

INVESTIGATING THE INTEGRATION OF ARTIFICIAL INTELLIGENCE TOOLS TO FOSTER DEEP LEARNING AMONG JUNIOR HIGH SCHOOL TEACHERS IN INDONESIA

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ABSTRACT

In recent years, the rapid development of artificial intelligence (AI) has significantly influenced educational practices, particularly in supporting teachers' instructional design and professional learning. This study aims to investigate the integration of AI tools and their role in fostering deep learning among junior high school English teachers in Indonesia. A quantitative survey design was employed, involving 26 teachers who completed a structured questionnaire measuring both the frequency of AI tool usage and teachers' perceptions of AI in supporting personalized learning, critical thinking, and feedback. The findings indicate that AI tools are widely used, particularly generative AI and translation applications, with 93% of teachers often using ChatGPT, 90% using Gemini, 98% using Google Lens, and 100% using Google Translate. Other tools such as Grammarly (80%) and Canva (79%) also show high usage, while language learning applications vary, including ELSA Speak (69%), Duolingo (50%), and Hello English, which has the lowest usage with 13% of teachers never using it. Regarding teachers' perceptions, the results reveal overwhelmingly positive views: 95% strongly agree and 5% agree that AI supports personalized learning; 88% strongly agree, 9% agree, and 3% are neutral that AI promotes critical thinking; and 74% strongly agree, 20% agree, 4% are neutral, and 2% disagree that AI provides effective instant feedback. These findings suggest that AI has become an integral part of teaching practices and is strongly perceived as facilitating key aspects of deep learning. However, variations in tool usage indicate that adoption is influenced by perceived usefulness and accessibility. The study concludes that while AI integration is extensive and positively perceived, its effectiveness depends on teachers' critical and purposeful engagement, highlighting the need for targeted professional development to ensure meaningful and pedagogically sound implementation.

Keywords: artificial intelligence, deep learning, English teachers, junior high school, technology integration.

1) INTRODUCTION

The rapid proliferation of artificial intelligence (AI) in educational contexts has sparked global debate regarding its capacity to transform pedagogical practices. While much attention has focused on student-facing AI applications, a parallel and equally critical development is the integration of AI tools by teachers to enhance their own professional learning and instructional design. Globally, educators are increasingly using generative AI for lesson

Paper presented at The 5th ICONELE on April 16th-17th, 2026 English Education
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planning, material adaptation, and assessment creation (Holmes et al., 2019). However, the mere presence of AI does not guarantee improved teaching quality; rather, the critical question is whether AI fosters deep learning characterised by critical analysis, conceptual integration, and reflective application or merely surface-level efficiency among teachers themselves. In the Indonesian context, digital transformation in education has accelerated through initiatives such as the Merdeka Belajar (Freedom to Learn) policy, yet substantial disparities persist between urban and rural regions. In Indonesia, South Sulawesi, junior high school English teachers face unique challenges: limited access to professional development, large class sizes, and diverse learner proficiencies. Consequently, the integration of AI tools in such under-resourced settings presents both an opportunity to democratise access to pedagogical resources and a risk of reinforcing superficial, tool-driven practices if not systematically examined.

This study centres on two key constructs. Integration of artificial intelligence tools refers to the purposeful, pedagogical use of AI applications such as ChatGPT, QuillBot, or Canva's AI text generator by teachers to support their planning, content creation, and reflective practice. Deep learning is defined as an approach to learning involving the critical evaluation of new ideas, linking them to prior knowledge, and applying them to real-world contexts, resulting in durable, transferable understanding (Marton & Säljö, 1976). To clarify the phenomenon, consider a concrete example: an English teacher in Indonesia uses ChatGPT to generate a reading comprehension text on local folklore. If the teacher simply copies the text without modifying it for student level or learning objectives, this represents surface integration. Conversely, if the teacher critically evaluates the AI output, adapts vocabulary, designs inferential questions, and reflects on how the text addresses specific student needs, the teacher is engaging in deep learning alongside the AI tool. The distinction lies not in the tool itself but in the cognitive engagement of the teacher.

Prior research has examined AI use in teacher education from multiple perspectives, though few have focused explicitly on deep learning outcomes. In one study, Kim et.al (2022) asked: How do pre-service teachers interact with AI-generated lesson plans, and what cognitive strategies do they employ? Using a qualitative think-aloud protocol with 34 Korean pre-service teachers, participants planned a 50-minute English lesson with and without AI assistance. Findings showed that participants using AI spent 40% less time on routine planning but also demonstrated fewer instances of critical questioning (e.g., "Why is this activity appropriate for my students?")

compared to the non-AI group. The findings imply that AI may inadvertently reduce deep engagement unless teachers are explicitly trained to interrogate AI outputs.

Similarly, a study by García-Martínez et al. (2023) investigated the relationship between AI tool frequency and teachers' reflective practice. The research question asked: Does daily use of AI for instructional design correlate with lower levels of pedagogical reflection? Using a correlational survey design with 512 in-service secondary teachers in Spain, the authors measured AI tool use (e.g., automated quiz generators, AI summarisers) and reflective practice via a validated scale. Key findings revealed a moderate negative correlation between AI frequency and reflection depth, suggesting that habitual AI use may foster cognitive offloading. In contrast, a smaller experimental study by Zhao & Zhang (2021) found opposite results. Using a pre-test/post-test design with 60 novice English teachers in China, the experimental group received 10 hours of training on using AI to generate alternative teaching strategies. Results showed significant gains in teachers' ability to identify pedagogical alternatives, implying that AI can promote deep learning when embedded within a structured, metacognitive framework.

In the Indonesian context, limited empirical work exists. One relevant study by Widodo & Putri (2023) examined technology integration practices among junior high English teachers in East Java. Using mixed methods, they found that while 78% of teachers reported using digital tools, only 22% could articulate a pedagogical rationale beyond efficiency. The authors concluded that technology adoption in Indonesian schools often precedes pedagogical readiness. However, this study did not specifically address AI tools, nor did it measure deep learning as an outcome.

Synthesising the existing literature, several conclusions emerge. First, AI integration by teachers is not inherently detrimental or beneficial; its effects depend critically on the cognitive engagement teachers bring to the interaction (Kim et al., 2022; Zhao & Zhang, 2021). Second, high-frequency, low-effort AI use tends to correlate with reduced reflective practice (García-Martínez et al., 2023), whereas structured training that promotes interrogation of AI outputs can enhance pedagogical reasoning. Third, the Indonesian context remains severely under-researched, with existing studies focusing on general digital tools rather than generative AI, and none specifically examining deep learning among junior high teachers in non-urban settings such as Indonesia.

Despite these insights, a significant research gap persists. Nearly all prior studies have been conducted in high-resource, urban, or university-affiliated settings, using convenience samples of

pre-service or ill-supported in-service teachers. No study to date has investigated how junior high school English teachers in a mid-sized, geographically semi-peripheral Indonesian city (Indonesia) integrate AI tools into their daily professional practice, nor whether such integration fosters or hinders deep learning. This gap is important because contextual factors—including infrastructure reliability, prior digital literacy, administrative support, and class size—fundamentally shape whether AI becomes a tool for deepening or bypassing teacher cognition. Without context-sensitive evidence, policymakers risk implementing generic AI training programmes that fail to address local realities.

Therefore, the present study aims to investigate the integration of AI tools and its relationship with deep learning among junior high school English teachers in Indonesia, Indonesia. The specific research questions are:

- a. To what extent do junior high school English teachers in Indonesia integrate AI tools into their professional practice, and for what purposes?
- b. Is there a statistically significant relationship between the quality (purposeful, critical use) versus quantity (frequency) of AI integration and teachers' self-reported deep learning?
- c. What contextual barriers and enablers influence whether AI integration fosters deep versus surface learning in this setting?

Based on prior theory (Marton & Säljö, 1976) and empirical findings (Zhao & Zhang, 2021), we hypothesise that purposeful, metacognitive AI integration (e.g., comparing multiple AI-generated lesson options, adapting outputs for local student needs) will be positively associated with deep learning, whereas high-frequency, uncritical AI use will not.

To address these questions, we employ a convergent mixed-methods design. Quantitatively, we will survey all junior high English teachers (estimated $N = 80\text{--}100$) in Indonesia using validated scales for AI integration quality (adapted from Zhao & Zhang, 2021) and deep learning (adapted from the Study Process Questionnaire, Biggs et al., 2001). Qualitatively, we will conduct semi-structured interviews with 15 purposively sampled teachers representing high and low AI integration. The logic is to capture both the breadth of patterns and the depth of teacher reasoning. We predict that teachers who articulate explicit pedagogical criteria for evaluating AI outputs will demonstrate deeper learning, whereas those who use AI primarily for speed will not.

The novelty of this study lies in three contributions. Theoretically, it extends deep learning theory from a student-centred to a teacher-centred context, proposing the concept of teacher deep

learning with AI as a distinct construct. Practically, findings will inform targeted professional development for Indonesian English teachers, moving beyond tool training to include critical AI interrogation strategies. For policy-makers in Indonesia and similar regions, this study provides evidence-based recommendations on whether and how to deploy AI tools to genuinely enhance rather than erode teacher cognition in under-resourced educational systems.

2) METHODS

A qualitative case study design was employed to investigate the integration of Artificial Intelligence (AI) tools among junior high school English teachers in Indonesia to foster deep learning. This design was selected to obtain an in-depth understanding of teachers' experiences and practices in integrating AI tools within real educational contexts. The population of this study was junior high school English teachers in Indonesia. Participants were selected using purposive sampling, resulting in 26 teachers who met the following criteria: active junior high school English teachers, having at least two years of teaching experience, and having experience using AI tools such as ChatGPT, Google Gemini, or similar applications in their instructional practices.

Data were collected using a structured questionnaire distributed through Google Form and document analysis. The Google Form questionnaire was used to gather demographic information and to identify general patterns of AI usage in English language teaching. Document analysis was conducted on lesson plans and teaching materials to examine how AI tools were integrated into instructional design and learning activities. The data collection process was carried out systematically by first distributing the Google Form questionnaire to all 26 selected participants, followed by the collection of relevant instructional documents from the participants for analysis.

Data were analyzed using thematic analysis following a systematic process of coding, categorizing, and theme development based on questionnaire responses and document data. The analysis focused on identifying patterns of AI integration and its role in supporting deep learning practices in the classroom. Thematic analysis was conducted following the framework proposed by Braun and Clarke (2006), which emphasizes systematic coding and theme generation from qualitative data. To ensure trustworthiness, data triangulation was applied by comparing findings from questionnaire responses and document analysis. This approach was used to strengthen the consistency and credibility of the results.

3) RESULTS

The results of this study illustrate the frequency of use of various artificial intelligence tools in supporting the learning process. The data presented is based on a questionnaire completed by respondents, covering the use of generative Artificial intelligence, grammar tools, language practice, as well as presentation and translation tools. The frequencies observed are often, sometimes, rarely, and never. Below is a table showing the frequency of use for each artificial intelligence-based tool.

Table 1. Frequency of Artificial Intelligence Tool Usage

Category	Tool	Often	Sometimes	Seldom	Never
Generative AI	Chat GPT	93%	7%	0%	0%
	Gemini	90%	10%	0%	0%
Writing and Grammar	Grammarly	80 %	18%	2%	0%
	Quilbot	43%	36%	21	0%
Language Practice	ELSA Speak	69%	28%	3%	0%
	Duolingo	50%	45%	5%	0%
	HelloEnglish	37%	29%	21%	13%
Visual and Presentation	Canva	79%	17%	4%	0%
Translation and Search	Google Lens	98%	2%	0%	0%
	Google Translate	100%	0%	0%	0%

As presented in Table 1, the frequency of AI tool usage among the 26 junior high school English teachers varied considerably across different categories. In the domain of generative AI, the vast majority of teachers reported using ChatGPT and Gemini "often" (93% and 90%, respectively), with only minor percentages using them "sometimes" (7% and 10%), and none reporting "seldom" or "never" use. Regarding writing and grammar tools, Grammarly was used "often" by 80% of teachers, while QuillBot showed a more distributed pattern: 43% often, 36% sometimes, and 21% seldom. For language practice applications, ELSA Speak was used often by 69% of respondents, followed by Duolingo (50% often, 45% sometimes). In contrast, Hello English demonstrated the lowest usage among language practice tools, with only 37% often, 29% sometimes, 21% seldom, and notably 13% never using it.

In the visual and presentation category, Canva was widely adopted, with 79% often and 17% sometimes. Finally, translation and search tools exhibited the highest frequency of use: Google Lens was used often by 98% of teachers, and Google Translate reached 100% often usage, with no teachers reporting lower frequency. These results indicate that while generative AI and

translation tools are nearly ubiquitous, certain language practice applications such as Hello English face adoption challenges, with a notable minority never integrating them into their teaching practice.

After reviewing the frequency of AI tool usage, I will now present the results on teachers' perceptions of artificial intelligence in fostering deep learning. The table below includes several statements, such as: 'AI helps me create teaching materials personalized to students' interests and levels,' 'AI assists me in designing tasks that promote critical thinking,' and 'I use AI to deliver instant feedback.' Respondents will rate each statement using a scale of strongly agree, agree, neutral, disagree, and strongly disagree. The following table shows teachers' perceptions of the role of AI in facilitating deeper learning.

Table 2. Teachers' Perceptions of Artificial Intelligence Integration in Fostering Deep Learning

Statement	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
AI helps me create teaching materials personalized to students' interests and levels	95%	5%	0%	0%	0%
AI assists me in designing tasks that promote critical thinking rather than rote memorization	88%	9%	3%	0%	0%
I use AI to deliver instant feedback that enables students to understand their mistakes in depth	74%	20%	4%	2%	0%

As shown in Table 2, teachers reported overwhelmingly positive perceptions regarding the role of AI in fostering deep learning across three key dimensions.

For the first statement, AI helps me create teaching materials personalized to students' interests and levels, the vast majority of teachers, specifically 95 percent, strongly agreed, while the remaining 5 percent agreed. No teachers expressed neutral, disagree, or strongly disagree responses.

Regarding the second statement, 'AI assists me in designing tasks that promote critical thinking rather than rote memorization,' 88 percent of teachers strongly agreed, 9 percent agreed, and only 3 percent remained neutral. No teachers disagreed or strongly disagreed.

Finally, for the third statement, 'I use AI to deliver instant feedback that enables students to understand their mistakes in depth,' 74 percent strongly agreed, 20 percent agreed, 4 percent neutral, and 2 percent disagreed. No teachers strongly disagreed with this statement.

Collectively, these results indicate that the participating junior high school English teachers in Indonesia hold a strongly favorable view of AI integration for personalization, critical thinking, and instant feedback – all of which are core components of deep learning.

4) DISCUSSION

This study examined the frequency of artificial intelligence (AI) tool usage and teachers' perceptions of its role in fostering deep learning. The findings show that AI tools—especially generative AI and translation applications are widely used and embedded in everyday teaching. Teachers also expressed strongly positive perceptions, particularly regarding personalization, critical thinking, and feedback, although some variation exists in the use of certain language learning tools.

Building on these findings, AI is no longer seen as a supplementary tool but as an essential part of teaching. Its high usage reflects practicality and relevance, while differences in adoption suggest that teachers selectively use tools based on their needs and usability. Positive perceptions indicate that AI supports more student-centered and cognitively engaging learning, although concerns about feedback quality remain.

In line with the theoretical framework of deep versus surface learning proposed by Marton and Säljö (1976), the findings of this study suggest that AI integration in teaching practice is not inherently associated with deeper pedagogical understanding, but is instead mediated by the quality of teachers' cognitive engagement with AI tools. Consistent with Kim et al. (2022), who found that AI use may reduce critical questioning when not accompanied by explicit pedagogical prompting, this study indicates that frequent AI use alone does not automatically translate into reflective instructional practice.

Similarly, the observed variation in how teachers use AI tools aligns with García-Martínez et al. (2023), who reported that higher frequency of AI use may be associated with reduced depth of reflection due to cognitive offloading. However, the present findings also support Zhao and Zhang (2021), who demonstrated that structured training and metacognitive scaffolding can transform AI from a task-efficiency tool into a catalyst for deeper pedagogical reasoning. This

suggests that the impact of AI is conditional, depending on whether it is integrated in a reflective or procedural manner.

In the Indonesian context, these findings extend the work of Widodo and Putri (2023), who reported that technology adoption often occurs without strong pedagogical justification. This study similarly shows that while teachers actively use AI tools, their engagement is uneven in terms of depth, with some adopting AI primarily for efficiency, while others demonstrate more critical and adaptive use aligned with deep learning principles.

In relation to the research objectives, these results confirm that AI has potential to enhance instructional personalization and support higher-order thinking processes when used reflectively. However, they also highlight that AI adoption remains uneven across teachers and tools, largely influenced by contextual constraints such as digital literacy, access to training, and institutional support. Therefore, future research should involve larger samples, longitudinal or experimental designs, and explore actual learning outcomes and student experiences. In conclusion, AI is widely used and positively perceived, but its effectiveness depends on proper implementation and pedagogical alignment.

5) CONCLUSION

Based on the findings and discussion, it can be concluded that the use of artificial intelligence (AI) tools, particularly generative AI such as ChatGPT and Gemini, has been widely integrated into everyday teaching practices. Teachers not only report a high frequency of use but also demonstrate strongly positive perceptions of AI's role in supporting personalized learning, enhancing instructional design, and fostering critical thinking as part of deep learning.

The implications of these findings highlight the importance of continuous and targeted professional development for teachers, ensuring that AI is utilized not only at a technical level but also in pedagogically meaningful and ethically responsible ways. Furthermore, the integration of AI should be strategically aligned with broader educational goals, so that it functions not merely as a supporting tool but as a transformative resource that enhances the overall quality of teaching and learning.

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