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DIGITAL LITERACY AND ARTIFICIAL INTELLIGENCE IN TRANSFORMING LANGUAGE LEARNING IN THE INDEPENDENT LEARNING ERA

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Abstract

This study examines the role of digital literacy and artificial intelligence in transforming language learning in the era of independent learning. It applies a qualitative library research approach by reviewing recent peer-reviewed studies published within the last five years and indexed in reputable academic databases. The literature was selected based on its relevance to digital literacy, AI literacy, language competence, learner autonomy, technology-enhanced learning, and ethical issues in education. Data were analyzed through thematic content analysis involving identification, classification, comparison, and synthesis of key findings. The results show that digital literacy is a fundamental prerequisite for the effective and responsible use of artificial intelligence in language learning. AI-supported tools, including chatbots, adaptive platforms, automated feedback systems, speech recognition, and generative applications, can improve learning flexibility, personalization, engagement, motivation, and access to continuous language practice. These technologies contribute to the development of vocabulary, grammar, writing, reading, listening, speaking, and pronunciation skills while supporting learners in planning, monitoring, and evaluating their own learning. However, the study also identifies challenges related to inaccurate information, algorithmic bias, privacy, plagiarism, overdependence, unequal access, and the declining originality of learners' work. Therefore, artificial intelligence should be positioned as a pedagogical support tool rather than a substitute for teachers, human interaction, and critical thinking. The study concludes that the successful integration of digital literacy and AI requires clear pedagogical design, teacher guidance, ethical standards, process-based assessment, and equitable digital infrastructure. Such integration can strengthen language competence and develop autonomous, reflective, adaptive, and responsible learners in contemporary education.

Keywords: artificial intelligence; digital literacy; independent learning; language competence; language learning; learner autonomy

Introduction

Digital transformation has transformed language learning from activities that previously relied on classrooms, textbooks, and face-to-face interaction to a learning process that is flexible, personalized, and can take place beyond the boundaries of space

and time. The development of online learning platforms, mobile applications, speech recognition systems, chatbots, and generative artificial intelligence allows learners to access authentic materials, practice communicating, and get feedback faster. These changes are increasingly relevant in the era of *independent learning* which places students as active subjects in determining the goals, sources, strategies, and evaluation of their learning. The presence of artificial intelligence not only expands access to learning resources, but also changes the relationship between teachers, students, technology, and knowledge. Teachers are no longer solely a source of information, but rather act as facilitators, designers of learning experiences, and mentors in the critical and responsible use of technology (Crompton et al., 2024; Warschauer & Xu, 2024).

In this transformation, digital literacy is a fundamental competency that determines students' ability to benefit from learning technology. Digital literacy is not only concerned with the technical ability to operate a device or application, but also includes the ability to search, evaluate, interpret, produce, and disseminate information safely and ethically. As the use of artificial intelligence increases, the concept of digital literacy has also evolved to include AI literacy, which is the ability to understand how artificial intelligence systems work, uses, limitations, risks, and social consequences. Students who have AI literacy are not only able to use chatbots or translation applications, but also able to evaluate the accuracy of their answers, recognize biases, protect privacy, and determine when the technology is worth using. Therefore, digital literacy and AI literacy are important prerequisites for building learning independence and preventing learners from becoming passive users of technology (Laupichler et al., 2022; Ng et al., 2021).

The use of artificial intelligence in language learning offers a wide range of pedagogical opportunities. Generative chatbots can serve as conversational partners, language use examples, text preparation assistants, translators, and sources of feedback on grammar, vocabulary, pronunciation, and writing organization. AI-based technology can also analyze the needs of learners and provide materials tailored to individual ability levels, learning speeds, and difficulties. The results of previous studies show that chatbots can increase students' practice opportunities, engagement, motivation, and interaction, while AI-guided individual language learning generally has a positive influence on the development of language competence. However, its effectiveness is highly dependent on the learning design, quality of feedback, duration of use, and learners' ability to utilize technology strategically (Huang et al., 2022; Kohnke et al., 2023; Lee & Lee, 2024).

The era of *independent learning* requires students to have the ability to set goals, choose learning resources, monitor development, and evaluate their learning outcomes independently. In the context of language learning, digital technology provides a space for learners to practice reading, writing, listening, and speaking outside of the formal learning schedule. Research on higher education in Indonesia shows that the use of digital technology in English classes can strengthen independence, information literacy, linguistic beliefs, learning strategies, and learning outcomes of students. However, the use of technology does not automatically result in learning independence. Students still need clear goals, self-regulation skills, guidance on the use of resources, and pedagogical

support from teachers. Thus, the success of language learning transformation is not only determined by the availability of technology, but also by the readiness of students and teachers to integrate technology into a directed and meaningful learning process (Pratiwi & Waluyo, 2023).

The rapid phenomenon of artificial intelligence adoption also poses a number of problems. Students can use AI to generate answers or complete tasks without going through the process of thinking, structuring arguments, and producing language independently. Over-reliance on AI has the potential to reduce creativity, critical thinking skills, writing authenticity, and academic responsibility. In addition, AI outputs can contain inaccurate information, fictitious references, cultural biases, out-of-context language choices, and more dominant representations of certain languages and cultures. Other issues include data privacy, technology access gaps, plagiarism, ownership of works, and unclear limits on acceptable use of AI. This condition shows that access to technology is not always followed by the ability to use it critically, ethically, and productively, so that increasing digital literacy is a need that cannot be separated from the integration of AI in language learning (Crompton et al., 2024; Hockly, 2023; Kohnke et al., 2023).

Although research on AI in language education is growing rapidly, there is still a significant research gap. Recent systematic studies show that most of the research is concentrated on higher education, the context of English as a foreign language, user perception, writing skills, and the use of ChatGPT in the short term. In contrast, research on speaking, listening, reading, school-level learning, languages other than English, and the impact of longitudinal use of AI is still relatively limited. Previous research has also tended to discuss digital literacy, the use of AI, learning independence, and language competence separately. As a result, there has not been much research that explains how digital literacy allows students to use AI critically and how this process further supports independent learning and multidimensional language competency development. The limitations of research in the context of developing countries and educational environments that have infrastructure gaps also reinforce the need for more contextual studies (Li et al., 2025).

Based on these gaps, the novelty of this research lies in the preparation of an integrative perspective that connects digital literacy, the use of artificial intelligence, independent learning, and language competence in one analytical framework. This research does not only view AI as a tool to increase the speed or efficiency of task completion, but as part of a learning ecosystem that requires evaluative skills, ethical awareness, self-regulation, and control of the learning process. Language competence is also widely understood, including receptive and productive skills, linguistic accuracy, communicative competence, pragmatic awareness, and the ability to use language according to social and cultural contexts. This approach provides *incremental newness* because it expands on previous research that is generally oriented towards the acceptance of technology or the effectiveness of one application by placing digital literacy as the foundation for the responsible use of AI and independent learning as a learning transformation mechanism.

This research has both theoretical and practical urgency. Theoretically, research is needed to clarify the relationship between digital literacy skills, critical interaction with AI, learning independence, and language competence development. In practical terms, the results of the research can be the basis for teachers and educational institutions to design language learning that optimizes personalization and AI feedback without eliminating students' thinking processes, creativity, human interaction, and academic responsibilities. This study is also important for curriculum development, teacher training, ethics policies, and assessment systems that are more appropriate for AI-based learning environments. Therefore, this study aims to analyze the role of digital literacy and artificial intelligence in transforming language learning and explain its contribution to improving language competence and student independence in the era of *independent learning* (Laupichler et al., 2022; Li et al., 2025).

Research Methods

This research uses a qualitative approach with *the library research* method to analyze the role of digital literacy and artificial intelligence in transforming language learning in the era of independent *learning*. The research data is in the form of secondary data obtained from articles in reputable international journals, academic books, conference proceedings, and research reports relevant to digital literacy, artificial intelligence, language learning, language competence, and learning independence. Literature searches are conducted through academic databases, such as Scopus, Web of Science, ScienceDirect, SpringerLink, Taylor & Francis, Wiley Online Library, and Google Scholar. Priority publications are English-language articles published in the last five years, have gone through *a peer review* process, and are directly related to the use of digital technology and AI in language learning. Literature selection was carried out based on the suitability of titles, abstracts, keywords, research objectives, methods, and research findings.

Data analysis is carried out through the stages of identification, screening, feasibility assessment, classification, and literature synthesis by adapting the principle *of Preferred Reporting Items for Systematic Reviews and Meta-Analyses* or PRISMA. Articles that are not directly related to language learning, are not available in full-text form, are duplicate, or do not explain the use of technology and AI in the learning process are excluded from the analysis. Literature that meets the criteria is then grouped into several main themes, namely digital literacy, AI literacy, learning personalization, automatic feedback, language competence, learning independence, the role of educators, and ethical and academic integrity challenges. Data were analyzed using thematic content analysis techniques by comparing similarities, differences, tendencies, and gaps in findings between studies. The results of the synthesis are then used to explain the contribution of technology and artificial intelligence to the transformation of language learning and formulate its implications for the development of independent, critical, ethical, and performance-oriented learning that improves students' competencies.

Results and Discussion

Results

The results of the literature synthesis show that digital literacy is the main foundation for the successful application of technology and artificial intelligence in language learning. Digital literacy includes not only the skills to operate devices and access learning resources, but also the ability to evaluate information, choose appropriate applications, produce content, and use technology safely and responsibly. In the context of artificial intelligence, these capabilities develop into AI literacy which includes the ability to understand the basic principles of AI, use and apply them, evaluate the results produced, and consider ethical aspects. Learners with good digital and AI literacy tend to be better able to check the accuracy of answers, recognize biased information, structure commands or *prompts* effectively, and determine if AI outputs are in line with language learning goals. Thus, increasing access to technology needs to be followed by strengthening critical competencies so that students do not only become passive users of technology (Ng et al., 2021; Kohnke et al., 2023).

The results of the study also show that AI supports personalized learning through the provision of materials, exercises, recommendations, and feedback that are tailored to students' abilities. Chatbots can serve as conversation partners, virtual tutors, recommenders, and flexibly accessible resources of assistance. This technology allows learners to repeat exercises indefinitely, request simplification of material, obtain sentence examples, and receive corrections directly. Prompt feedback helps learners identify grammatical errors, vocabulary usage, pronunciation, writing coherence, and the appropriateness of expressions to the context of communication. However, these benefits are greatly influenced by assignment design, the quality of learners' questions, the accuracy of the system, and the teacher's involvement in validating AI-generated information (Huang et al., 2022; Law, 2024; Wiboolyasarin et al., 2025).

The use of AI was found to contribute positively to the development of language competence, although the magnitude of the influence differed on each skill. A meta-analysis of 46 empirical studies showed that the use of AI had an overall effect in the medium to large category on language learning, with the strongest influence found on vocabulary mastery, then reading, writing, listening, and speaking. On speaking skills, chatbots provide a relatively safe training environment so that learners can practice without being too afraid of making mistakes or receiving negative judgments from others. Repeated interactions with chatbots can also improve learners' fluency, pronunciation, confidence, engagement, and motivation. However, chatbots' ability to understand contextual meaning, emotions, humor, cultural variations, and pragmatic communication is still more limited than human-to-human interaction (Du & Daniel, 2024; Torres & Kahveci, 2025; Wiboolyasarin et al., 2025).

The literature analyzed further shows that digital technology has the potential to support independent learning by giving learners greater control over the time, place, source, and speed of learning. The use of Google Forms, Quizizz, Quizlet, Kahoot!,

Socrative, chatbots, and digital learning platforms helps students plan activities, conduct self-exercises, monitor progress, and evaluate their learning outcomes. Research on EFL learning in Indonesian higher education shows that the integration of various digital technologies can strengthen independence and learning outcomes when accompanied by clear goals, instructions, and pedagogical support. AI can also support self-paced learning through the creation of materials, conversation simulations, the provision of alternative explanations, and the availability of feedback at all times. However, the use of AI does not necessarily form a habit of self-regulation in the long term if students only use it to get answers instantly (Pratiwi & Waluyo, 2023; Li et al., 2024; Torres & Kahveci, 2025).

In addition to the benefits, the results of the study identified a number of challenges, namely information inaccuracy, language and cultural bias, technology dependence, data privacy, access gaps, plagiarism, and declining originality of students' work. AI can generate text that appears convincing but contains information or references that cannot be verified. Unsupervised use also has the potential to make learners go through the process of reading, composing arguments, solving problems, and producing language independently. Cutting-edge literature is still dominated by research on higher education and the context of English as a foreign language. A total of 86.7% of the generative AI research studied by Li et al. (2025) were conducted in higher education, while 86.1% were in the context of EFL and 42.4% focused on writing skills. The findings show the limitations of research at the school level, languages other than English, receptive skills, longitudinal impacts, and regional contexts with limited digital infrastructure (Law, 2024; Li et al., 2025).

Discussion

The findings of the study show that the transformation of language learning does not occur solely due to the presence of digital devices or AI, but through changes in the way students acquire knowledge, practice language, and evaluate learning outcomes. In the perspective of constructivism, technology can be a means for learners to build knowledge through exploration, conversation, feedback, and repetitive improvement. The personalization provided by AI allows the material to be at a level of difficulty that better suits individual needs, while the immediate feedback helps reduce the gap between actual performance and expected competence. However, the effectiveness of AI is determined more by the implementation strategy than the type of platform used. AI provides better results when positioned as a support tool for face-to-face learning or *blended learning*, not as a substitute for pedagogical interaction between teachers and learners (Torres & Kahveci, 2025; Wiboolyasarin et al., 2025).

In the era of *independent learning*, AI can expand the learning space because students do not have to rely entirely on the material and time determined by the teacher. Students can set goals, choose activities, ask for additional explanations, and repeat exercises as needed. However, learning independence does not mean learning without guidance. Students still need the ability to set goals, manage time, monitor understanding, assess the quality of resources, and reflect on their learning progress. Therefore, the role of teachers changes from the main conveyor of information to the designer of the learning

experience, facilitator, validator of information, and reflection supervisor. Teachers need to design assignments that ask students to explain the process, compare sources, revise AI outputs, and account for their language decisions (Pratiwi & Waluyo, 2023; Li et al., 2024; Kohnke et al., 2023).

Digital literacy and AI literacy need to be understood as critical and ethical skills, not just technical skills using applications. Learners must be able to recognize the limitations of AI, check the correctness of information, value intellectual property, protect personal data, and disclose the use of AI in task completion. Another implication is the need to change the language assessment system. Assessments that focus only on the final product are increasingly difficult to portray learners' genuine competencies because texts can be generated or improved by AI. Assessments need to pay more attention to the drafting process, revision recording, reflection, oral presentation, source verification, and the ability to defend arguments. The use of AI in assessment must also consider validity, reliability, fairness, transparency, and accessibility so that the technology does not generate new discrimination or disparities (Ng et al., 2021; Chuang & Yan, 2025).

Overall, this discussion strengthens that the relationship between digital literacy, the use of AI, learning independence, and language competence is interrelated. Digital literacy is the foundation that allows students to use AI critically; AI provides personalization, training, and feedback; Meanwhile, self-regulation determines whether the facility really results in the development of language competence. The conceptual novelty of this study lies in the placement of digital literacy and AI as a prerequisite for transformation, not as an additional result of the use of technology. Educational institutions therefore need to develop an AI literacy curriculum, ethical usage guidelines, teacher training, infrastructure support, and learning design that still maintains human interaction. Subsequent research needs to involve more diverse levels of education, language, region, and social groups and use longitudinal design to find out whether the benefits of AI persist after learners no longer use the technology (Law, 2024; Li et al., 2025).

Conclusion

Digital literacy and artificial intelligence have an important role in transforming language learning in the era of *independent learning*. The integration of digital technology and AI allows learning to take place in a more flexible, personalized, interactive, and student-centered manner. AI can be used as a conversation partner, virtual tutor, material source, and feedback on vocabulary, grammar, pronunciation, writing, reading, listening, and speaking skills. This utilization can also increase students' motivation, confidence, involvement, and independence in setting goals, strategies, time, and evaluation of learning. However, the success of using AI is not only determined by technological sophistication, but also by the level of digital literacy, self-regulation ability, quality of learning design, and guidance provided by educators.

The use of AI in language learning also presents various challenges, such as information inaccuracies, language and cultural bias, technology dependence, privacy violations, plagiarism, access gaps, and declining originality of students' work. Therefore,

AI needs to be placed as a learning support tool, not as a substitute for the role of teachers, human interactions, and students' thought processes. Educational institutions need to strengthen digital literacy and AI literacy through curriculum, teacher training, ethical guidelines, process-based assessment systems, and the provision of equitable infrastructure. With a critical, ethical, and directed approach, the integration of digital literacy and artificial intelligence can improve language competence while forming students who are independent, reflective, adaptive, and responsible in dealing with the development of digital education.

Bibliography

Chuang, P.-L., & Yan, X. (2025). Language assessment in the era of generative artificial intelligence: Opportunities, challenges, and future directions. *System, 134*, Article 103846. doi:10.1016/j.system.2025.103846

Crompton, H., Edmett, A., Ichaporia, N., & Burke, D. (2024). AI and English language teaching: Affordances and challenges. *British Journal of Educational Technology, 55*(6), 2503–2529. doi:10.1111/bjet.13460

Du, J., & Daniel, B. K. (2024). Transforming language education: A systematic review of AI-powered chatbots for English as a foreign language speaking practice. *Computers and Education: Artificial Intelligence, 6*, Article 100230. doi:10.1016/j.caeai.2024.100230

Hockly, N. (2023). Artificial intelligence in English language teaching: The good, the bad and the ugly. *RELC Journal, 54*(2), 445–451. doi:10.1177/00336882231168504

Huang, W., Hew, K. F., & Fryer, L. K. (2022). Chatbots for language learning—Are they really useful? A systematic review of chatbot-supported language learning. *Journal of Computer Assisted Learning, 38*(1), 237–257. doi:10.1111/jcal.12610

Kohnke, L., Moorhouse, B. L., & Zou, D. (2023). ChatGPT for language teaching and learning. *RELC Journal, 54*(2), 537–550. doi:10.1177/00336882231162868

Laupichler, M. C., Aster, A., Schirch, J., & Raupach, T. (2022). Artificial intelligence literacy in higher and adult education: A scoping literature review. *Computers and Education: Artificial Intelligence, 3*, Article 100101. doi:10.1016/j.caeai.2022.100101

Law, L. (2024). Application of generative artificial intelligence (GenAI) in language teaching and learning: A scoping literature review. *Computers and Education Open, 6*, Article 100174. doi:10.1016/j.caeo.2024.100174

Lee, H., & Lee, J. H. (2024). The effects of AI-guided individualized language learning: A meta-analysis. *Language Learning & Technology, 28*(2), 134–162. doi:10.64152/10125/73575

Li, B., Lowell, V. L., Wang, C., & Li, X. (2024). A systematic review of the first year of publications on ChatGPT and language education: Examining research on ChatGPT's use in language learning and teaching. *Computers and Education: Artificial Intelligence, 7*, Article 100266. doi:10.1016/j.caeai.2024.100266

Li, B., Tan, Y. L., Wang, C., & Lowell, V. (2025). Two years of innovation: A systematic review of empirical generative AI research in language learning and teaching. *Computers and Education: Artificial Intelligence, 9*, Article 100445. doi:10.1016/j.caeai.2025.100445

Ng, D. T. K., Leung, J. K. L., Chu, S. K. W., & Qiao, M. S. (2021). Conceptualizing AI literacy: An exploratory review. *Computers and Education: Artificial Intelligence, 2*, Article 100041. doi:10.1016/j.caeai.2021.100041

Page, M. J., McKenzie, J. E., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D., Shamseer, L., Tetzlaff, J. M., Akl, E. A., Brennan, S. E., Chou, R., Glanville, J., Grimshaw, J. M., Hróbjartsson, A., Lalu, M. M., Li, T., Loder, E. W., Mayo-Wilson, E., McDonald, S., . . . Moher, D. (2021). The PRISMA 2020 statement: An updated guideline for reporting systematic reviews. *BMJ, 372*, Article n71. doi:10.1136/bmj.n71

Pratiwi, D. I., & Waluyo, B. (2023). Autonomous learning and the use of digital technologies in online English classrooms in higher education. *Contemporary Educational Technology, 15*(2), Article ep423. doi:10.30935/cedtech/13094

Torres, P. J., & Kahveci, Y. E. (2025). Effectiveness of artificial intelligence (AI) in language teaching. *Computers and Education: Artificial Intelligence, 9*, Article 100522. doi:10.1016/j.caeai.2025.100522

Warschauer, M., & Xu, Y. (2024). Artificial intelligence for language learning: Entering a new era. *Language Learning & Technology, 28*(2), 1–4. doi:10.64152/10125/73569

Wiboolyasarin, W., Wiboolyasarin, K., Tiranant, P., Jinowat, N., & Boonyakitanont, P. (2025). AI-driven chatbots in second language education: A systematic review of their efficacy and pedagogical implications. *Ampersand, 14*, Article 100224. doi:10.1016/j.amper.2025.100224