stakes decisions, ensuring that users embrace AI tools perceived as transparent and reliable. [46,47]

Significant challenges temper AI acceptance among preservice teachers, including concerns about data privacy, the accuracy of AI-generated feedback, and insufficient institutional support or training. [38,48] Generational and experiential differences also influence acceptance, with middle-aged educators often exhibiting greater intentions to use AI than younger cohorts do. [49] User segmentation studies reveal heterogeneous acceptance profiles, highlighting the influence of digital ability, subjective norms, and personal attitudes on AI adoption decisions. [50,51] These insights underscore the necessity for context-sensitive, inclusive, and ethically grounded professional development programs, as well as AI systems designed with user trust and pedagogical utility in mind. Collectively, the literature advocates for nuanced strategies to foster AI acceptance among preservice teachers, ensuring that they are equipped both cognitively and affectively to harness the transformative potential of AI in education.

Relationships among literacy, readiness-confidence and acceptance of AI in education

Artificial intelligence (AI) acceptance among preservice teachers in higher education is a dynamic and multifaceted construct that critically influences the successful adoption and integration of AI technologies in education. Research grounded in foundational theoretical models such as the Technology Acceptance Model (TAM) and the Unified Theory of Acceptance and Use of Technology (UTAUT) consistently identifies perceived usefulness, perceived ease of use, attitudes toward technology, social influence, facilitating conditions, and behavioral intention as robust predictors of AI acceptance. [38,39,52] These models integrate psychological factors such as technological self-efficacy and a sense of coherence, highlighting their crucial mediating role in shaping preservice teachers' attitudes and willingness to adopt AI tools in their future classrooms. [45] Moreover, ethical perceptions and trust have been increasingly acknowledged as pivotal determinants affecting acceptance, especially in domains requiring high-stakes decisions and transparent AI applications. [46,47]

Empirical studies elucidate the complex interplay of determinants shaping AI acceptance among preservice teachers across various educational contexts. Perceived usefulness and ease of use consistently emerge as the strongest influences on behavioral intentions to use AI, reinforcing the notion that educators are more likely

to accept AI technologies when they find them relevant and user friendly.[43,53] Attitudinal and motivational factors, such as intrinsic motivation and hedonic enjoyment, further shape acceptance, as evidenced in studies involving trainee teachers and nursing students.[40,44] The habitual use of AI, which reflects routine engagement and familiarity, also positively predicts acceptance, underscoring the importance of sustained exposure to AI tools in shaping usage patterns.[49,54] Self-efficacy, or confidence in managing AI technologies, anchors these relationships by fostering readiness and reducing anxiety, highlighting the value of competence-building initiatives in teacher education.[32,48] Social and cultural factors, such as subjective norms and peer influence, further modulate acceptance, revealing that preservice teachers' AI adoption behaviors are embedded within broader sociocultural ecosystems.[55,56]

Despite these advances, several barriers to AI acceptance persist among preservice teachers. Ethical concerns about data privacy, the reliability of AI-generated feedback, and limited transparency continue to temper enthusiasm, necessitating ethically grounded AI literacy education to address these issues.[38,47,57] Infrastructural challenges, such as uneven access to resources and formal training, particularly in low-resource environments such as nursing education in Saudi Arabia and academic librarianship in India, underscore the need for equitable resource distribution.[40,48] Furthermore, variations in acceptance according to generational and experiential factors suggest the need for differentiated professional development approaches that resonate with diverse cohorts within the preservice teacher population.[49] Segmenting user groups by digital ability reveals heterogeneous acceptance profiles, emphasizing that effective AI integration strategies must be tailored to address diverse readiness and openness levels.[50,51] Collectively, the literature advocates for comprehensive, inclusive, and ethically informed approaches to cultivating AI acceptance among preservice teachers, laying a foundation for sustainable and effective AI integration in education.

METHOD
Research Design
This study utilized a cross-sectional research design, an observational approach that gathers data from a defined population at a single point intime without manipulating variables. [58] The choice of this design was appropriate for examining the current state and interrelationships of artificial intelligence (AI) literacy, readiness-confidence, and acceptance among preservice teachers. Since the purpose of the study was to capture a snapshot of these constructs across different demographic groups, the cross-sectional design provided a reliable means of generating evidence without inferring causality, which is often the case in educational research.

Respondents of the Study
The respondents of the study were 384 preservice teachers enrolled in higher education institutions across the Zamboanga Peninsula, Philippines. The sample was composed of 238 females (62,0 %) and 146 males (38,0 %). With regard to academic discipline, 156 (40,6 %) came from STEM programs, while 228 (59,4 %) were from non-STEM programs. In terms of internet access, 345 participants (89,8 %) reported having reliable connectivity, whereas 39 (10,2 %) indicated that their internet access was unreliable. This variation in connectivity is significant because access to digital infrastructure directly influences preservice teachers' exposure to and readiness for AI adoption in educational practice.

Research Tool
AI literacy was measured using the scale developed by Ayanwale et al.[23], which examines domains such as knowledge, ethics, problem-solving, application, and emotion regulation. The instrument consists of multiple items rated on a six-point Likert scale (1 = Strongly Disagree to 6 = Strongly Agree) and has demonstrated strong internal consistency, with Cronbach's alpha values ranging from 0,70 to 0,87 across its subscales.

To capture preservice teachers' readiness and confidence toward AI integration, the instrument of Ayanwale et al.[9] was used. The readiness subscale comprised five items, while the confidence subscale consisted of four items, both rated on a seven-point Likert scale (1 = Strongly Disagree to 7 = Strongly Agree). Reliability analysis showed excellent internal consistency, with Cronbach's alpha values of 0,85 for readiness and 0,88 for confidence.

AI acceptance was measured using the Acceptance of Artificial Intelligence Scale adapted from Zhang et al.[20], which contains 25 items organized into eight constructs: Perceived Usefulness, Perceived Ease of Use, AI Self-Efficacy, AI Anxiety, Perceived Enjoyment, Subjective Norm, Job Relevance, and Behavioral Intention. This instrument employed a five-point Likert scale (1 = Strongly Disagree to 5 = Strongly Agree) and demonstrated satisfactory reliability, with Cronbach's alpha values of 0,82, 0,81, 0,81, 0,77, 0,73, 0,72, 0,90, and 0,66 for the respective constructs.

In addition to these measures, the survey also gathered demographic information to contextualize the findings. Respondents provided details on their gender, academic discipline (STEM or non-STEM), and internet

connectivity status (reliable or unreliable).

Data Collection Procedure

Data were collected through an online survey administered to preservice teachers across the participating higher education institutions. The questionnaire included two sections: first, the demographic information (gender, academic discipline, and internet connectivity), and second, items assessing AI literacy, instruments measuring readiness-confidence, and AI acceptance. Prior to answering the survey, respondents were informed of the objectives of the study and were asked to provide consent. Participation was voluntary, and confidentiality and anonymity were guaranteed. The online format was chosen for its accessibility and efficiency, allowing data to be gathered systematically within a defined period.

Data Analysis Procedure and Statistical Treatment

The data collected from the online survey were systematically encoded, organized, and subjected to statistical analysis. Descriptive statistics, specifically the mean and standard deviation, were employed to determine the levels of AI literacy, readiness-confidence, and acceptance among preservice teachers. These measures provided a summary of central tendency and variability, offering a clear picture of the overall trends across the sample.

To examine differences across demographic variables, inferential statistics were utilized. Independent samples t-tests were conducted to identify significant differences in AI literacy, readiness-confidence, and acceptance when respondents were grouped according to gender (male and female), academic discipline (STEM and non-STEM), and internet connectivity (reliable and unreliable). These tests allowed for the detection of statistically significant mean differences between independent groups.

Pearson product–moment correlation coefficients were computed to explore the strength and direction of relationships among AI literacy, readiness-confidence, and acceptance. Correlation analysis was used to determine whether increases in one construct were associated with corresponding increases in another, thereby assessing their interdependent nature.

All analyses were carried out using the Statistical Package for the Social Sciences (SPSS). Statistical significance was set at $p < 0.05$ for all inferential tests to ensure that the results were robust and reliable.

RESULTS AND DISCUSSION
Preservice Teachers' Level of Literacy, Readiness-Confidence, and Acceptance of AI
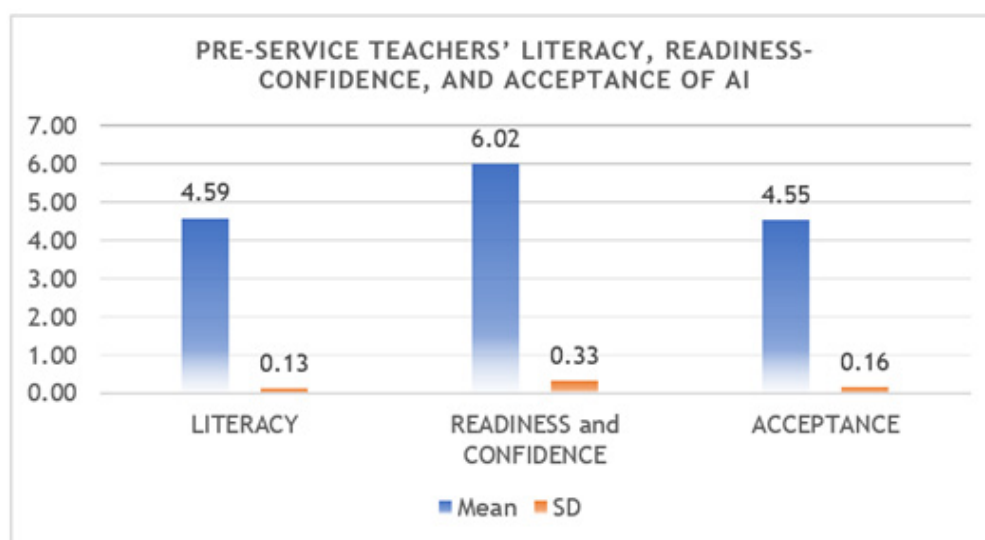

Figure 1. Preservice Teachers' Literacy, Readiness-Confidence, and Acceptance of AI

Figure 1 presents the descriptive statistics of AI literacy, readiness-confidence, and acceptance levels among preservice teachers, measured on different Likert scales. AI literacy was assessed using a 6-point scale, while AI acceptance was measured on a 5-point scale. The results yielded high mean scores of 4,59 (SD = 0,13) for literacy and 4,55 (SD = 0,16) for acceptance, indicating that participants generally possess strong foundational knowledge of AI as well as positive attitudes and intentions toward its integration in education. These findings are consistent with those of Lumanlan et al.[14] and Zhang et al.[20], who reported moderate to high AI literacy and favorable acceptance profiles among Filipino and international preservice teachers. The relatively small standard deviations suggest a strong consensus among respondents regarding their AI literacy and acceptance.

In contrast, readiness-confidence was measured on a more sensitive 7-point scale, with an even higher mean score of 6,02 (SD = 0,33), suggesting that preservice teachers perceive a strong sense of preparedness and self-efficacy in adopting AI technologies in their future classrooms. This elevated score corresponds with findings by Ayanwale et al.[23], who emphasize confidence as a critical mediator facilitating the transition from AI literacy to actual AI use. The difference in measurement scale highlights that while literacy and acceptance reflect cognitive and attitudinal baselines, readiness-confidence taps deeper into motivational and self-perceived capacity, which may develop at a higher level independent of formal knowledge.

These results suggest a positive relationship among the three variables, where adequate AI literacy fosters readiness and confidence, which in turn reinforces the acceptance of AI as a transformative educational tool. This interplay supports the theoretical propositions of the Technology Acceptance Model and Self-Determination Theory, as documented in Maulana et al.[34] and Herzallah et al.[45], which advocate for the integrated development of knowledge, attitudes, and self-efficacy to enhance technology adoption among educators. However, the variance in scale and directional emphasis also indicates the need for tailored interventions: foundational knowledge and positive disposition toward AI must be paired with targeted confidence-building initiatives to ensure successful integration in educational praxis.

Difference in the level of literacy, readiness-confidence, and acceptance of AI among preservice teachers when they are grouped by gender

Table 1. Independent Samples T-test Results for Literacy, Readiness-Confidence, and Acceptance of AI among Pre-Service Teachers by Gender

Variables	Gender	N	Mean	SD	t	df	p value	d	Interpretation
Literacy	Female	238	4,52	0,12	-16,688	382	0,000	0,10	Significant;
	Male	146	4,70	0,06	-19,439	363,403			Negligible effect
Readiness - confidence	Female	238	5,83	0,22	-19,630	382	0,000	0,23	Significant;
	Male	146	6,32	0,26	-18,935	272,070			Small effect
Accept	Female	238	4,50	0,16	-7,955	382	0,000	0,15	Significant;
	Male	146	4,62	0,12	-8,463	362,990			Negligible effect

The independent samples t-test results in table 1 reveal significant gender differences in AI literacy, readiness-confidence, and acceptance among preservice teachers. Compared with female teachers, male preservice teachers reported higher mean scores across all three variables—literacy (M = 4,70, SD = 0,06), readiness-confidence (M = 6,32, SD = 0,26), and acceptance (M = 4,62, SD = 0,12)—(literacy: M = 4,52, SD = 0,12; readiness-confidence: M = 5,83, SD = 0,22; acceptance: M = 4,50, SD = 0,16). The p values are all highly significant (p = 0,000), indicating that these differences are statistically robust. However, the effect sizes vary: readiness-confidence has a small effect (d = 0,23), whereas literacy and acceptance have negligible effects (d = 0,10 and 0,15, respectively), suggesting that while gender influences readiness and confidence meaningfully, differences in literacy and acceptance between genders are less pronounced.

These findings corroborate those of previous studies indicating gender disparities in AI engagement and self-efficacy among preservice educators. Dai et al.[22] and Ayanwale et al.[21] similarly reported that male preservice teachers tend to express higher confidence and readiness levels regarding AI technologies. This pattern may be attributed to broader sociocultural factors impacting digital self-efficacy and technology familiarity. However, the negligible effect size in literacy and acceptance aligns with studies suggesting that while males may feel more confident, fundamental knowledge and attitudes toward AI do not drastically differ by gender Lumanlan et al.[14], underscoring a complex gender technology relationship requiring nuanced interpretation.

Difference in the level of literacy, readiness-confidence, and acceptance of AI among preservice teachers when they are grouped by discipline

Table 2. Independent Samples T-test Results for Literacy, Readiness-Confidence, and Attitudes Toward AI among Pre-Service Teachers by Discipline

Variables	Discipline	N	Mean	SD	t	df	p value	d	Interpretation
Literacy	STEM	156	4,66	0,10	8,678	382	0,000	0,12	Significant;
	Non-STEM	228	4,55	0,13	9,208	380,907			Negligible effect
Readiness - confidence	STEM	156	6,23	0,29	12,150	382	0,000	0,28	Significant;
	Non-STEM	228	5,87	0,28	12,091	327,449			Small effect
Accept	STEM	156	4,66	0,13	14,186	382	0,000	0,13	Significant;
	Non-STEM	228	4,47	0,13	14,167	331,658			Negligible effect

Table 2 presents the results of independent samples t-tests comparing AI literacy, readiness-confidence, and acceptance scores between preservice teachers from STEM and non-STEM disciplines. The mean scores indicate that STEM preservice teachers consistently reported higher levels of literacy (M = 4,66, SD = 0,10), readiness-confidence (M = 6,23, SD = 0,29), and acceptance (M = 4,66, SD = 0,13) than their non-STEM counterparts did (literacy M = 4,55, SD = 0,13; readiness-confidence M = 5,87, SD = 0,28; acceptance M = 4,47, SD = 0,13). The p values (all p = 0,000) indicate statistically significant differences across all the variables. However, effect sizes vary, with readiness-confidence exhibiting a small effect (d = 0,28), whereas literacy and acceptance have negligible effects (d = 0,12 and d = 0,13, respectively). These results reveal that while discipline influences self-perceived preparedness and confidence meaningfully, differences in knowledge and attitudinal acceptance are less pronounced, echoing patterns observed in prior research.[14,34]

Furthermore, the relatively greater readiness-confidence among males than females likely reflect their greater self-assurance in applying AI tools despite their literacy and acceptance levels being similar to those of females. This distinction suggests the critical need for targeted interventions aimed at bolstering female preservice teachers' confidence and self-efficacy, which are pivotal for actual AI adoption.[32,45] The findings also emphasize integrating gender-sensitive training approaches in teacher education programs to address these disparities and promote equitable AI integration readiness across genders.

The elevated readiness-confidence scores among STEM preservice teachers likely reflect greater familiarity with and prior exposure to technology-intensive environments, facilitating greater self-efficacy in engaging with AI applications.[26] This aligns with the findings of Abdulayeva et al.[26] and Wang et al.[59], who argue that AI literacy enhances perceived behavioral control and readiness, particularly among STEM educators trained in scientific and technological problem solving. Conversely, non-STEM preservice teachers may encounter greater challenges in confidently adopting AI because of less technical exposure and different pedagogical norms, which is consistent with findings of Pei et al.[25], who emphasized tailored training to address these discipline-specific gaps.

Interestingly, the negligible effect sizes in literacy and acceptance suggest that, despite discipline-based differences in confidence, baseline knowledge and positive dispositions toward AI integration are relatively similar across the STEM and non-STEM groups. This observation suggests a broad foundational awareness of AI's importance in education that transcends disciplinary boundaries, a trend supported by Chang et al.[50], who identify commonalities in AI awareness among diverse academic cohorts. These nuances underscore the need for differentiated yet inclusive AI literacy programs that build confidence and practical competence for all educators, ensuring equitable preparation for AI-enhanced teaching practices irrespective of discipline.

Difference in the level of literacy, readiness-confidence, and acceptance of AI among preservice teachers when they are grouped by internet connectivity

Table 3. Independent Samples T-test Results for Literacy, Readiness-Confidence, and Acceptance of AI among Pre-Service Teachers by Internet Connectivity

Variables	Internet Connectivity	N	Mean	SD	t	df	p value	d	Interpretation
Literacy	Reliable	345	4,62	0,08	14,013	382	0,000	0,11	Significant;
	Unreliable	39	4,36	0,23	6,993	39,229			Negligible effect
Readiness - confidence	Reliable	345	6,07	0,29	11,450	382	0,000	0,29	Significant;
	Unreliable	39	5,52	0,20	15,207	57,408			Small effect
Accept	Reliable	345	4,59	0,10	19,824	382	0,000	0,11	Significant;
	Unreliable	39	4,21	0,17	13,610	41,326			Negligible effect

Table 3 presents independent samples t-test results comparing AI literacy, readiness-confidence, and acceptance scores among preservice teachers categorized by their reported internet connectivity status—reliable versus unreliable. Preservice teachers with reliable internet access scored significantly higher across all three variables— literacy (M = 4,62, SD = 0,08), readiness-confidence (M = 6,07, SD = 0,29), and acceptance (M = 4,59, SD = 0,10)—than did those reporting unreliable access—literacy (M = 4,36, SD = 0,23), readiness-confidence (M = 5,52, SD = 0,20), and acceptance (M = 4,21, SD = 0,17). All differences were statistically significant (p = 0,000), with readiness-confidence showing a small effect size (d = 0,29) and literacy and acceptance demonstrating negligible effects (d = 0,11). These results underscore that access to stable internet connectivity is a critical enabling factor that distinctly influences preservice teachers' confidence and perceived readiness to engage with AI tools while also affecting their foundational knowledge and attitudinal acceptance to a somewhat lesser

extent.

These findings corroborate prior research emphasizing the pivotal role of digital infrastructure in supporting equitable AI literacy and technology readiness among educators.[48] Reliable internet access not only facilitates continuous exposure and interaction with AI platforms but also bolsters self-efficacy and confidence—key mediators for effective adoption, as highlighted by Ayanwale et al.[23]. Without reliable connectivity, preservice teachers may experience restricted opportunities for experimentation, training, and confidence building, which can exacerbate digital divides and hinder inclusive professional readiness programs.[22]

Furthermore, the modest but meaningful impact of connectivity on readiness-confidence aligns with theoretical insights from self-determination theory and technology acceptance models, which emphasize the importance of competence and autonomy facilitated through accessible resources.[34,35] While literacy and acceptance gaps exist, the stronger effect on confidence highlights the necessity of robust internet infrastructure paired with supportive pedagogical frameworks to nurture empowered, technologically adept future educators. These integrated findings advocate for policy interventions that prioritize connectivity upgrades along with comprehensive AI literacy and training curricula to bridge technical and psychological readiness gaps in teacher education.

Relationship Between Literacy, Readiness-Confidence, and Acceptance of AI among Preservice Teachers

Table 4. Correlation Matrix between Literacy, Readiness-Confidence, and Acceptance of AI among Pre-Service Teachers			
Variables	**1**	**2**	**3**
1. Literacy	—	0,897**	0,913**
2. Readiness-Confidence	0,897**	—	0,902**
3. Acceptance	0,913**	0,902**	—
N	384	384	384
Note: N = 384. Pearson correlation coefficients are reported. p < 0,01 (2-tailed).			

Table 4 shows a correlation matrix representing the relationships among AI literacy, readiness-confidence, and acceptance of AI in education among preservice teachers. The Pearson correlation coefficients reveal very strong, positive, and statistically significant associations between all pairs of variables (p < ,01). Specifically, AI literacy is correlated with readiness-confidence at 0,897 and with acceptance at 0,913, whereas readiness-confidence and acceptance are correlated at 0,902. These coefficients indicate that as preservice teachers' AI literacy increases, their readiness and confidence in the use of AI also increase, which in turn is strongly associated with greater acceptance of AI in educational contexts.

This pattern of associations aligns well with theoretical models such as the Technology Acceptance Model and Self-Determination Theory, which propose that knowledge and self-efficacy (confidence) are foundational to forming positive attitudes and behavioral intentions toward technology use.[34,45] The very high correlations suggest that these constructs are intertwined facets of a holistic AI integration readiness profile among preservice teachers, reflecting a synergistic relationship where gains in literacy reinforce confidence and, together, bolster acceptance.

Consistent with prior empirical findings [20,23,33] this evidence underscores the critical role of comprehensive AI literacy programs that concurrently develop technical knowledge and learner confidence to achieve meaningful acceptance and use. It also highlights that targeting improvements in one dimension can create cascading positive effects across others, informing the design of teacher education curricula and professional development initiatives to foster integrated and sustained AI adoption readiness.

CONCLUSION

This study demonstrates that preservice teachers in Philippine higher education possess generally positive levels of AI literacy and acceptance, complemented by high luma. These three constructs are closely intertwined, underscoring that knowledge, confidence, and openness must be cultivated together to achieve meaningful AI integration in education. The presence of differences across gender, academic discipline, and internet connectivity further highlights that readiness for AI is shaped not only by individual competencies but also by broader contextual factors. Taken together, these findings affirm the urgency of inclusive and equitable strategies in teacher preparation for the digital era.

RECOMMENDATIONS

In response to these conclusions, teacher education institutions should systematically embed AI literacy programs within preservice curricula, pairing foundational knowledge with hands-on experiences to strengthen

both confidence and competence. Training must incorporate ethical awareness and transparency in AI use to build trust and responsible practice. Targeted professional development should be directed toward addressing gender and disciplinary disparities, while policy makers and institutions must work to close the digital divide through improved connectivity. Continuous research is also needed to monitor the long-term effects of AI training and to develop pedagogical models that combine technical skill, critical thinking, and motivation. Implementing these measures will not only prepare preservice teachers to adopt AI responsibly but also empower them to lead educational transformation, ensuring that future classrooms are equitable, innovative, and future-ready.

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CONFLICT OF INTEREST

The author declares that there is no conflict of interest.

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