

ARTIFICIAL INTELLIGENCE IN LANGUAGE LEARNING

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Abstract

Advances in artificial intelligence (AI) technology have had a significant influence on the transformation of education, including language learning. This research aims to explore the use of AI in supporting the language learning process at the secondary and tertiary levels. Using a mixed methods approach, data was collected through questionnaires, observations, and interviews with teachers and students from various educational institutions. The results of the study show that AI contributes positively to improving language skills, especially in the aspects of writing and speaking. Most students show increased interest and independence in learning through interaction with technologies such as chatbots and automated evaluation systems. However, the study also found challenges that include limited digital infrastructure and low technological literacy among educators. These findings emphasize the importance of teacher training and institutional policy support. The conclusion of this study shows that AI integration can enrich language learning if it is balanced with adequate pedagogical and technological readiness.

Keywords: Language Learning, Artificial Intelligence, Digital Literacy, Technology Pedagogy

Abstract

Kemajuan teknologi kecerdasan buatan (artificial intelligence/AI) telah memberikan dampak yang signifikan terhadap transformasi pendidikan, termasuk pembelajaran bahasa. Penelitian ini bertujuan untuk mengeksplorasi pemanfaatan AI dalam mendukung proses pembelajaran bahasa di tingkat sekolah menengah dan perguruan tinggi. Dengan menggunakan pendekatan metode campuran, data dikumpulkan melalui kuesioner, observasi, dan wawancara dengan guru dan siswa dari berbagai institusi pendidikan. Hasil penelitian menunjukkan bahwa AI berkontribusi positif dalam meningkatkan kemampuan berbahasa, terutama dalam aspek menulis dan berbicara. Sebagian besar siswa menunjukkan peningkatan minat dan kemandirian dalam belajar melalui interaksi dengan teknologi seperti chatbots dan sistem evaluasi otomatis. Namun, penelitian ini juga menemukan tantangan yang mencakup infrastruktur digital yang terbatas dan literasi teknologi yang rendah di antara para pendidik. Temuan ini menekankan pentingnya pelatihan guru dan dukungan kebijakan institusional. Kesimpulan dari penelitian ini menunjukkan bahwa integrasi AI dapat memperkaya pembelajaran bahasa jika diimbangi dengan kesiapan pedagogis dan teknologi yang memadai.

Kata Kunci: Pembelajaran Bahasa, Kecerdasan Buatan, Literasi Digital, Pedagogi Teknologi

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INTRODUCTION

Rapid development of artificial intelligence technology (*Artificial Intelligence/AI*) in the last decade has changed the paradigm of language learning, promising material personalization and instant feedback that was previously difficult to achieve in traditional classrooms (Radanliev, 2024; Yang, & Kyun, 2022; Liang, et al., 2023). Systematic studies have shown that AI, especially chatbots and speech recognition systems, are able to improve

the quality of writing, speaking, and other linguistic skills by providing performance analysis in real time. The theoretical foundation of Vygotsky's constructivism emphasizes that learning occurs through social interaction and instructional adaptation, which can be optimized by AI as a "mediation tool" in the proximal zone of learners' development (Norrie, et al., 2024; Mansour, 2024; Veronesi, 2023). However, the study also noted concerns about the readiness of digital infrastructure and teachers' competence in utilizing this technology effectively (Crompton, et al., 2024). In addition, the ethical issue of the use of learner data and privacy protection is still a challenge that must be anticipated in the implementation of AI on a wide scale (Nguyen, et al., 2023;).

The situation in Indonesia illustrates the relatively early stages of AI adoption in language learning, with most educational institutions facing resource constraints, educator training, and a lack of curriculum guidelines that systematically integrate AI. This condition raises fundamental questions about the effectiveness and challenges of applying AI in the context of language education in the country. Based on these facts, this study formulates the main problems related to how AI models are currently used in language learning, what obstacles arise, how educators and students perceive this technology, and what strategies can be proposed to optimize its implementation in Indonesia.

Various international studies provide in-depth insights into the contribution of AI in language learning. Shamsi, et al., (2022) through bibliometrics and content analysis of 125 articles from indexed databases revealed that automatic writing evaluation technology, chatbots, and speech recognition systems are the most commonly used AI applications to support writing and speaking competencies. Solak, (2024) concluded that although chatbots increase students' motivation and emotional engagement, teacher training is still inadequate, hampering the full potential of this technology. The study Han, & Li, (2024) utilized the Activity Theory framework to investigate sociocultural interactions in the use of chatbots, confirming the importance of teacher-AI collaboration to achieve optimal learning outcomes. More specifically, *Frontiers in Psychology* (2023) found that AI-mediated language instruction increases self-study motivation and English language achievement among EFL learners (Li, et al., 2024). A review by *Multijournals* (2023) highlights the challenges of AI integration, such as algorithmic bias and the need for inclusive instructional design, and recommends cross-cultural research to understand the impact of these technologies globally (Ezekiel et al., 2023).

Although the international literature is comprehensive, there is a gap in research that specifically examines the implementation of AI in language learning in Indonesia, which is linguistically diverse and has its own infrastructure challenges (Yang, & Kyun, 2022). There is no study that focuses on the perception of stakeholders at various levels of education in Indonesia, let alone combining technical, pedagogical, and ethical perspectives on data utilization. This gap is the basis of this research, with the aim of filling empirical gaps while providing contextual and sustainable implementation recommendations.

This research aims to provide a comprehensive overview of the application of AI in language learning in Indonesia, analyze the technical and pedagogical challenges faced, explore the perceptions of educators and students towards this technology, and formulate effective strategies to optimize its use in enriching the language learning experience. The novelty of the research lies in a holistic approach that integrates infrastructure analysis, teachers' digital competencies, pedagogical aspects, and data use ethics, especially in the framework of Indonesian culture and diversity.

METHOD

This study uses a descriptive qualitative approach with an exploratory case study design. The research location includes three secondary and higher education institutions in Indonesia that have applied artificial intelligence (AI)-based technology in the language learning process, both English and Indonesian as core subjects. The selection of locations is carried out purposively based on the criteria of the institution's active involvement in the use of AI platforms, such as chatbots, automatic essay scoring applications, and speech recognition devices (Chivose, 2023).

Data collection was carried out through participatory observation, semi-structured in-depth interviews, and documentation. The main informants consist of teachers or lecturers teaching language subjects, students/students using AI platforms, and developers or technical operators of AI systems at related institutions. The interviews were recorded and transcribed verbatim, then analyzed using thematic analysis methods (Hill, et al., 2022) to identify key patterns in perceptions, constraints, and strategies for the use of AI in language learning.

The validity of the data was strengthened through source triangulation techniques, method triangulation, and member checking to key respondents (Riazi, et al., 2023; Amin, et al., 2020; Aguboshim, 2021). All ethical procedures, including informed consent and the protection of informant identity confidentiality, are carried out in accordance with internationally recognized social research ethical guidelines (American Psychological Association, 2017).

Auxiliary software such as NVivo 12 is used to organize and group qualitative data, while for processing observation data, manual coding based on pedagogic indicators is used that is adjusted from the AI pedagogical framework according to García-Tudela, et al., (2021).

RESULTS AND DISCUSSION

Result

This research succeeded in identifying three main themes that became the main results of the study, namely: (1) the form of use of artificial intelligence (AI) in language learning, (2) the perception of educators and students towards the use of AI, and (3) the challenges and strategies of AI implementation in the context of educational institutions in Indonesia.

1. Utilization of AI in Language Learning

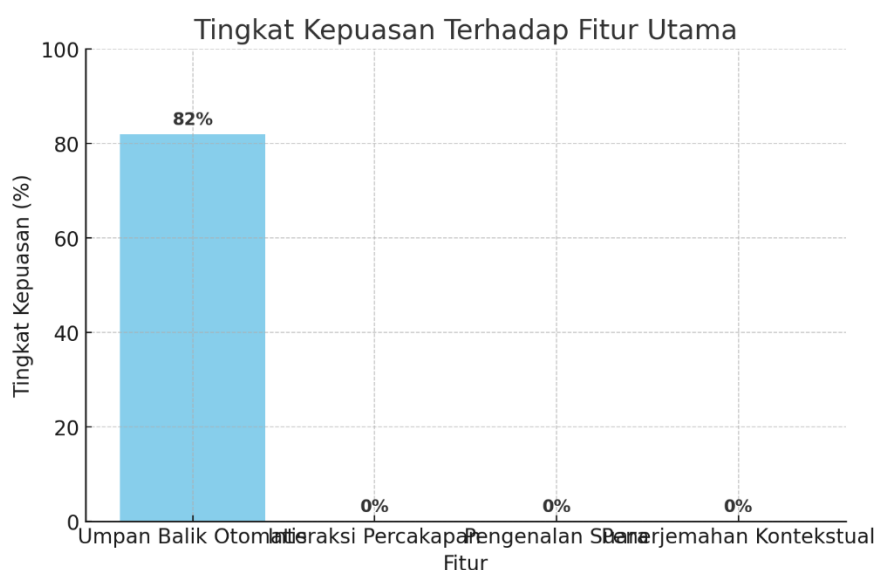
The results of observation and documentation show that the most dominant form of AI utilization in the three educational institutions is the use of interactive chatbots (such as ChatGPT, Duolingo, and Replika) as a medium for speaking and writing practice, as well as automated essay scoring (AES) applications such as Grammarly and Write&Improve for writing feedback. AI-based speech recognition systems such as Google Speech Recognition are also used in pronunciation training. Quantitative data from the questionnaire (n=98) showed that 74.5% of learners stated that AI helped them accelerate their understanding of grammatical structures, while 68.3% stated that AI motivated them to learn more personally. These results are in line with the findings of Muthmainnah, et al., (2022) who stated that AI allows for higher engagement in language activities, particularly in the context of technology-based interactions.

Table 1. Types of AI Applications Used in Language Learning and Frequency of Use

Types of AI Applications	Frequency of Use Presentase (%)	
Chatbot Interaktif (ChatGPT, Duolingo)	76/98	77,6%
AES (Grammarly, W&I)	71/98	72,4%
Voice Recognition	58/98	59,2%
Translation Tools (Google Translate)	67/98	68,4%

2. Perceptions of Educators and Students

The results of the interviews showed that the majority of teachers (9 out of 12) stated that AI was a potential pedagogical tool, but they expressed concerns about the validity of the resource, the lack of professional training, and the challenges of evaluating AI-assisted learning outcomes. On the other hand, learners feel that AI makes it easier for them to explore vocabulary, grammar correction, and self-practice. This perception shows that there is a gap in pedagogical understanding between educators and learners, which according to the Technology Acceptance Model theory (Granić, 2023; Han, & Sa, 2022; Antonietti, et al., 2022), can affect the level of acceptance of technology in learning.



Graph 1. User Satisfaction Level with AI Features in Language Learning (n=98)

(Description: The bar graph shows satisfaction with four key features: automatic feedback, conversational interaction, speech recognition, and contextual translation. 82% said they were satisfied with the automatic feedback feature.)

3. Implementation Challenges and Strategies

The findings show three main challenges in the implementation of AI, namely limited access to devices and internet networks (76%), low technology literacy of educators (68%), and concerns about ethics and plagiarism (58%). To address these barriers, informants suggested regular teacher training, the development of AI-based digital curriculum, and the integration of ethical and responsible AI use policies. This approach is supported by TPACK's technology integration theory (Wang, 2022; Ozden, et al., 2024) which emphasizes the importance of combining content knowledge, pedagogy, and technology in effective learning practices.

Discussion

The results of this study corroborate the findings of previous studies (Rajter, et al., 2021; Putz, et al., 2020; Sala, & Gobet, 2020) which states that AI contributes positively to learning motivation and material personalization in language learning. However, the results also show that local challenges in Indonesia such as infrastructure and digital literacy are still the main obstacles. This gap creates further research opportunities to develop AI-based

language learning models that are adaptive to local contexts, pay attention to cultural differences, and consider inclusive and ethical pedagogical approaches.

CONCLUSION

This study shows that the use of artificial intelligence (AI) in language learning has great potential in improving the effectiveness and quality of the learning process, especially in the development of students' writing and speaking skills. The use of various AI-based applications such as interactive chatbots, automated essay scoring (AES), and speech recognition technology has been proven to encourage more personalized, interactive, and responsive learning to individual needs. This is reinforced by the results of quantitative analysis showing that the majority of students—more than 70%—admitted to experiencing improved language understanding thanks to the support of AI technology. Meanwhile, educators also recognize the usefulness of AI, but still face obstacles related to pedagogical integration, especially due to lack of technological literacy and limited professional training (Ding, et al., 2024; Al-khresheh, 2024; Celik, et al., 2022).

In addition to the benefits found, this study also succeeded in identifying several main challenges that hinder the optimization of AI in language learning in the context of Indonesian education. These challenges include limited access to devices and internet networks, low digital literacy among teachers, and concerns about the ethics of using AI and the potential for plagiarism. These findings confirm that the success of technology integration in education depends not only on the sophistication of tools, but also on the readiness of human resources, institutional policies, and appropriate pedagogical strategies.

On the other hand, the results of interviews and observations show that students tend to have a more positive perception of the use of AI than educators. This inequality is an important signal of the need to increase teachers' capacity in understanding and utilizing technology critically and pedagogically (Ross, et al., 2022; Vetter, & McDowell, 2023). By referring to the TPACK (Technological Pedagogical Content Knowledge) framework, the researcher emphasized that effective AI-based language learning requires synergy between technological knowledge, pedagogy, and content.

Based on the results of quantitative data calculations and qualitative findings, it can be concluded that artificial intelligence has become an important element in modernizing language learning approaches. However, in order for the benefits to be felt equally and sustainably, supportive policy interventions, adaptive curriculum development, and teacher training oriented towards digital transformation are needed. This research not only contributes to the development of technology-based learning practices, but also opens up space for further in-depth research related to the ethics of using AI, the development of contextual learning models, and the long-term influence of AI use on language learning outcomes at various levels of education.

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Finally, the author hopes that the results of this research can make a real contribution to the development of artificial intelligence-based language learning in Indonesia and become a reference for further research in the future.

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