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Artificial intelligence in Philippine education: A narrative review of applications, perceptions, and challenges

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ABSTRACT

This narrative review analyzes the current status of artificial intelligence (AI) implementation in Philippine educational settings through a comprehensive synthesis of scholarly literature from 2018 to 2025. This study aims to identify current AI applications across different educational levels, analyze stakeholder perceptions and readiness, and determine implementation challenges in Philippine educational settings. A systematic literature search was conducted across Google Scholar, EBSCO Host, and ScienceDirect databases using search terms combining "Artificial Intelligence," "Philippines," and "Education". Following the selection criteria, 43 published studies underwent examination through Braun and Clarke's thematic analytical approach. Results indicate significant implementation disparities, with higher education institutions—particularly private universities in urban centers—demonstrating substantially more advanced AI integration than K-12 schools. Three major themes emerged: (1) current AI applications spanning teaching tools, student support systems, administrative functions, and research tools; (2) mixed stakeholder perceptions with students showing more positive attitudes than faculty; and (3) significant implementation challenges including infrastructure limitations and technical expertise gaps as major barriers. Key challenges include the urban-rural digital divide, insufficient professional development opportunities, ethical concerns around academic integrity, and the absence of comprehensive institutional policies. The study concludes that realizing AI's potential in Philippine education requires coordinated efforts to enhance technological infrastructure, develop educator capacity, establish appropriate policies, and ensure equitable access. The study recommends developing national AI education policy frameworks, investing in rural digital infrastructure, and implementing systematic professional training initiatives targeting technical skills and educational AI implementation.

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INTRODUCTION

The incorporation of artificial intelligence (AI) technologies in educational contexts has rapidly expanded worldwide, revolutionizing instructional practices and learning processes via customized educational platforms, computerized evaluation tools, smart tutoring systems, and streamlined administrative operations (Rrustemaj, 2025; Gjermeni et al., 2025; Chaudhary & Goyal, 2025). Contemporary research has established AI's diverse capabilities to improve academic achievements through individualized learning trajectories, minimize administrative workload, and enable educational data analysis (Wang et al., 2025; Bushuyev et al., 2025), with researches emphasizing AI's ability to develop interactive, motivating, and fair educational settings while acknowledging requirements for contextual implementation understanding (Dahri et al., 2025; Al-Aghbari et al., 2025).

While developed nations have made significant strides in implementing and researching educational AI technologies, developing countries face distinct challenges and opportunities in this digital transformation (Davar et al., 2025; Eden et al., 2024). Contemporary research has identified this disparity as contributing to what scholars describe as a 'digital divide' in AI access and implementation that could worsen current academic disparities without targeted investigation and implementation strategies (Vesna, 2025; Zhang, 2024).

The Philippine context presents a particularly valuable case study for examining AI integration in education. As a developing nation with a strong tradition of educational innovation yet persistent infrastructure challenges, the Philippines embodies the tensions between technological aspiration and implementation realities (Toquero, 2020; Barrot et al., 2021). The Philippine education system, serving millions of students throughout basic and tertiary education levels, has progressively emphasized technological modernization after Commission on Higher Education's (CHED) flexible learning directives (Joven et al., 2020).

The global health crisis hastened technological adoption, with the Basic Education-Learning Continuity Plan (BE-LCP) mandating technology integration across educational levels (Alvarez, 2020), revealing the need for customized approaches and enhanced faculty preparation in digital instruction (Zhang, 2024; Co, 2025). This period saw experimental implementations of AI tools for remote learning, yet comprehensive documentation of these initiatives remains limited (Barrot et al., 2021; Alibudbud, 2021).

Despite growing interest, research on AI adoption, stakeholder readiness, and implementation challenges in Philippine education remains fragmented, creating difficulties for stakeholders seeking to understand current landscapes and pathways forward (Lapada et al., 2020; Oducado et al., 2021). The Philippines' unique socioeconomic and infrastructural characteristics necessitate contextual understanding rather than adopting approaches from high-resource settings (Huang et al., 2020; Villarino, 2025).

OBJECTIVES OF THE STUDY

This research's primary aim involves delivering thorough insights into artificial intelligence applications in Philippine education by synthesizing research published between 2018 and 2025. This review addresses the research question: What are the main themes in AI applications and adoption in Philippine education from 2018 to 2025, and what contextual factors influence these themes? Particularly, this analysis seeks to determine present AI implementations across different educational levels in the Philippine setting, examining both the extent and nature of implementation in various academic settings. This research additionally examines attitudes and preparedness levels of primary stakeholders such as educators, learners, and administrators concerning AI integration in education, with particular attention to factors influencing acceptance and utilization. Additionally, this review aims to determine the challenges and issues encountered in implementing AI in Philippine educational contexts, examining infrastructure limitations, knowledge gaps, ethical considerations, and policy frameworks. Through accomplishment of these goals, this investigation aims to enhance the scholarly foundation by identifying patterns, gaps, and possibilities for AI implementation in Philippine academic systems, with implications for policy development, teaching practice, and future research directions.

The study conceptualizes AI in education as computational systems that can perform tasks typically requiring human intelligence, including language processing, image recognition, decision-making, and adaptive learning, specifically designed or implemented for educational purposes, drawing from established technology acceptance frameworks to examine implementation across technological, human, and organizational dimensions.

MATERIALS AND METHODS

This investigation adopted a narrative literature synthesis method to analyze the present condition of artificial intelligence in Philippine academic institutions. This approach was chosen given the emerging and diverse nature of AI applications in Philippine educational contexts, allowing for synthesis of heterogeneous studies across various implementations (Wang et al., 2025; Adewale et al., 2024). The analysis concentrated on publications released from January 2018 and March 2025.

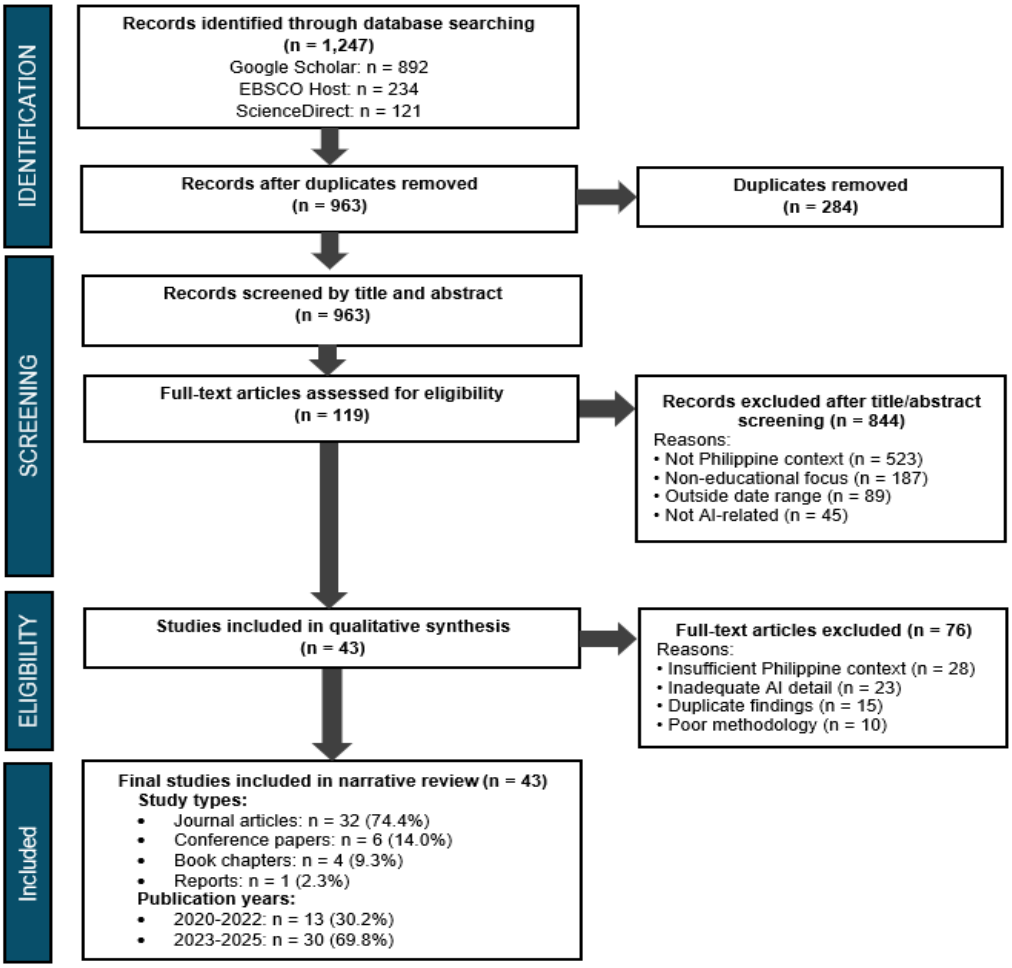

Figure 1. PRISMA flow diagram for literature selection

Search Strategy and Selection Process

As seen in Figure 1, the scholarly search was performed across various databases such as Google Scholar, EBSCO Host, ScienceDirect, and specialized repositories. Primary search strings included combinations of "Artificial Intelligence," "AI," "ChatGPT," "Generative AI," "Philippines," "Education," and "Teacher." These terms were designed to capture both general AI applications and specific implementations in Philippine educational contexts. Search refinement involved using synonyms such as "Filipino students," "Philippine schools," and "educational

technology," combined with Boolean operators (AND, OR) to optimize retrieval. Database-specific filters were applied to limit results to educational contexts and the specified timeframe (2018-2025).

Inclusion and Exclusion Criteria

Research was included when: (1) addressing Philippine academic environments (basic or tertiary education), (2) were published between January 2018 and March 2025, (3) examined AI use and applications, stakeholder perceptions, or implementation challenges in education, and (4) provided sufficient detail on AI use in educational settings. Publications were omitted when they inadequately addressed the Philippine educational context, contained insufficient details on AI use and applications in education, or presented duplicate findings from the same research projects.

The initial database searches yielded a substantial number of results across Google Scholar, EBSCO Host, and ScienceDirect. After applying relevance filtering, removing duplicates, and screening titles and abstracts, 119 full-text researches were evaluated for eligibility on rigorous inclusion and exclusion criteria based on set parameters.

Ultimately, 43 publications met all inclusion criteria and were included in the narrative synthesis. These comprised 32 journal articles, 6 conference papers, 4 book chapters, and 1 report spanning from 2020 to 2025, with the majority (approximately 70%) published between 2023 and 2025. This collection represented diverse perspectives on AI integration across different educational levels and contexts within the Philippines.

Data Synthesis and Analysis

The analysis employed a thematic approach to identify recurring patterns, trends, and gaps across the literature. Using a cyclical approach of analysis, categorization, and improvement using Braun and Clarke's (2006) model, three primary thematic domains surfaced: (1) current AI applications in Philippine education across different educational levels; (2) stakeholder perceptions and readiness; and (3) implementation challenges and considerations. This process involved familiarization with the literature, initial coding of key concepts, and progressive refinement of themes that captured important distinctions in the literature.

Within each theme, subthemes were identified to facilitate meaningful analysis. Throughout the analysis, particular attention was paid to the educational level, stakeholder group, geographical context, and specific AI technologies discussed in each publication. Points of consensus and disagreement among the studies were noted, along with deficiencies in current scholarship. This narrative analysis emphasized creating significant explanations and identifying conceptual relationships across the literature rather than aiming for exhaustive coverage or statistical aggregation (Green et al., 2006), constructing a coherent narrative that captured the intricate environment of AI in Philippine academic settings while recognizing zones of ambiguity and continuous evolution.

RESULTS

Theme 1: Current AI Applications in Philippine Education.

The review revealed varying levels of AI implementation across Philippine educational contexts, with the most extensive applications found in higher education institutions, particularly in urban centers and private universities. Implementation patterns can be categorized into four main areas: (1) teaching and learning tools, (2) student support systems, (3) administrative applications, and (4) research tools.

Teaching and Learning Tools. Within tertiary education, multiple universities have deployed AI-enhanced learning management systems that offer personalized learning pathways and adaptive content delivery. Espartinez (2024) recorded the application of generative AI technologies for composition teaching across eight academic institutions, noting that these applications were primarily instructor-led rather than institutionally mandated.

Similarly, Barrot (2024) explored the integration of ChatGPT for second language writing, finding that implementation was largely experimental and confined to specific courses rather than program-wide.

At the K-12 level, AI applications appear more limited, with Prestoza and Banatao (2024) reporting on a pilot implementation of AI-driven personalized learning in science education at select secondary schools in urban areas. This study found measurable improvements in student engagement but noted significant challenges in scaling these initiatives beyond the pilot phase due to infrastructure constraints.

Several studies documented the use of AI-powered intelligent tutoring systems in both K-12 and higher education settings. Hatmanto et al. (2024) investigated the utilization of ChatGPT to improve learner participation in educator-led curriculum development in Mindanao, finding that senior teachers effectively utilized AI to create more personalized learning experiences despite initial skepticism. In contrast, elementary schools showed minimal AI implementation beyond basic educational applications that may incorporate rudimentary AI features (Fontanilla et al., 2023).

Student Support Systems. AI-powered student support applications were recorded across multiple tertiary institutions. Agbong-Coates (2024) described AI deployment for individualized learning in an extensive investigation involving 785 college students in the Philippines, finding that integrated AI systems significantly enhanced personalized learning outcomes. These support systems ranged from AI chatbots for answering common student queries to more sophisticated systems for identifying at-risk students and providing targeted interventions. In contrast, Fabro et al. (2024) found limited implementation of sophisticated student support AI at the K-12 level, with existing technologies primarily focused on basic administrative functions rather than personalized student support. The few exceptions were private international schools in Metro Manila that had implemented AI-driven learning analytics systems to track student progress and provide early interventions.

Administrative Applications. Administrative applications of AI were more uniformly distributed across educational levels. Luciano (2024) documented the use of AI for automating routine administrative tasks in higher education, including scheduling, document processing, and preliminary admission assessments. Similarly, Ramos et al. (2024) examined ChatGPT incorporation into administrative functions within a secondary school environment, finding efficiency improvements in routine document processing but noting challenges in data privacy and security.

Research Tools. AI utilization for research purposes was mainly recorded in tertiary educational contexts. Bula et al. (2025) explored how university students utilized AI tools for research assistance in library science, finding widespread adoption of tools like ChatGPT for literature reviews and initial data analysis. This trend was particularly pronounced in STEM disciplines, where machine learning applications were increasingly incorporated into research methodologies (Cacho, 2024; Barrot, 2023).

Theme 2: Stakeholder Perceptions and Readiness

Research on stakeholder perceptions revealed complex attitudes toward AI in education, with notable variations across different stakeholder groups and educational contexts. These perceptions can be categorized by stakeholder type: (1) teachers and faculty, (2) students, and (3) administrators and policymakers.

Teachers and Faculty Perceptions. Studies examining teacher perceptions showed mixed attitudes toward AI integration. Sumandal (2024) examined 25 educator AI-users at Abueg National High School, discovering strong confidence levels with AI technologies despite minimal structured preparation. Similarly, Goli-Cruz (2024) found that higher education faculty demonstrated moderate awareness of ChatGPT's capabilities and generally positive attitudes toward its potential benefits, though they expressed concerns about overreliance on technology. In contrast, Candinlas et al. (2025) found significant reservations among teachers regarding AI applications, with specific worries regarding scholarly honesty and possible replacement of essential instructional roles. Notably, these concerns were

more pronounced among older faculty members and those with limited prior exposure to educational technology (Suello et al., 2024).

Regarding readiness, Bautista et al. (2024) assessed pre-service teachers' readiness for integrating AI tools using the TPACK framework, finding that while technical knowledge was developing, pedagogical integration remained a significant challenge. This theme of technical capability outpacing pedagogical integration was consistent across multiple studies (Zaragoza, 2023; Gonzales & Nabua., 2025).

Student Perceptions. Student perceptions were generally more positive than those of faculty. Patac and Patac (2025) performed an experiential investigation of learners' interactions with ChatGPT for educational assistance, discovering participants noted decreased cognitive load and enhanced learning efficiency. Similarly, Obenza et al. (2024) surveyed university students regarding their perception and use of ChatGPT, discovering strong comprehension, awareness, and favorable perspectives regarding AI incorporation in tertiary education. However, perceptions varied by educational level and subject area. Suarez et al. (2025) found that secondary students expressed greater enthusiasm for AI tools in STEM subjects compared to humanities, where concerns about creativity and critical thinking were more prominent. Additionally, Villarosa (2024) noted that college students' awareness of AI in flipped classroom models varied significantly by program, with technology-focused majors showing greater awareness and positive perceptions.

Several studies highlighted the relationship between AI perception and actual usage. Navales (2024) found that English teachers' perceptions of ChatGPT's usefulness strongly correlated with their willingness to incorporate it into writing instruction. Similarly, Bancoro (2024) investigated the connection between AI utilization and scholarly achievement among commerce program learners, finding that while moderate integration yielded positive outcomes, overreliance raised concerns about skill development.

Administrator and Policymaker Perspectives. Research on administrator and policymaker perspectives was more limited. Piedad et al. (2025) evaluated regulatory strategies for governing generative AI in academic publications throughout Philippine universities, finding inconsistent regulatory frameworks and significant variations in institutional readiness. Giray et al. (2024) surveyed administrators and instructors regarding AI use in Philippine higher education, finding collective acknowledgment of AI as a transformative tool with potential benefits alongside ethical concerns.

A key theme across studies was the disconnect between institutional policy and practical implementation. Plata et al. (2023) examined strategies for scholarly honesty during the generative AI era, noting that educational institutions struggle to develop comprehensive policies that address both technological innovations and traditional academic values. This policy gap was identified as a significant barrier to effective AI integration across multiple studies (Cacho, 2024; Funa & Gabay, 2025).

Theme 3: Implementation Challenges

The review identified multiple challenges to AI implementation in Philippine education, which can be categorized into four main areas: (1) infrastructure and resource limitations, (2) knowledge and skills gaps, (3) ethical and sociocultural considerations, and (4) policy and governance issues.

Infrastructure and Resource Limitations. Infrastructure constraints emerged as a primary challenge across educational levels. Melchor et al. (2023) identified significant infrastructure limitations in implementing AI in mathematics education, especially in remote regions with restricted network access and technological infrastructure. Similarly, Villarino (2025) found that rural higher education institutions faced substantial challenges in AI integration due to connectivity issues and outdated hardware.

Funding constraints were consistently cited as barriers to AI implementation. Digo et al. (2024) found that the high costs associated with AI system acquisition, deployment, and maintenance presented significant challenges, particularly for public institutions. These financial constraints often resulted in piecemeal implementation rather than systematic integration (Dungo et al., 2025).

Multiple investigations emphasized the technological gap separating metropolitan and remote academic institutions. Balasa et al. (2025) found significant variations in AI implementation between schools in Zamboanga Peninsula, with urban schools demonstrating greater adoption rates compared to their rural counterparts. This urban-rural divide was consistent across multiple studies (Diaz, 2025; Bula et al., 2025).

Knowledge and Skills Gaps. Technical expertise emerged as a significant barrier to effective AI implementation. Alejandro et al. (2024) discovered that trainee educators' technological adoption of AI tools was restricted by perceived difficulty of use and lack of training. Similarly, Barrot (2023) identified knowledge gaps among educators as a key challenge in leveraging AI for writing instruction.

Professional development needs were highlighted across multiple studies. De Jesus (2024) found that teachers who received specific training on ChatGPT demonstrated significantly greater integration and effectiveness compared to those without training. This result was supported by Fontanilla et al. (2023), who recognized restricted capacity-building prospects as a key constraint on AI adoption.

Student digital literacy also emerged as a concern. Rom and Soriano (2025) found varying levels of AI literacy among students, with implications for equitable access to AI-enhanced learning opportunities. Asio (2024) recorded substantial differences in AI knowledge, confidence, and capability among university learners depending on variables such as college, year level, and gender.

Ethical and Sociocultural Considerations. Ethical concerns were prominently featured across multiple studies. Gustilo et al. (2023) investigated educators' practices, perceptions, and policies regarding AI in academic writing, finding significant ethical concerns around academic integrity and potential plagiarism. Similarly, Barrot (2024) highlighted the pitfalls and potentials of using ChatGPT for second language writing, noting tensions between technological assistance and academic honesty.

Data privacy and security concerns were raised in several studies. Obenza et al. (2024) found that while university students showed positive perceptions toward ChatGPT in higher education, they also expressed concerns about data privacy and ethical implications. This concern was echoed by administrators and policymakers in Giray et al.'s (2024) study of institutional responses to AI integration.

Cultural appropriateness of AI tools emerged as a consideration unique to the Philippine context. Calizo and Bauyot (2025) noted that many AI systems were not designed with Filipino cultural contexts in mind, potentially limiting their effectiveness in local educational settings. Similarly, Candilas (2025) found that language barriers could impede effective use of AI tools primarily designed for English-language contexts.

Policy and Governance Issues. The lack of comprehensive policies emerged as a significant challenge. Bongcac and Pabalan (2024) evaluated the possibilities, dangers, and moral consequences of AI-driven educational tools, revealing a clear absence of institutional regulations managing their implementation. Likewise, Funa and Gabay (2025) performed a comprehensive analysis of policy frameworks on AI application in instruction, observing the scattered character of current regulations among institutions.

Regulatory uncertainty was identified as a barrier to systematic implementation. Piedad et al. (2025) analyzed approaches to regulating generative AI in scholarly works, finding inconsistent approaches across institutions and a lack of national guidance. This regulatory gap created challenges for institutions seeking to implement AI solutions while maintaining academic standards (Plata et al., 2023).

Institutional readiness varied significantly. Cacho (2024) suggested an equilibrium strategy for incorporating generative AI in academic instruction, observing that organizational preparedness elements substantially influenced success. Likewise, De Guzman et al. (2024) discovered differing degrees of AI apprehension and preparedness among English educators and learners in a Philippine institution.

DISCUSSION

This review reveals a complex landscape of AI implementation in Philippine education characterized by uneven adoption, mixed stakeholder perceptions, and multifaceted challenges. Several key patterns emerge from the analysis of existing literature.

Uneven Development of Higher Education vs. Basic Education

The implementation gap between higher education and basic education represents one of the most significant findings, with universities—particularly private and urban institutions—demonstrating substantially more advanced AI integration compared to K-12 schools. Universities possess greater institutional flexibility and autonomy, enabling rapid decision-making for technology adoption driven by competitive pressures and research mandates (Jala, 2025; Espartinez, 2024).

The concentration of AI applications in STEM disciplines reflects both disciplinary cultures embracing innovation and faculty technical expertise, as evidenced by widespread adoption of AI tools for research documented by Bula et al. (2025) and Cacho (2024). Conversely, K-12 schools face constraints from standardized curricula and centralized oversight, leading to systemic rigidity that hinders timely adoption of educational technologies. This implementation disparity directly influences stakeholder perceptions, with higher education faculty and students demonstrating greater AI readiness due to increased exposure, while simultaneously creating pressure for differentiated policy approaches across educational levels. The uneven development pattern compounds infrastructure challenges, as institutions with advanced AI implementations can better advocate for supportive policies and resources.

Perceptions by Stakeholder Group

Stakeholder perceptions reveal a generational and positional divide, with students generally expressing more positive attitudes toward AI compared to faculty and administrators (Suarez et al., 2025; Navales, 2024). This finding aligns with broader technology acceptance patterns in educational settings, where "digital natives" may demonstrate greater comfort with emerging technologies compared to some educators (Mallillin et al., 2025).

Students consistently demonstrate enthusiasm for AI technologies, creating bottom-up pressure for institutional adoption that often outpaces formal policy development, as documented by Patac and Patac (2025) and Obenza et al. (2024). Faculty perceptions present more complexity—while showing positive attitudes toward AI's potential benefits, they express concerns about academic integrity and pedagogical displacement (Goli-Cruz, 2024; Candilas et al., 2025).

These divergent stakeholder attitudes directly shape implementation success, as institutions with greater faculty readiness tend to develop more comprehensive AI policies, while those with resistant stakeholders often experience slower adoption regardless of available infrastructure. The generational divide also influences resource allocation decisions, with student-driven demand often compelling institutions to invest in AI technologies even without formal policy frameworks.

Infrastructure Disparities and Developing Nation Challenges

The implementation challenges identified reflect the Philippines' position as a developing nation with significant infrastructure disparities. The urban-rural divide in technological resources emerges as a persistent theme across studies (Villarino, 2025; Balasa et al., 2025), raising equity concerns about AI potentially worsening existing educational inequalities rather than upgrading them.

This pattern mirrors similar challenges faced by other ASEAN developing nations like Indonesia and Vietnam, where metropolitan areas consistently demonstrate higher educational technology adoption rates compared to rural regions. However, the Philippines' English language proficiency provides unique advantages for AI tool adoption, as many systems are optimized for English interactions, potentially positioning the country more favorably than regional neighbors with predominantly local language contexts (Calizo & Bauyot, 2025).

Infrastructure limitations directly constrain stakeholder readiness, as educators and students in under-resourced areas cannot develop positive AI perceptions without adequate access to technology. These resource disparities also perpetuate policy fragmentation, as institutions with better infrastructure can advocate more effectively for supportive AI policies, while under-resourced institutions lack the capacity for meaningful policy engagement.

CONCLUSION AND RECOMMENDATION

This investigation delivers a thorough examination of AI's present condition in Philippine academic systems, revealing a landscape characterized by emerging implementation, mixed stakeholder perceptions, and significant contextual challenges. While AI technologies offer promising opportunities to address persistent educational challenges in the Philippines, their effective implementation requires thoughtful consideration of infrastructure limitations, knowledge gaps, ethical considerations, and policy frameworks.

Notwithstanding these important findings, certain constraints must be recognized. The quickly changing character of AI in Philippine academic settings means this narrative review cannot capture all relevant implementations, particularly those not formally documented in academic literature. The focus on published research may underrepresent practical applications that have not yet been studied, while the disproportionate representation of higher education studies compared to basic education research creates a potential imbalance in understanding AI implementation across the entire educational system. Despite these constraints, the findings provide a foundation for understanding current patterns and identifying strategic directions for AI integration in Philippine educational settings.

Implications for Practice

The findings reveal that effective AI implementation in Philippine education requires coordinated action across multiple stakeholder groups and institutional levels. These implications underscore that successful integration depends not only on technological readiness but also on policy frameworks, infrastructure capacity, and human resource development that address the unique contextual challenges identified in this review.

Three urgent priorities demand immediate attention. First, developing a national AI education policy is critical to address the current regulatory gap that creates uncertainty and impedes systematic implementation. Second, investing in rural digital infrastructure represents an equity imperative, as the persistent urban-rural divide threatens to deepen existing educational inequalities. Third, comprehensive professional development programs must bridge critical knowledge gaps among educators, moving beyond technical training to incorporate pedagogical frameworks for effective AI integration.

As AI technologies continue to evolve, stakeholders must act decisively. Government officials should create nationwide structures guaranteeing fair access, teachers must participate in capacity building, and academic administrators should advance from trial programs to holistic AI approaches.

Future Research Directions

Prospective studies should emphasize extended studies monitoring AI effects on educational achievements, especially in underserved elementary and secondary environments. These initiatives are essential for establishing evidence-based implementation strategies. Comparative research examining implementation across different socioeconomic contexts could inform more equitable integration strategies, while policy research on governance frameworks is critically required to guarantee AI systems strengthen rather than weaken academic equity.

The implications for future research extend beyond methodological considerations to include the development of culturally responsive evaluation frameworks specific to the Philippine context. Cross-disciplinary collaboration emerges as essential for comprehensive understanding, requiring future research that incorporates perspectives from education, technology, and policy sciences to address the multifaceted nature of AI implementation challenges. By addressing identified gaps and building on promising practices, Philippines can attain successful and fair AI education that addresses the varied requirements of its students and teachers.

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