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Utilization of Artificial Intelligence (AI) in Indonesian Language Learning in Elementary Schools: Teacher Perceptions and Challenges

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ABSTRACT

The rapid expansion of Artificial Intelligence (AI) has begun to influence instructional practices in primary education, including Indonesian language learning. Although AI offers opportunities for automated feedback and personalized learning, existing studies in Indonesia have largely focused on AI use in general subjects or secondary and higher education levels, with limited empirical investigation into its application in primary-level Indonesian language instruction, particularly from the perspective of classroom teachers. Moreover, little is known about how teachers mediate AI use in relation to cultural and pedagogical appropriateness. Therefore, this study addresses this gap by exploring elementary school teachers' perceptions and classroom experiences of AI integration in Indonesian language learning. This study aims to explore the perceptions and classroom experiences of Indonesian language teachers in utilizing AI for literacy learning in primary schools. A qualitative descriptive approach was used, involving twelve teachers selected through purposive sampling. Data were collected through semi-structured interviews, classroom observations, and document analysis. The findings show that teachers generally view AI as helpful in providing immediate corrective feedback, supporting instructional preparation, and increasing student engagement. However, challenges were also identified, including limited digital infrastructure, diverse teacher digital literacy, ethical concerns related to data security, and the risk of students relying too heavily on AI-generated suggestions. The study concluded that AI can make a meaningful contribution to Indonesian language learning when used under teacher supervision. Specifically, the results showed that teachers utilized AI to provide automatic corrections for spelling and structure, guide the process of developing open-ended sentence materials, and assist with task differentiation for students with varying abilities. Furthermore, it was found that teachers' limited digital literacy, limited availability of devices in schools, and a lack of formal training were key barriers to optimizing AI use. Therefore, educators play a mediating role to ensure that AI output remains pedagogically and culturally appropriate. Implications for policy development, teacher professional training, and future research are also discussed.

Keywords: Artificial Intelligence, Indonesian Language Learning, Teacher Perception, Literacy Development

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INTRODUCTION

The rapid development of Artificial Intelligence (AI) in recent years has brought significant changes to the field of education, including instructional practices at the primary school level. In elementary education, AI has begun to be introduced through a range of learning platforms designed to support literacy development such as reading comprehension, writing skills, and language awareness. Technologies like chatbot-based tutoring, automated writing evaluation, and adaptive learning systems now offer more personalized learning experiences for young learners. In the context of Indonesian language learning, AI can assist students in practicing writing, recognizing sentence structures, and receiving immediate feedback on their written expressions. However, alongside these opportunities, various challenges emerge, particularly related to teachers' digital competence and the alignment of AI-generated content with Indonesian cultural and linguistic contexts (Syarifudin 2024; Adrian, 2024).

Teachers in primary schools play a central role not only as designers of learning experiences but also as evaluators of the accuracy, appropriateness, and pedagogical value of AI outputs. Thus, the integration of AI in primary-level Indonesian language learning cannot be separated from teachers' readiness to understand, supervise, and critically mediate the use of digital technologies. Issues such as students' over-reliance on instant answers, AI's limited understanding of contextual nuances, and the lack of structured digital literacy training for teachers illustrate the complexity of adopting AI in language classrooms. These dynamics suggest that the integration of AI should be viewed not merely as technological adoption but as a pedagogical transformation that reshapes teachers' roles and instructional strategies (Fradana and Suwarta 2025;Fatmawati et al. 2025).

From a theoretical standpoint, the use of AI in language learning can be examined through the lens of the Technology Acceptance Model (TAM) and digital pedagogy frameworks. Both perspectives emphasize that teachers' perceptions of usefulness, ease of use, and system reliability strongly influence the success of technology integration. Teachers who believe that AI can support efficiency and enhance learning quality tend to show higher acceptance toward its use in the classroom (Widianingtyas, Mukti, and Silalahi 2023). Nevertheless, Indonesian language instruction presents distinctive challenges when compared to subjects that rely heavily on factual or numerical accuracy. Language learning involves interpretive, expressive, and contextual dimensions that cannot be fully captured by automated systems.

For example, while AI may provide students with technical corrections such as grammar, spelling, or sentence structure, its ability to critically evaluate meaning, creativity, and cultural nuance remains limited (Gagaramusu, Kaharu, and Pratama 2025). Moreover, primary school students are at a developmental stage that requires intensive guidance from teachers, especially in understanding text meaning, expressing ideas, and building foundational literacy skills. As such, teachers must carefully balance the use of AI with pedagogical principles that prioritize meaningful interaction, critical thinking, and culturally rooted language development. This balance highlights the need for teachers not only to operate AI tools but also to interpret their outputs, guide students' reflections, and ensure that the learning process remains authentically human-centered.

Beyond pedagogical considerations, the readiness of educational institutions also plays a critical role in determining the effectiveness of AI implementation. Schools equipped with adequate digital infrastructure, clear technology policies, and continuous professional development programs for teachers are generally better positioned to adopt AI meaningfully. However, the reality in many

Indonesian primary schools shows uneven access to digital resources and limited technical support. Previous research has shown that without proper training, teachers tend to rely on AI primarily for administrative tasks such as creating worksheets or developing lesson plans, rather than integrating it into the core learning process (Fauziddin et al. 2025; Lubis et al. 2024). These findings align with the 2024 Evaluation Report on the Digital Transformation of Education published by the Yogyakarta Special Region Education, Youth, and Sports Agency (Disdikpora), which stated that 68% of elementary school teachers in the Yogyakarta Special Region use AI-based technology only for administrative purposes, while its utilization in learning activities remains relatively low due to a lack of AI-related pedagogical training. The report also emphasized the need to improve digital competencies so that teachers can meaningfully integrate AI into the learning process.

Ethical concerns further complicate the situation, particularly in relation to data privacy, student safety, and the possibility of AI-generated misinformation. Young learners are especially vulnerable to the risks of inappropriate content and over-dependence on automated assistance. In Indonesian language learning, ethical issues also surface regarding plagiarism, as students may increasingly rely on AI-generated texts rather than developing their own writing abilities. These concerns underscore the importance of clear institutional guidelines that regulate the appropriate, safe, and educationally meaningful use of AI in primary schools. Such guidelines must encompass not only technical rules but also pedagogical standards that ensure technology supports rather than replaces the humanistic dimensions of literacy learning (Apriliani 2024; Vaccino-salvadore 2023).

Although research on AI in education has expanded considerably, studies that specifically investigate AI integration in primary-level Indonesian language learning remain scarce. Most existing literature focuses on AI use in STEM-related subjects or discusses AI integration at a general level without examining the unique linguistic and cultural challenges inherent in language learning. Yet effective Indonesian language instruction requires attention to cognitive, linguistic, and sociocultural dimensions that automated systems cannot fully replicate (Sabaruddin et al. 2024). Furthermore, many local studies that explore teachers' perceptions of AI are still limited in scope, often providing only descriptive insights rather than an in-depth analysis of the practical challenges teachers face in the classroom.

This creates a knowledge gap, especially considering that Indonesian language teachers hold a fundamental role in shaping students' literacy foundations. Understanding how these teachers perceive AI whether as a supportive tool, a disruptive force, or something in between is crucial for designing effective and sustainable implementation strategies. Addressing this gap allows research to illuminate the real experiences of teachers, the barriers they encounter, and the pedagogical decisions they make when integrating AI into literacy instruction. By centering the perspectives of primary school Indonesian language teachers, this study contributes to a more contextualized understanding of AI's pedagogical implications and provides practical recommendations tailored to the specific needs of Indonesian primary education (Citrawati et al. 2025; Ningsih et al. 2025).

The novelty of this research lies in three major aspects. First, it provides empirical evidence based on direct classroom observations and interview data from Indonesian language teachers at the elementary school level a context that has rarely been studied in depth in educational AI research. Second, it offers a detailed look at how teachers actually mediate AI-generated feedback during literacy instruction, including how they select, modify, and re-explain AI suggestions to students a dimension that has not been explicitly addressed in previous research. Third, it identifies specific challenges emerging in the local Yogyakarta context, such as limited elementary school digital infrastructure, variations in teachers' digital literacy skills, and technical policy needs at the elementary school level, thus providing a more contextual, practical contribution to education policy formulation.

METHODS

This study employed a qualitative descriptive research approach aimed at exploring elementary school teachers' perceptions and experiences in utilizing Artificial Intelligence (AI) within Indonesian language learning. A qualitative design was selected because it allows rich exploration of meaning, context, and real classroom practices that cannot be captured through quantitative measures alone. Such an exploratory approach is widely recommended in studies investigating emerging technologies in education where user interpretation and localized practices are central to understanding adoption processes. The participants consisted of twelve Indonesian language teachers from public and private elementary schools in Yogyakarta. The sample size was based on data saturation. Yogyakarta was selected due to its status as an education and digital innovation hub. These teachers were selected using purposive sampling to ensure that all participants had experience using AI-supported tools such as automated feedback platforms, chatbot learning aids, or AI-assisted reading and writing applications. Purposive sampling is commonly used in qualitative research to capture diverse yet relevant perspectives and to ensure data richness rather than representativeness (Creswell 2017; Levitt et al. 2018).

Data collection was carried out through several interconnected stages to gain a comprehensive understanding of teachers' real experiences with AI. First, permission was obtained from school principals, after which qualified teachers were invited to participate and provided informed consent. Semi-structured interviews served as the primary method of data collection, each lasting approximately thirty to forty-five minutes. This format was chosen because it balances structure with flexibility, allowing the researcher to pursue emerging ideas while maintaining comparability across participants (Karaoglu and Seher 2015). Interviews explored teachers' perceptions of AI, its benefits and limitations, ethical concerns, and institutional support for technology integration. In addition, classroom observations were conducted when accessible to document teacher–student interactions with AI tools in natural instructional contexts. Observation is considered a key technique in qualitative research as it captures actual behaviors and instructional decisions that may not fully surface through interviews. To strengthen interpretation, supplementary documents such as lesson plans, student AI-generated assignments, and technology policy notes were collected to triangulate data and understand how AI was represented in planning and assessment practices (Fahruddin 2024; Setiawan and Aji 2024).

Several research instruments were employed, including an interview guide, observation protocol, and document review sheet. The interview guide contained open-ended questions addressing teachers' knowledge of AI, practical classroom challenges, instructional strategies, and perceived impact on literacy development. Semi-structured interviews are especially suitable for studies involving teachers' beliefs because they enable deeper engagement with personal reasoning and professional judgment. The observation protocol was designed to record behaviors and contextual features observed during AI-assisted lessons, including the types of tools used, student responses, teacher mediation, and emergent constraints. Document analysis followed a structured review template to examine how AI was embedded into formal instructional planning and evaluation. Using multiple instruments improved the depth and credibility of the findings, as data from one source could corroborate or clarify patterns from another.

Data analysis employed thematic analysis following systematic qualitative procedures. All interview recordings and field notes were transcribed verbatim before coding began. The researcher then conducted open coding line by line to identify recurring ideas, terms, and concepts relevant to teachers' perceptions and practices. This method aligns with qualitative analytical traditions that view coding as a process of constructing meaning rather than merely categorizing text. Codes were then grouped into thematic categories such as perceived usefulness of AI, teacher mediation strategies, ethical concerns, digital readiness, and institutional support. Data triangulation was conducted by comparing interview data, classroom observation records, and instructional

documents such as lesson plans and student assignments. Discrepant findings were clarified through follow-up interviews.

RESULTS

Data triangulation was carried out by systematically comparing three sources of evidence: interview transcripts, classroom observation notes, and instructional documents. Teachers' interview statements regarding AI use were cross-checked with direct classroom observations to confirm actual instructional practices. In addition, lesson plans and examples of student assignments generated through AI were examined to verify the consistency between teachers' reported practices and documented instructional outputs. Any discrepancies between sources were revisited through follow-up questioning to ensure the credibility and dependability of the research findings. However, while participants agreed that AI has the potential to improve learning efficiency, they also emphasized that such benefits can only be achieved when teachers themselves possess a sufficient level of digital literacy to operate, supervise, and critically evaluate AI-generated suggestions (Pratiwi and Utami 2023).

In one observed Grade 5 class, students used AI to revise descriptive paragraphs, which were later discussed with the teacher to assess appropriateness and correctness. This shows AI functioned as a supportive tool under teacher supervision. Teachers noted improvements in students' ability to correct basic writing errors, and some reported increased enthusiasm from students who enjoyed interacting with AI systems. Nonetheless, teachers also observed that students occasionally relied too heavily on AI output, adopting suggested revisions without fully understanding the underlying grammatical or linguistic reasoning. This tendency raised concerns that AI might inadvertently reduce students' opportunities to engage in analytical thinking and independent language construction if not carefully mediated (Dincer 2024; Untsa and Nuha 2025).

In addition to pedagogical themes, the study found that institutional readiness significantly influenced the extent and quality of AI implementation. Schools with sufficient devices, stable internet access, and administrative policies encouraging the use of digital tools demonstrated more consistent integration of AI in instruction. In contrast, teachers in less equipped schools struggled with limited device availability, unreliable connectivity, and the absence of structured training programs. Many participants expressed the view that the success of AI in language learning is closely tied to system-level support, particularly in the form of ongoing professional development. Without such support, teachers often learned to use AI independently, which led to uneven implementation and uncertainty about best practices (Dincer 2024).

Ethical considerations also emerged strongly in the findings. Teachers voiced concerns related to student data privacy, the accuracy and cultural relevance of AI-generated content, and the possibility of plagiarism or lack of originality in student writing. Some teachers shared experiences in which AI produced sentences or ideas that were grammatically correct but contextually inappropriate for Indonesian cultural norms or primary-grade language expectations. Others noted that younger students, who are still developing foundational literacy skills, may struggle to distinguish between their own work and AI-generated suggestions. These observations reinforced teachers' belief that AI must be integrated carefully, with clear instructions and supervision, to ensure that students learn not only how to produce text but also how to understand and evaluate the meaning behind it (Nugroho et al. 2024).

Despite these concerns, teachers demonstrated an overall positive attitude toward adopting AI as long as its use remained aligned with the goals of literacy development rather than replacing essential human-centered teaching. Many teachers explained that AI can function as a helpful partner when treated as an instructional supplement that assists with technical aspects of writing, while teachers continue to guide higher-level thinking, interpretation, and creative expression. This

perspective reflects a balanced understanding that AI is most effective when used to support, rather than dominate, the learning process. From the participants' reflections, it became clear that the central role of teachers remains irreplaceable in shaping meaningful, culturally grounded Indonesian language learning experiences, particularly for students in the early stages of literacy development (Sumakul, Hamied, and Sukyadi 2022).

DISCUSSION

The findings of this study portray a nuanced picture in which elementary school teachers regard Artificial Intelligence (AI) as a promising pedagogical aid for Indonesian language learning while simultaneously expressing significant reservations about its practical and ethical implications. This ambivalence aligns with the Technology Acceptance Model (TAM) literature, which posits that perceived usefulness and perceived ease of use drive adoption intentions (Davis, 1989; Pranata and syamsujuliato,2025), but extends that framework by highlighting domain-specific concerns unique to language education namely, contextual meaning, cultural nuance, and developmental appropriateness. Where TAM explains *whether* teachers might adopt AI, the present findings deepen understanding of *how* and *under what conditions* adoption becomes pedagogically meaningful in the Indonesian language classroom. Teachers in this study accepted AI primarily for low-level corrective tasks (spelling, punctuation), instructional preparation, and scaffolded practice, which corroborates earlier reports that AI often functions best as an efficiency tool rather than a substitute for teacher judgment (Mutammimah et al. 2024; Zainuddin and Bukhari 2024).

Comparing these findings with prior empirical studies reveals both consonance and divergence. Similar to studies in K-12 contexts elsewhere, this research found that AI can increase students' engagement with routine literacy tasks and provide rapid, individualized feedback (Syarifah and Fakhruddin 2024). However, contrary to optimistic claims that AI uniformly enhances higher-order writing skills (e.g., argumentation, narrative depth), our data show that without deliberate teacher mediation, AI tends to promote surface-level corrections rather than deep rhetorical development (Sadigzade 2025). This suggests that prior positive results reported in experimental or tool-centric studies may not fully translate to classroom realities absent teacher scaffolding and contextual adaptation.

Institutional readiness emerged as a decisive moderator of AI's pedagogical impact. Schools with adequate infrastructure and explicit policies reported more integrated and purposeful AI use, whereas resource-constrained schools faced fragmented or tokenistic implementations findings echoed by (Kim 2025). This reinforces the argument that technology adoption must be considered at multiple levels: individual teacher agency, classroom practice, and school/systemic support. The result complements organizational change theory in education, which emphasizes alignment across policy, professional learning, and material resources, and points to the insufficiency of deploying AI without parallel investment in teacher training and governance.

Ethical concerns reported by participants data privacy, inappropriate cultural content, and potential for increased plagiarism correspond with broader critiques in the AI-in-education literature (Siau and Wang 2020). Importantly, teachers in this study articulated ethical worries through a child-development lens: they feared that unmediated AI interactions could undermine students' identity formation, authorship understanding, and critical language faculties. This child-centered ethical framing extends prior research by emphasizing developmental vulnerability as a distinct consideration in primary education settings (Salloum 2024). Consequently, ethical frameworks for AI in schools should incorporate age-specific safeguards and explicit guidelines for promoting student authorship and critical evaluation of AI outputs.

Methodologically, this study contributes by integrating multimodal evidence interviews, classroom observations, and document analysis to produce a triangulated account of teacher

practice. This mixed-evidence qualitative approach addresses limitations in earlier studies that relied predominantly on surveys or tool-generated metrics. By foregrounding observed classroom dynamics, the study reveals micro-practices (e.g., teacher revoicing of AI feedback, selective acceptance or rejection of suggestions) that are often invisible in self-report data. Such methodological nuance supports calls for research designs that capture both stated attitudes and enacted teaching behaviours when evaluating educational technologies (Nolan et al. 2024; Tay 2024).

Theoretically, the findings invite an expansion of TAM and digital pedagogy frameworks to include a *pedagogical mediation* construct conceptualizing teachers not just as adopters but as active mediators who interpret, contextualize, and remoralize AI outputs for classroom learning. This construct synthesizes insights from teacher agency theory and sociocultural perspectives on literacy, suggesting that effective AI integration depends on teachers' capacity to translate algorithmic feedback into dialogic learning opportunities (An et al. 2023). Such a theoretical extension can inform both future empirical work and professional development models that center teacher decision-making as pivotal for meaningful AI use.

Practically, the study points to several actionable recommendations. First, professional development must move beyond tool training toward pedagogical coaching that models how to leverage AI outputs for higher-order literacy tasks. Second, curriculum designers and ed-tech developers should co-design language-aware AI tools with teachers, ensuring cultural and linguistic appropriateness. Third, policymakers should establish age-sensitive data protection and academic integrity policies tailored to primary education contexts (Donley 2024; Kamarullah, Sarinauli, and Syahmidi 2024).

Limitations of the current study must be acknowledged. The purposive sample from a limited geographic region may constrain transferability to other Indonesian provinces with different resource profiles. In addition, while qualitative depth provides rich contextual insights, it does not quantify the magnitude of AI's impact on specific literacy outcomes. Future research should therefore combine longitudinal quasi-experimental designs with qualitative inquiry to measure learning gains and to observe how teacher mediation practices evolve over time. In conclusion, this study complements and complicates the emerging consensus on AI in education: AI holds clear promise for enhancing routine aspects of Indonesian language learning, but its pedagogical value is contingent on teacher mediation, institutional support, and ethically grounded implementation. By centering teacher perspectives and classroom practices, the research offers both theoretical expansions and practical pathways for integrating AI in developmentally appropriate and culturally responsive ways within primary language education (Adha et al. 2019; Budi et al. 2024; Hasanah et al. 2025).

CONCLUSION

The findings of this study demonstrate that Artificial Intelligence presents considerable potential for supporting Indonesian language learning in elementary schools, particularly in providing immediate feedback, personalizing learning tasks, and reducing teachers' administrative workload. However, its effectiveness is contingent upon the digital literacy of teachers, the robustness of school infrastructure, and the presence of supportive institutional policies that guide appropriate use in the classroom. The results also show that AI tends to be most beneficial when used to complement rather than replace human-led instruction, with teachers acting as active mediators who interpret, contextualize, and refine AI-generated feedback to support deeper literacy development. Ethical considerations including concerns about plagiarism, data security, and the cultural relevance of AI-generated content further reinforce the need for careful supervision and pedagogical framing, particularly for young learners who are still developing foundational understanding of authorship and written expression.

Based on these conclusions, several recommendations can be proposed. Schools and education authorities should prioritize professional development that enables teachers not only to operate AI tools but also to integrate them meaningfully into learning strategies that stimulate higher-order thinking, interpretation, and creativity. Technology developers and curriculum designers should collaborate to produce AI systems that are linguistically and culturally aligned with the needs of Indonesian primary education. Policymakers must also develop clear ethical guidelines and age-sensitive data protection frameworks to ensure that AI use remains safe, constructive, and educationally grounded. This study is limited by its geographic scope, which focused on teachers from a single region, and by the qualitative nature of its design, which does not measure the extent of AI's impact on learning outcomes quantitatively. Future research may involve wider samples across diverse educational contexts, longitudinal studies to track changes in teacher practice over time, and mixed-method approaches to evaluate the measurable effects of AI on literacy growth. Nonetheless, the study contributes meaningful insight into the realities of AI implementation in primary language learning and emphasizes the continuing centrality of teacher expertise in shaping meaningful and human-centered educational innovation.

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