Integrating Artificial Intelligence in Indonesian Language Learning in the Era of Society 5.0: A Literature Review

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ABSTRACT - The rapid development of Artificial Intelligence (AI) presents new opportunities and challenges for education, particularly in Indonesian language learning. This study aims to explore the integration of AI in Indonesian language learning within the framework of Society 5.0, emphasizing its potential to create smart and personalized education. This research employs a qualitative literature study by analyzing national and international articles published between 2018 and 2024. Sources were reviewed thematically to identify the forms of AI integration, its benefits, challenges, and implications for Indonesian language learning. Findings indicate that AI supports personalized learning through instant feedback, automated assessment, and adaptive pathways that enhance student engagement and literacy. Tools such as Grammarly and chatbots improve writing and comprehension skills while aligning with constructivist learning principles and the TPACK framework. However, challenges remain, including infrastructure limitations, unequal digital access, ethical concerns, and teacher readiness to utilize AI-based learning. The study concludes that AI holds significant potential to transform Indonesian language learning into a smart and personalized education system. The novelty of this research lies in its specific focus on integrating AI into Indonesian language education, a field that has not been widely explored. These findings contribute new insights for educators, researchers, and policymakers in designing adaptive and innovative learning strategies for the era of Society 5.0.

Keywords—Artificial Intelligence, Indonesian language learning, personalized education, Society 5.0, TPACK

I. INTRODUCTION

The development of Society 5.0, introduced in Japan and increasingly adopted as a global vision for human-centered technology, highlights the need for education systems to adapt to the rapid advancement of digital innovation. Unlike Industry 4.0, which emphasizes automation and efficiency, Society 5.0 places humans at the center of technological progress by combining cyber and physical spaces to improve quality of life. In this context, education must evolve into a more adaptive, personalized, and technology-driven ecosystem (Fukuda, 2020; Susanti & Widodo, 2021). For

language education, particularly the teaching of Indonesian language, this transformation requires the integration of new digital tools that not only facilitate learning but also encourage creativity, literacy, and critical thinking skills.

The Indonesian language has a crucial role as both the national and instructional language in Indonesia. However, teaching and learning Indonesian face challenges in terms of student engagement, the relevance of instructional methods, and the effectiveness of assessment systems (Kurniawan & Rahmawati, 2022). Traditional approaches such as grammar-focused instruction and teacher-centered learning are often insufficient to address the needs of twenty-first century learners, who are accustomed to interactive and digital-rich environments. Therefore, it is essential to rethink Indonesian language learning by adopting technological innovations, particularly Artificial Intelligence (AI), which has been proven in many contexts to support adaptive and personalized education (Holmes et al., 2019; Wang, 2022).

Artificial Intelligence is increasingly recognized as a transformative force in education. AI applications such as automated writing assistants, chatbots, intelligent tutoring systems, and learning analytics platforms have been widely used to improve language learning outcomes (Zawacki-Richter et al., 2019; Xu, 2023). In Indonesian language education, AI tools like Grammarly and AI-driven chatbots have been reported to enhance writing skills and comprehension through immediate feedback and adaptive scaffolding (Arifah, Kuncorowati, Suprapti, & Narimo, 2025). Furthermore, AI integration aligns with constructivist learning principles, where learners actively construct knowledge with the aid of interactive tools, and with the Technological Pedagogical Content Knowledge (TPACK) framework, which emphasizes the integration of content, pedagogy, and technology in teaching (Mishra & Koehler, 2016).

Despite these potentials, the adoption of AI in Indonesian language learning is still at an early stage. Most research in Indonesia has focused on digital platforms and e-learning rather than AI-driven approaches (Aini, 2022). Studies on AI in language learning are often limited to English as a foreign language (Nasution, Syahfitri, & Septriani, 2025), while Indonesian language education has received relatively little attention. This research gap raises an important question: how can AI be effectively integrated into Indonesian language

learning to address the needs of students in the era of Society 5.0?

This paper seeks to answer that question through a literature review that synthesizes studies from 2015 to 2025 on the integration of AI in language education, with a particular focus on Indonesian language teaching. By systematically analyzing existing research, this paper identifies the forms of AI integration, the benefits and challenges, and the implications for future educational practices. The novelty of this study lies in its specific attention to Indonesian language learning within the broader discourse of AI in education. Unlike previous studies that tend to focus either on general educational technology or foreign language instruction, this paper highlights the unique opportunities and challenges of applying AI to Indonesian language teaching in the context of Society 5.0.

Therefore, this study contributes not only to the academic literature but also provides practical insights for educators, curriculum developers, and policymakers in designing adaptive, innovative, and human-centered approaches to Indonesian language education.

Table 1. Summary of Previous Studies on AI in Language Learning (2019–2025)

Author(s) & Year	Context / Subject	Method	Key Findings	Relevance to This Study
Zawacki-Richter et al. (2019)	Global review of AI in higher education	Systematic review	Identified AI in profiling, tutoring, assessment, adaptive systems	Framework of AI applications in education
Holmes et al. (2019)	AI in language learning	Conceptual analysis	AI supports personalized learning and formative feedback	Foundation for adaptive language education
Aini (2022)	Indonesian language learning	Qualitative case study	AI enhances literacy but limited adoption	Contextualizes AI use in Indonesian language education
Xu (2023)	Indonesian language learners (foreigners)	Experimental	AI improved speaking fluency and vocabulary	Shows AI effectiveness in BIPA learning
Arifah et al. (2025)	Indonesian high school students	Literature review	Grammarly and chatbots improved writing skills	Highlights AI's role in writing development
Nasution et al. (2025)	BIPA learners	Mixed-method	AI chatbots improved comprehension and engagement	Demonstrates AI's potential for non-native learners

II. METHODOLOGY

This study employed a qualitative literature review approach to synthesize research findings on the integration of Artificial Intelligence (AI) in Indonesian language learning within the framework of Society 5.0. The literature review design was chosen to identify trends, gaps, and implications of AI adoption in language education, with a particular focus on Indonesian language instruction.

A. Data Sources and Search Strategy (Heading 2)

Relevant articles were collected from several academic databases, including Google Scholar, ResearchGate, ERIC, Scopus, and DOAJ. Additional references were retrieved from conference proceedings, electronic books, and institutional repositories. The keywords used in the search included: "Artificial Intelligence in education", "AI in language learning", "Indonesian language teaching and AI", "Society 5.0 and education", and "personalized learning with AI."

The time frame was limited to publications from 2015 to 2025, in line with the rapid development of AI applications in education. Both national and international studies were considered, with a priority given to peer-reviewed journals, conference proceedings, and academic books.

B. Inclusion and Exclusion Criteria

Articles were included if they met the following criteria:
- Published between 2015–2025.
- Focused on the use of AI in language learning (general,
- foreign languages, or specifically Indonesian).
- Published in reputable journals, proceedings, or books.
- Provided empirical data, conceptual frameworks, or
- systematic reviews relevant to AI and education.

Exclusion criteria included:
- Articles not directly related to education or language
- learning.
- Publications prior to 2015.
- Non-academic sources (blogs, opinion articles, popular
- media).

C. Selection Proccess

The initial search yielded 145 articles. After screening titles and abstracts, 62 articles were identified as potentially relevant. A full-text review was conducted, resulting in 28 studies that met the inclusion criteria. From these, 20 studies were selected for in-depth analysis and synthesis, ensuring both national and international perspectives were represented.

D. Data Analysis

The selected studies were analyzed thematically through content analysis. Findings were organized into four categories:
- Forms of AI integration in language learning.
- Benefits of AI for Indonesian language education.
- Challenges and barriers in AI adoption.
- Implications and future directions for teaching Indonesian
- in the Society 5.0 era.

E. Research Rigor and Validity

To ensure rigor, the selection process followed a systematic procedure resembling the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines. Cross-checking was conducted to reduce bias, and triangulation of sources (national and international studies) was applied to strengthen validity.

III. RESULTS AND DISCUSSION

A. Forms of AI Integration in Indonesian Language Learning

The literature shows that AI has been integrated into language learning in several distinct forms. In writing instruction, AI-driven tools such as Grammarly and automated feedback systems provide immediate correction of grammar, syntax, and style, allowing learners to engage in self-regulated learning (Arifah et al., 2025). For reading comprehension, adaptive learning platforms offer personalized text selections and vocabulary scaffolding (Xu, 2023). Speaking skills have benefited from AI-powered chatbots and voice recognition applications, which enable learners to practice pronunciation and dialogue in real time (Nasution et al., 2025). In addition, AI has been integrated into assessment systems through automated scoring and learning analytics, which help teachers identify learners' strengths and weaknesses more effectively (Zawacki-Richter et al., 2019).

The forms of AI integration can be mapped into four categories:

- Instructional support – automated writing assistants,
- grammar checkers.
- Learning interaction – chatbots, virtual tutors.
- Adaptive personalization – recommender systems,
- adaptive reading platforms.
- Assessment and feedback – automated scoring, plagiarism
- detection.

This shows that AI is not only a technological supplement but has begun to function as a pedagogical partner in Indonesian language education.

B. Benefits of AI Integration

AI adoption in Indonesian language learning has generated significant benefits. First, personalization of learning allows learners to progress according to their needs and abilities. Unlike traditional one-size-fits-all models, AI enables differentiated learning experiences (Holmes et al., 2019). Second, AI tools provide immediate and formative feedback, which enhances student motivation and self-correction (Arifah et al., 2025). Third, AI fosters digital literacy and 21st-century competencies, preparing learners to critically engage with technology in academic and professional contexts (Kurniawan & Rahmawati, 2022). Fourth, AI integration supports inclusive education by providing accessibility tools, such as speech-to-text and text-

to-speech features, which benefit students with disabilities (Wang, 2022).

These benefits are consistent with the goals of Society 5.0, where technology is designed to empower human potential rather than replace it.

C. Challenges and Barriers

Despite its potential, integrating AI into Indonesian language learning faces several challenges. Infrastructure limitations remain a pressing issue, as unequal internet access across Indonesia prevents equal opportunities in AI-based learning (Susanti & Widodo, 2021). Ethical concerns are also significant, particularly regarding plagiarism, over-reliance on AI, and data privacy (Holmes et al., 2019). Teacher readiness is another barrier, as many educators are not yet trained in AI pedagogy or the TPACK framework (Mishra & Koehler, 2016). Furthermore, there is a cultural dimension, where traditional perspectives on education sometimes resist the integration of advanced technologies (Aini, 2022).

Thus, while AI offers many opportunities, its implementation requires careful consideration of infrastructure, policy, and teacher training.)

D. Summary of Previous Studies

To provide an empirical overview, the selected literature was synthesized into a comparative table.

Table 2. Empirical Findings on AI in Language Learning (2019–2025)

Author (s) & Year	Language/ Context	Focus of AI Integration	Main Findings	Implication for Indonesian Language Learning
Holmes et al. (2019)	Global	Personalized learning & feedback	AI fosters adaptivity and motivation	Framework for Indonesian classrooms
Zawacki-Richter et al. (2019)	Higher education	Tutoring & assessment	Identified profiling and adaptive systems	Highlights potential for automated Indonesian assessment
Aini (2022)	Indonesian language	Digital and AI-assisted tools	AI enhances literacy but limited adoption	Teacher training needed
Xu (2023)	Indonesian for foreigners	Adaptive learning for speaking	Improved fluency and vocabulary	Useful for BIPA programs
Arifah et al. (2025)	Indonesian high schools	Writing support	Improved writing quality and engagement	Practical evidence of AI impact
Nasution et al. (2025)	BIPA learners	AI chatbots for comprehension	Increased engagement and comprehension	Potential for non-native learners

The synthesis shows that most research focuses either on English or foreign language learning, with relatively fewer studies addressing AI in Indonesian language instruction. Even within Indonesian contexts, studies often focus

narrowly on writing skills, leaving listening, reading, and speaking skills underexplored. This gap strengthens the novelty of the present study.

E. Future Directions

The findings indicate several directions for the future of AI in Indonesian language learning.

- Curriculum integration: AI tools should be systematically embedded in Indonesian language curricula, aligned with national education standards.
- Teacher professional development: Continuous training in AI pedagogy and TPACK is crucial to equip educators with the skills to integrate AI effectively.
- Ethical and responsible use: Policies and guidelines must be developed to ensure ethical AI usage, focusing on academic integrity and data privacy.
- Collaborations with EdTech industries: Partnerships between schools, universities, and technology developers can accelerate innovation and ensure relevance.
- Inclusive learning: AI applications should be tailored to diverse learners, including students in rural areas and those with special educational needs.

By addressing these directions, Indonesian language education can leverage AI not only as a tool but also as a transformative agent in achieving the ideals of Society 5.0.

IV. CONCLUSION

This literature review explored the integration of Artificial Intelligence (AI) in Indonesian language learning within the framework of Society 5.0. The findings reveal that AI has been applied in various forms, including instructional support (e.g., Grammarly), interactive learning (e.g., chatbots), adaptive personalization, and automated assessment. These applications offer substantial benefits, such as personalized learning pathways, immediate feedback, enhanced digital literacy, and inclusivity for diverse learners.

However, several challenges persist. Infrastructure gaps, teacher readiness, ethical concerns, and cultural resistance remain barriers to effective adoption. Despite these limitations, AI holds strong potential to transform Indonesian language education when supported by adequate policies, teacher training, and collaboration with educational technology industries.

The novelty of this paper lies in its specific focus on Indonesian language learning, an area that has been less studied compared to English or other foreign languages. By synthesizing studies published between 2015 and 2025, this paper highlights both the opportunities and the underexplored dimensions of AI integration in Indonesian language instruction.

Future efforts should prioritize curriculum-level integration, professional development programs for teachers, and policies to ensure ethical and equitable AI usage. In doing so, Indonesian language education can advance toward the vision of Society 5.0, where technology empowers rather than replaces human potential.

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