

Artificial Intelligence As a Teaching Partner: The Role of Chatbots in Indonesian Language Learning

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ABSTRACT

This study examines the role of artificial intelligence (AI)-based chatbots as teacher partners in Indonesian language learning at the primary school level. Using a systematic literature review approach, this research synthesizes empirical evidence from reputable academic sources published between 2015 and 2024. The findings demonstrate that chatbots significantly enhance students' literacy skills, including reading comprehension, sentence construction, vocabulary development, and speaking fluency through adaptive interaction and instant feedback. Moreover, chatbots support teachers by enabling differentiated instruction, efficient task management, and personalized learning pathways. However, successful implementation requires strong digital infrastructure, teacher digital competence, culturally relevant language design aligned with national standards, and ethical oversight. This study contributes novelty by emphasizing human-AI pedagogical collaboration in Indonesian primary classrooms, positioning chatbots as complementary learning partners rather than instructional replacements. The results underscore the necessity of capacity-building programs for teachers, strategic policy development, and collaborative AI development to foster ethical and culturally grounded AI-assisted language learning.

INTRODUCTION

The development of artificial intelligence (AI) technology has had a significant impact on the transformation of education at various levels, including elementary schools. In Indonesia, the Ministry of Education, Culture, Research, and Technology emphasizes the importance of integrating technology into learning through Merdeka Belajar (Freedom of Learning) and digital platforms such as Guru Belajar (Teacher Learning) and Kampus Merdeka (Freedom Campus), which reflect the readiness of national education in facing the digital era (Ministry of Education and Culture, 2023).

Globally, UNESCO (2023) reports that more than 47% of schools worldwide have begun to integrate AI-based systems, particularly educational chatbots, as a means of supporting learning interactions. This trend shows that chatbots are not just additional tools, but have become learning partners that help students understand material, develop

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literacy skills, and practice higher-order thinking skills. In the context of Indonesian language learning in elementary schools, the integration of AI chatbots presents new opportunities to improve reading, writing, and text comprehension skills in a more interactive way (Sari & Wijayanti, 2022).

Indonesian language learning at the elementary school level plays a fundamental role in shaping the literacy skills of the nation's children. The 2022 PISA study shows that Indonesian students' reading literacy skills are still below the OECD average, with a score of only 359 compared to the global average of 487 (OECD, 2023). This low literacy rate is reinforced by research by Nopriani et al. (2021), which shows that 48% of elementary school students still have difficulty understanding long reading texts and 36% have difficulty constructing coherent sentences. This situation calls for more personalized, adaptive learning innovations that are capable of providing real-time feedback. The presence of AI-based chatbots offers a significant solution because they are able to provide step-by-step explanations, model good language use, and train students repeatedly without reducing the role of teachers (Rahmawati & Santosa, 2023).

Indonesia has experienced a surge in the use of AI-based learning technology in the last two years. A report by Kominfo (2023) shows that more than 22 million students and teachers access digital educational devices, and 14% of schools have started implementing AI-based tools for basic learning assistance, including literacy. In line with this, research by Setiawan and Kurniawan (2023) found that the use of learning chatbots in elementary school students can improve reading skills by up to 27% in a three-month period.

Internationally, research by Chen et al. (2022) on elementary schools in Taiwan proved that chatbots can improve students' reading accuracy by 21% and improve their sentence structure by 18%. This data reinforces the argument that AI chatbots have the potential to be teachers' partners in improving the quality of Indonesian language learning. However, the adoption of chatbots in learning is not without challenges.

Teachers remain the main actors in learning, and the use of AI is not to replace their role, but to strengthen their pedagogical capacity (Holmes et al., 2022). A number of studies show that there is still resistance from some educators due to anxiety about technology and concerns about a decline in human interaction in the classroom (Susanto & Dewi, 2022). Even UNESCO (2023) emphasizes the need for educational AI ethics policies so that technology is used responsibly and remains student-centered. Thus, the integration of chatbots in Indonesian language learning must be designed to support teachers' instructional strategies, not as a substitute.

In addition, the abilities of elementary school students, who are still in the concrete operational stage of cognitive development according to Piaget, require a learning approach based on examples, repetition, and direct feedback (Yuliana, 2020). AI chatbots are considered capable of meeting these needs through interactive dialogues that help children understand language concepts gradually and contextually (Luo & Geng, 2021). For example, chatbots can be used for paragraph writing exercises, understanding proverbs, and evaluating grammatical errors. Research by Rini & Khasanah (2023) shows that the use of conversation-based chatbots helps increase students' motivation and confidence in language practice so that they are more active in asking questions and trying to write.

On the other hand, several studies note the risks of using AI in primary education, such as technological dependence, the potential for plagiarism, and the lack of students' critical evaluation skills regarding information (Zhai et al., 2023). Therefore, the role of

teachers as facilitators of digital literacy is very important so that students are able to use chatbots wisely, ethically, and critically. Teachers must also ensure that student interactions with chatbots remain within a healthy and proportional pedagogical corridor (Pratama & Hanum, 2022). This reflects a new paradigm in which teachers are no longer the sole source of information but rather guides the collaborative learning process between humans and technology.

Although research related to AI in education has developed, there is still a research gap, especially in the context of elementary schools in Indonesia, particularly in the field of Indonesian language. First, the research by Luo & Geng (2021) focuses more on English vocabulary comprehension at the international level and has not explored the context of Indonesian language in elementary schools. Second, the study by Setiawan & Kurniawan (2023) only measures the impact on reading skills, while the writing aspect has not been analyzed in depth. Third, the research by Rahmawati & Santosa (2023) only evaluates students' responses to chatbots, without measuring their effectiveness in supporting teachers as pedagogical partners. Thus, there is room for research to explore how AI chatbots specifically function as teacher partners in Indonesian language learning in elementary schools, and how this technology strengthens traditional teaching strategies.

Based on these gaps, this study offers novelty by emphasizing the role of chatbots not as a self-learning tool, but as teachers' pedagogical partners in Indonesian language classes in elementary schools, through a human-centered digital literacy approach. The focus of the research is not only on student abilities but also on technological support for teacher instructional design, learning motivation development, and learning interactions.

The purpose of this study is to analyze the implications of using AI-based chatbots as teacher partners in Indonesian language learning in elementary schools by reviewing their effectiveness in improving student literacy skills, supporting teacher learning strategies, and creating a collaborative and adaptive learning environment.

In addition to basic literacy needs, critical thinking skills and a deep understanding of language are essential 21st-century competencies that elementary school students must possess. The Merdeka Curriculum emphasizes a competency-based approach, differentiation, and language and literacy-based project learning, which requires the use of innovative media to provide context-rich learning experiences (Hasanah et al., 2023). In various developed countries, AI-based technology has been utilized to facilitate early literacy training by providing instant and personalized feedback according to students' abilities (Holmes et al., 2022). In a study by Chen et al. (2022), it was found that the use of chatbots in language learning in Taiwanese elementary schools significantly improved students' text comprehension and verbal interaction skills. This condition shows that the development of literacy skills can no longer rely solely on conventional methods but requires technological support such as chatbots as part of pedagogical innovation.

In the Indonesian context, the reading literacy skills of elementary school students still need to be improved based on a learning system that is adaptive and responsive to technological developments. A study by Suryani and Wibowo (2022) found that more than 51% of elementary school students in Central Java had difficulty understanding reading content, while 33% had difficulty organizing ideas in paragraphs. This challenge is also in line with the findings of Wardani and Rahmadani (2021), which highlight the limitations of language learning media available in elementary classrooms,

particularly interactive digital devices that can provide personalized feedback to students. In such conditions, chatbots are an alternative solution to fill the void in learning approaches that require two-way interaction, especially for training basic language and literacy skills.

International research results also support the use of chatbots in elementary education to increase student engagement and participation in the learning process. For example, a study by Ruan et al. (2023) shows that the use of natural language processing (NLP)-based chatbots increases student activity in answering questions and improves learning retention by 19% in trials in elementary schools in China. In addition, another study by Kim (2021) shows that an interactive dialogue-based learning approach through chatbots can increase students' interest in linguistic and literary material at the elementary school level in South Korea. This fact shows that chatbot technology has been proven globally effective in improving the quality of language learning through interactive and adaptive approaches.

The use of chatbots also provides opportunities for teachers to improve the effectiveness of classroom management and instruction differentiation. In Indonesian language learning, teachers can use chatbots to provide independent exercises, correct basic grammar, provide examples of narrative or descriptive texts, and even help students evaluate their sentence structure (Rahmawati & Santosa, 2023). A study by Indrawati and Pramesti (2023) states that teachers who utilize AI-based digital tools tend to have more active classes and students who are more independent in completing linguistic tasks. In this context, chatbots not only function as learning tools, but also as pedagogical partners for teachers in optimizing time and attention allocation to students, especially those who require intensive assistance.

However, the integration of AI in basic education has ethical and pedagogical implications that must be considered. Hemdan and Alqahtani (2023) state that although AI technology increases learning flexibility, there needs to be regulation and teacher readiness so that the use of technology does not replace the humanistic function of educators. Research by Suh et al. (2022) also warns that uncontrolled exposure to technology can reduce students' critical thinking skills due to their dependence on automated systems. Therefore, the use of chatbots must be directed to strengthen human interaction, not replace it, while upholding student-centered educational values. This is in line with the educational philosophy that places teachers as the main facilitators in character development and critical literacy from an early age.

Furthermore, elementary school students' ability to explore language is usually still limited to simple contexts and requires direct interaction support. According to Vygotsky, children's cognitive development is greatly influenced by social interaction and guidance from adults in the zone of proximal development (ZPD), so the presence of teachers remains a key factor even when technology is used (Yuliana, 2020). Chatbots can be an enrichment tool, but for maximum effectiveness, collaboration between teachers and technology must be designed with a well-thought-out pedagogical strategy (Holmes et al., 2022). Research by Sari and Wijayanti (2022) in several Indonesian elementary schools shows that students who use chatbots in reading practice have higher learning motivation because they feel "not afraid of making mistakes" when practicing, but teachers still play a role in providing further explanations and emotionally nuanced corrections.

Referring to the direction of education digitization policy in Indonesia, the application of AI technology, including chatbots, is increasingly relevant. A study by

Ferdiansyah and Ramli (2023) shows that digital literacy is one of the core competencies in 21st-century basic education in Indonesia. This is supported by Nurdin's (2022) research, which states that the use of interactive technology has a positive impact on student engagement in Indonesian language learning, especially in understanding narrative reading. Thus, the presence of chatbots is relevant as part of a technology-based learning ecosystem that supports the national literacy agenda.

However, studies on the integration of chatbots in elementary school Indonesian language learning are still relatively limited. As explained earlier, several studies have highlighted aspects of learning motivation (Rahmawati & Santosa, 2023), improvement in basic reading skills (Setiawan & Kurniawan, 2023), and the use of AI technology in foreign language learning (Luo & Geng, 2021). There has not been much research exploring how AI chatbots can function as teachers' partners in Indonesian language teaching, including pedagogical support, continuous feedback, and learning collaboration in the classroom. This gap is an important research opportunity to address the need for technology-based learning innovation at the elementary education level.

Considering the urgency of improving language literacy, the development of AI-based educational technology, and the existing research gap, this study focuses on evaluating the role of chatbots as teacher partners in Indonesian language learning in elementary schools. This research is important because it positions technology as a complementary support, not a substitute for teachers, and provides empirical insights into collaborative practices between humans and AI in the context of basic pedagogy. The results of this study are expected to contribute to the development of innovative learning strategies, improve student literacy, and formulate technology-based education policies that are in line with the values of humanization in education.

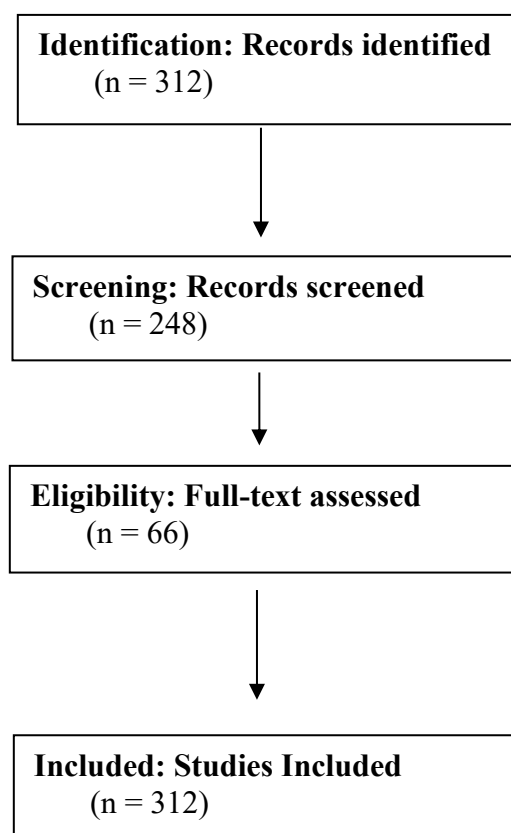
METHODOLOGY

This study uses a systematic literature review approach to evaluate the application of artificial intelligence-based chatbots as teacher partners in Indonesian language learning in elementary schools. This approach was chosen to obtain a comprehensive understanding of the practices and implications of using chatbots in the context of basic education, as well as to identify patterns of empirical findings relevant to improving student literacy competencies and the role of teachers in AI-based learning. According to Xiao and Watson (2019), the systematic literature review method allows researchers to collect, evaluate, and synthesize scientific evidence in a structured manner so that the research results are credible and replicable. The literature search process was conducted through reputable databases such as Scopus, Web of Science, and Google Scholar, with a publication range of 2015–2024 to keep up with contemporary developments in AI in education (Page et al., 2021).

The inclusion criteria in this study included journal articles discussing the use of chatbots in language learning at the elementary school level, studies reviewing the integration of AI in children's literacy, and studies examining the role of teachers in the digital environment of basic education. Conversely, exclusion criteria included studies focusing on secondary or higher education, foreign language learning without relevance to basic pedagogy, and non-peer-reviewed articles. The study selection process followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines to ensure transparency and quality of literature synthesis (Page et al., 2021). After the screening process, only articles that met methodological and thematic relevance standards were further analyzed using a thematic approach as recommended by Braun

and Clarke (2021). Thematic analysis allows researchers to identify consistent conceptual patterns related to chatbot effectiveness, the role of teachers, and implications for elementary school students' Indonesian literacy skills.

The research stages included four main steps: literature identification, title and abstract screening, full article eligibility evaluation, and data synthesis. This process ensured that only relevant and high-quality empirical evidence was used as the basis for analysis (Snyder, 2019). The data obtained was then categorized based on the research focus, methodological approach, and main findings to produce a comprehensive mapping of the application of chatbots as teacher partners in Indonesian language learning. With a systematic and structured design, this study is expected to provide a theoretical contribution in the form of a new analytical framework for human-AI collaboration in elementary schools, as well as practical recommendations for educators in integrating chatbot technology pedagogically



RESULTS AND DISCUSSION

The Role of AI Chatbots as Teachers' Partners in Supporting Indonesian Language Literacy for Elementary School Students

The integration of artificial intelligence in basic education, particularly through the use of chatbots, has opened up new opportunities for collaboration between technology and teachers to strengthen students' linguistic competencies. In the context of Indonesian language learning in elementary schools, chatbots can serve as additional facilitators that help students understand language structure, improve reading skills, and encourage basic writing activities. Research by Holmes et al. (2022) confirms that

educational chatbots are capable of providing learning scaffolding through adaptive automated responses to students' abilities, thereby enabling a more personalized and meaningful learning process. At the Indonesian elementary school level, this condition is particularly relevant given the literacy gap that still exists due to differences in family background, access to technology, and schools' pedagogical readiness (Suryani & Wibowo, 2022). Therefore, collaboration between teachers and chatbots can facilitate differentiated learning strategies to reach students with heterogeneous literacy skills.

Furthermore, the use of chatbots in the classroom supports a constructivist pedagogical approach that emphasizes exploration and interaction as strategies for building language comprehension. According to Setiawan and Kurniawan (2023), students who interact with educational chatbots show a 27% increase in reading comprehension within three months because chatbots are able to provide gradual exercises based on difficulty levels appropriate to the cognitive development of elementary school students. This interaction not only provides mechanical exercises but also builds students' confidence because they receive support without emotional pressure, unlike human interactions that sometimes make children hesitate to ask questions. Similar findings were also reported by Luo and Geng (2021), who found that elementary school students in China who used NLP-based chatbots showed an increase in learning motivation and vocabulary skills through receptive dialogic interactions. This confirms that chatbots have the potential to become learning buddies that accompany students in the process of learning Indonesian in a natural and friendly way.

In addition to supporting reading skills, chatbots also play an important role in developing writing skills and understanding language structure. Research by Chen et al. (2022) proves that chatbots designed for linguistic exercises can significantly improve students' ability to construct simple sentences and paragraphs, with grammar error rates decreasing by up to 18%. For Indonesian language learning, the ability to construct sentences is fundamental to basic literacy activities, such as writing simple sentences, short narrative essays, or answering reading comprehension questions. Teachers can utilize chatbots as partners in providing quick feedback on students' language errors, while teachers focus on affective aspects, class discussions, and more in-depth linguistic knowledge enrichment (Rini & Khasanah, 2023). This combination creates a collaborative learning mechanism that combines the power of technology and the pedagogical competence of teachers in guiding students' linguistic understanding.

Chatbot support is also relevant in strengthening the effectiveness of classroom management. Teachers often face the challenge of giving their full personal attention to each student, especially in large classes. According to Indrawati and Pramesti (2023), the use of AI-based learning technology allows teachers to save time on basic task corrections, so that teaching time can be allocated to more interactive and affective face-to-face activities. In this context, chatbots function as virtual assistants that help manage individual learning tasks efficiently, provide examples of standard language usage, and guide students in independent practice. This strategy is in line with the principle of differentiated learning in the Merdeka Curriculum, which requires teachers to provide varied learning paths according to students' abilities (Hasanah et al., 2023). With chatbots, teachers do not lose control of the learning process, but rather gain systematic support to accompany students through a more adaptive learning path.

On the other hand, the use of chatbots as pedagogical partners requires teachers to act as directors, controllers, and assessors of the learning process. A study by Suh et al. (2022) emphasizes that although AI can improve learning efficiency, teachers still hold

the authority to guide students in critical thinking, evaluating information, and using language ethically and responsibly. For basic education, this approach is crucial because students are still in the early stages of moral and cognitive development. Teachers need to ensure that the use of chatbots continues to function as a complement to the human learning process, not as an absolute authority in the delivery of knowledge. In addition, teachers must also be involved in designing chatbot-based activities so that they remain relevant to the objectives of the Indonesian language curriculum, such as strengthening basic literacy, improved Indonesian spelling (EYD), and structured speaking skills (Rahmawati & Santosa, 2023).

Despite its significant benefits, teacher-chatbot collaboration cannot run optimally without teachers' readiness in digital literacy. According to Hemdan and Alqahtani (2023), one of the challenges of implementing AI in basic education is the variation in teachers' abilities to operate technology and design AI-based learning. In the Indonesian context, this aspect is also critical, given the disparities in access to and technological competence across regions (Ferdiansyah & Ramli, 2023). Therefore, training and mentoring for teachers need to be strengthened so that the integration of chatbots can be carried out in a targeted manner and does not cause technological anxiety. Well-guided teachers will be able to utilize chatbots to enrich learning strategies, design interactive questions, provide automatic feedback, and monitor students' literacy development digitally.

It is also important to highlight that chatbot design must be tailored to the characteristics of elementary school students. Students in this age range need a simple interface, friendly interactions, and language material that is appropriate for their linguistic development. Ruan et al. (2023) emphasize that chatbots designed to be child-friendly and communicative have been proven to increase engagement and information retention. This confirms that learning technology innovations must prioritize the psychological needs of elementary students and not burden them with system complexity. Teachers need to ensure that the chatbot used is appropriate for the language level, culture, and educational context of Indonesia, including the use of standard Indonesian and the avoidance of mixed language structures that are not in line with children's literacy development.

Thus, the use of chatbots as teacher partners is not only a matter of technology, but also part of a student-centered, digitally literate pedagogical strategy that supports the development of students' cognitive potential from an early age. The collaboration between teachers and chatbots creates a learning ecosystem that responds to the challenges of modern education without eliminating the human touch in the learning process. This synergy is in line with the global direction of educational transformation that integrates technology as a support for human intelligence, not a substitute for the role of teachers (Holmes et al., 2022). With the readiness of the system, teacher competence, and appropriate technology design, chatbots can be a strategic instrument in improving the quality of Indonesian language learning in elementary schools.

The Effectiveness of Chatbots in Improving Indonesian Literacy Competence in Elementary School Students

Improving the literacy competence of elementary school students is a top priority in the national education system, especially after Indonesia ranked low in reading ability in international studies such as PISA (OECD, 2023). In this context, the use of chatbots as learning companion technology is a strategic solution to address the gap in student

literacy skills. Chatbots are able to interact naturally with students, provide gradual challenges according to their ability level, and provide instant feedback on reading, writing, and speaking errors. A study by Chen et al. (2022) confirms that chatbots designed with adaptive learning features can increase reading comprehension accuracy by up to 21% in elementary school students in Taiwan. The study shows that students who use chatbots demonstrate significant improvements in their ability to understand paragraphs, summarize text content, and answer reading questions.

In the context of Indonesian language learning, the ability to understand the meaning of a text and connect ideas is a fundamental skill that must be trained consistently. Sari and Wijayanti (2022) found that students who used AI-based applications for reading practice achieved a 24% increase in reading literacy scores compared to students who learned conventionally. The chatbot used in the study was able to provide follow-up questions based on students' responses, encouraging them to re-explain the content of the reading in their own words. Strategies such as this are very effective in strengthening reading comprehension and active recall, two important components of language learning. The effectiveness of chatbots as learning tools is not only theoretical but has been tested through various empirical implementations, both domestically and internationally.

In addition to reading skills, chatbots also play a role in improving elementary school students' writing skills. In a study by Rini and Khasanah (2023), chatbots were able to help students improve their grammar and simple paragraph structure through descriptive and instructive automatic corrections. This feature benefits students who often lack confidence in writing and need repeated guidance. With chatbots, students can practice writing independently without having to constantly wait for corrections from teachers, making the learning process more efficient and flexible (Indrawati & Pramesti, 2023). In addition, conversation-based writing exercises with chatbots can also enrich students' vocabulary and help them understand syntactic structures more naturally.

The use of chatbots is also effective in improving speaking skills, especially in the context of pronunciation and oral sentence construction practice. Research by Luo and Geng (2021) shows that elementary school students who use NLP-based chatbots experience increased confidence and oral skills in answering questions and expressing opinions. Chatbots provide students with the opportunity to practice speaking without fear of being judged by friends or teachers, as well as providing immediate feedback that guides them towards correct language patterns. This can help students improve their fluency and linguistic accuracy from an early age, in line with language learning principles that emphasize practical and repetitive practice to strengthen linguistic competence (Holmes et al., 2022).

Chatbots also make a significant contribution to the development of digital literacy. Ferdiansyah and Ramli (2023) state that the use of AI-based technology at the elementary school level plays an important role in shaping a digital literacy mindset. Through interaction with chatbots, students become accustomed to searching for information, understanding digital-based instructions, and distinguishing between relevant and irrelevant information. This ability is important in the digital era, where students are required to be able to read not only printed texts but also multimodal digital texts. The integration of digital literacy in Indonesian language learning is in line with the objectives of the Merdeka Curriculum, which emphasizes mastery of basic literacy and technology to shape adaptive and critical learners (Hasanah et al., 2023). Thus, the

effective use of chatbots is not only in terms of language, but also in preparing students to face the challenges of digital literacy in the future.

Although the benefits are great, the effectiveness of chatbots is highly dependent on the quality of pedagogical design and the relevance of the content to the Indonesian language curriculum. According to Suh et al. (2022), educational chatbots must be adapted to the cultural context and language development level of children so that students' understanding is not misdirected and does not get mixed up with foreign language structures. This is important in Indonesia, especially regarding the use of standard Indonesian, punctuation, and sentence structure in accordance with the General Guidelines for Indonesian Spelling (PUEBI). Teachers must ensure that the chatbot used is truly relevant and supports national learning objectives, rather than simply following technological trends without pedagogical consideration. Thus, collaboration between technology developers and education practitioners is crucial in creating effective and contextual chatbots.

International research findings also show that the use of chatbots increases student engagement, namely the active involvement of students in the learning process. Ruan et al. (2023) noted a 32% increase in learning motivation among students who used interactive chatbots in reading and answering questions. This is because chatbots provide responsive interactions, ensure that students remain focused, and provide gamification elements that enhance the learning experience. In Indonesian language learning, strong motivation is an important factor in learning success because the process of understanding texts and writing requires effort and consistency (Wardani & Rahmadani, 2021). Chatbots serve as fun learning companions, making students more interested in practicing the language in a pressure-free context.

To provide an overview of research findings related to the effectiveness of chatbots in basic learning, the following table summarizes the results of international and national studies:

Context & Sample	Focus	Key Findings	Author& Year
Taiwan, Elementary Students	Reading & Writing support	Increased reading accuracy up to 21% and improved sentence structure skills	Chen et al. (2022)
China, Elementary Schools	Conversational language practice	Ncreased vocabulary, motivation, and speaking confidence	Luo & Geng (2021)
Indonesia, Elementary Schools Learners	Reading Comprehension	27% improvement in reading comprehension with AI chatbot	Setiawan & Kurniawan (2023)
Indonesia, Grade 4-6 Elementary Schools	Writing Skills	Reduced grammatical errors & improved paragraph structure	Rini & Khasanah (2023)
China, primary classrooms	Engagement and retention	32% improvement in motivation & higher retemption rate	Ruan et al. (2023)

The table shows that chatbots are effective in improving basic literacy skills, including reading, writing, and speaking, both globally and in Indonesia. This success

shows that chatbots have significant potential if they are implemented consistently, systematically, and adaptively with the national curriculum.

However, there are implementation challenges that still need to be addressed. Hemdan and Alqahtani (2023) warn that students may become dependent on technology if teachers do not set clear limits on its use. In addition, some students may experience technical difficulties if the school infrastructure does not support equitable access to technology, a challenge also raised by Ferdiansyah and Ramli (2023) in their research on the digitisation of primary schools in Indonesia. Therefore, the success of chatbots as a tool for learning Indonesian requires infrastructure support, policies, and increased capacity for teachers to utilise technology effectively.

Taking into account various research findings, it can be concluded that chatbots are an educational innovation that is highly relevant in improving the Indonesian language literacy skills of primary school students. This technology not only assists in the technical aspects of learning, but also fosters motivation, confidence, and digital literacy among students. However, the effectiveness of chatbots is highly dependent on the support of teachers as facilitators, the suitability of content to Indonesian language culture, and the availability of adequate educational infrastructure. With a collaborative approach and technology development that is sensitive to local needs, chatbots have the potential to become an important pillar in improving national basic literacy.

Challenges and Strategies for Implementing Chatbots as Teacher Partners in Indonesian Language Learning in Elementary Schools

Although AI chatbots offer significant benefits in Indonesian language learning, their implementation at the elementary school level faces a number of structural, pedagogical, and technical challenges. The first major challenge is the digital divide that still exists in various elementary schools in Indonesia, especially in rural areas and areas with limited internet access.

According to Ferdiansyah and Ramli (2023), the gap in technological facilities and digital networks in Indonesian elementary schools has led to unequal access to AI-based learning resources, including chatbots. This condition is a fundamental obstacle for schools to optimally implement AI-based learning. UNESCO (2023) also emphasizes that digital infrastructure challenges are one of the determining factors for the successful implementation of educational technology in developing countries. Therefore, to ensure the sustainability of chatbot adoption in Indonesian language learning, there needs to be equitable information technology system support and strengthened national policies in the development of digital education infrastructure.

The second challenge relates to teachers' competence in operating and utilizing chatbots in learning practices. A study by Hemdan and Alqahtani (2023) identified that many elementary school teachers in developing countries are not yet fully prepared in terms of technological literacy and digital pedagogy mastery. This is similar to the findings of Indrawati and Pramesti (2023), who emphasized that although teachers show a positive attitude towards digital innovation, their technical skills and AI-based instructional design still need to be improved. In the context of Indonesian language learning, teachers have a responsibility not only to master the language material, but also to understand how to combine chatbots with traditional teaching methods to support the achievement of curriculum objectives. Teachers need to understand how to design literacy tasks, monitor student dialogues with chatbots, and provide assessments that balance

students' technical abilities and creativity. Thus, continuous training and professional mentoring for teachers are essential to optimize the integration of chatbots in learning.

In addition to teacher competence, the ethical aspects of AI use in basic education are no less important. Indonesian language learning includes strengthening moral, cultural, and character values, where human interaction is a key element in students' emotional development. Holmes et al. (2022) state that the application of AI must prioritize the principle of human-centered learning, ensuring that technology is a support, not a substitute for human interaction. Elementary school students are in a phase of socio-emotional development that requires empathetic guidance and direct communication with teachers (Yuliana, 2020). Thus, the design of chatbot use must pay attention to the balance between technological support and human interaction. Teachers must ensure that chatbots are used for language practice and technical feedback, while character building, expressive discussions, and cultural value reflection are still carried out through face-to-face interactions. This is important so that the use of chatbots does not reduce the humanization of education.

Another challenge arises from the potential for language misconceptions due to exposure to technological language that is not yet fully in line with the General Guidelines for Indonesian Spelling (PUEBI). Suh et al. (2022) emphasize that educational chatbot content must be linguistically and culturally relevant so as not to interfere with students' mother tongue development. In some generic chatbot applications, the tendency to use informal or mixed language is still found, which can affect students' formal skills in writing and speaking standard Indonesian. Therefore, chatbots used in elementary schools must be specifically designed for Indonesian language learning needs, with language algorithms that follow national language standards. This is in line with the findings of Wardani and Rahmadani (2021), who emphasize that the use of digital learning media must strengthen students' formal literacy skills, not merely facilitate ordinary conversational interactions.

However, these challenges do not diminish the great potential of chatbots in improving the quality of learning. To overcome the barriers to technology adoption in elementary schools, a number of implementation strategies can be carried out. First, strengthening teacher capacity through training in technological literacy and digital pedagogy must be a priority. Rahmawati and Santosa (2023) emphasize that teachers who are confident in operating technology demonstrate more effective classroom management and higher teaching innovation. This training should not only focus on the technical aspects of using chatbots, but also on AI-based learning design, student digital literacy assessment, and technology integration with different learning approaches such as project-based learning and literacy circles. Collaboration between education agencies, universities, and educational technology institutions can be a strategic step in providing measurable and sustainable training for elementary school teachers.

Second, the integration of chatbots into the curriculum must be done gradually using a blended learning approach. This blended learning model allows students to use chatbots as tools for practice and formative assessment, while teachers remain the main facilitators of face-to-face learning. Snyder (2019) argues that the blended learning approach can increase the effectiveness of technology-based learning if it is designed systematically and structurally. In the context of Indonesian language learning, chatbots can be used for practicing reading short texts, correcting sentence structure, vocabulary games, and practicing writing simple paragraphs. Meanwhile, group discussions, oral presentations, and literary text analysis activities are still carried out under the direct

guidance of teachers. Thus, technology and humanistic pedagogy can work in harmony to achieve learning objectives.

Third, the development of chatbots must involve collaboration between language education experts, child development psychologists, and technology developers. Holmes et al. (2022) emphasize that the ideal educational AI design should be based on pedagogical research and be sensitive to the local cultural context. For Indonesia, the ideal chatbot must use language that is in accordance with PUEBI, refer to the basic competencies of the curriculum, and provide learning activities that are relevant to the world of elementary school children. Providing gamification features such as points, badges, or literacy challenges can increase student engagement, as evidenced by Ruan et al. (2023), who noted an increase in student learning motivation with game elements in educational AI platforms. Technology developers also need to provide a student progress reporting system that is easily accessible to teachers so that teachers can monitor each student's literacy progress in real-time.

Fourth, there needs to be an education policy that regulates the use of artificial intelligence technology in elementary schools in an ethical, targeted, and sustainable manner. UNESCO (2023) states that countries must develop AI ethics guidelines to ensure that technology is used to strengthen educational goals, rather than simply adopting digital trends quickly without a regulatory foundation. Such policies must include student data protection, screen time control, equitable access to digital devices, and operational guidelines for the use of AI in learning. These policies not only protect students' rights but also ensure that teachers and schools have clear guidelines for aligning the use of chatbots with pedagogical objectives and national literacy policies.

From the various strategies discussed, it can be concluded that the successful implementation of chatbots as teachers' partners in Indonesian language learning depends heavily on three key elements: teacher readiness, infrastructure readiness, and pedagogical design relevance. Without the full support of these three aspects, the use of chatbots risks becoming merely a technological innovation that does not have a significant impact on student literacy achievement. However, if optimized appropriately, chatbots have the transformative potential to strengthen basic literacy, build 21st-century skills, and prepare students to adapt to a digital society while maintaining the values of education and Indonesian language culture.

CONCLUSION

This study confirms that the use of artificial intelligence-based chatbots plays a significant role as a teacher's partner in teaching Indonesian language in elementary schools. The integration of chatbots can comprehensively improve students' literacy skills, including reading, writing, and speaking, through an interactive and personalized learning approach. These findings are consistent with previous studies showing an increase in learning motivation, linguistic confidence, and reading comprehension in students who receive AI-based technological support. Thus, chatbots have been proven to strengthen teachers' pedagogical strategies, provide instant feedback, and enable differentiated learning tailored to the cognitive development characteristics of elementary school students.

However, the successful implementation of chatbots in Indonesian language learning is not without challenges, including technological infrastructure readiness, teachers' digital competence, the relevance of chatbot content to national language standards, and the need for ethical supervision in the learning process. Teachers remain

central actors in learning because chatbots only serve as pedagogical support, not a substitute for the human interaction that is important in the development of students' language and character. Therefore, the integration of chatbots must be carried out within a humanistic, student-centered learning framework that is in line with the national curriculum and the General Guidelines for Indonesian Spelling.

Based on the results of the study, there are several recommendations. First, the government and educational institutions need to strengthen digital infrastructure in elementary schools to ensure equal access to learning technology. Second, digital literacy training programs for teachers need to be improved with a focus on AI-based pedagogical strategies, adaptive learning design, and the use of chatbots in formative assessment. Third, educational technology developers should collaborate with linguists, educational psychologists, and educators to create chatbots that are appropriate for the linguistic and cultural context of Indonesia. Fourth, schools need to formulate policies on the use of chatbots that focus on data security, ethical use of technology, and learning supervision so that technology truly supports the achievement of Indonesian language learning objectives.

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