



AI DEPENDENCY AND INDEPENDENT LEARNING: A SEQUENTIAL EXPLANATORY MIXED-METHODS ANALYSIS OF STUDENTS' PERCEPTIONS IN ENGLISH LANGUAGE EDUCATION

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ABSTRAK

Kemajuan teknologi Kecerdasan Buatan (*Artificial Intelligence/AI*) telah mendorong perubahan signifikan dalam cara mahasiswa mempelajari bahasa Inggris, khususnya terkait potensi munculnya ketergantungan dalam penggunaan teknologi tersebut. Alat-alat AI seperti pemeriksa tata bahasa, penerjemah otomatis, dan platform pembuat teks generatif membantu mahasiswa memahami materi serta meningkatkan keterampilan bahasa secara mandiri. Penelitian ini bertujuan untuk mengkaji persepsi mahasiswa terhadap ketergantungan mereka pada AI dalam mendukung pembelajaran bahasa Inggris secara mandiri. Penelitian ini menggunakan pendekatan metode campuran dengan pengumpulan data melalui kuesioner terhadap 30 mahasiswa EFL dan wawancara semi-terstruktur dengan lima partisipan yang dipilih secara purposif. Hasil penelitian menunjukkan bahwa mahasiswa mengapresiasi penggunaan alat AI seperti Grammarly, Google Translate, dan ChatGPT karena mampu memberikan umpan balik instan, pengalaman belajar yang terpersonalisasi, serta peningkatan kemampuan bahasa. Di sisi lain, temuan juga menunjukkan adanya kecenderungan ketergantungan yang berpotensi mengurangi inisiatif belajar mandiri apabila tidak dikontrol dengan baik. Simpulan penelitian ini menegaskan bahwa pemanfaatan AI dapat secara efektif mendukung kemandirian belajar mahasiswa apabila digunakan secara bijak, terarah, dan diimbangi dengan strategi pembelajaran konvensional. Penelitian ini memberikan wawasan bagi pemangku kepentingan pendidikan dalam memanfaatkan AI untuk mendorong kemandirian belajar dan literasi digital.

Kata kunci: *Kecerdasan Buatan, Ketergantungan, Kemandirian Belajar, EFL, Teknologi Digital*

ABSTRACT

The advancement of Artificial Intelligence (AI) technology has driven significant changes in how students learn English, particularly in relation to the potential emergence of dependency on such technologies. AI tools such as grammar checkers, machine translation, and generative text platforms assist students in understanding materials and improving their language skills independently. This study aims to examine students' perceptions of their dependency on AI in supporting independent English language learning. This research employs a mixed-methods approach, collecting data through questionnaires administered to 30 EFL students and semi-structured interviews with five purposively selected participants. The findings indicate that students appreciate the use of AI tools such as Grammarly, Google Translate, and ChatGPT for providing instant feedback, personalized learning experiences, and improved language proficiency. On the other hand, the findings also reveal a tendency toward dependency, which may reduce learners' initiative in independent study if not properly managed. The study



concludes that the use of AI can effectively support learner autonomy when applied responsibly, strategically, and in balance with conventional learning methods. This study provides insights for educational stakeholders in leveraging AI to promote independent learning and digital literacy.

Keywords: *Artificial Intelligence, Dependency, Learner Autonomy, EFL, Digital Technology Technology*

INTRODUCTION

Independent learning refers to an educational approach in which learners take active responsibility for managing their own learning processes, including setting goals, selecting strategies, and evaluating outcomes. In language learning contexts, this autonomy is closely linked to sustained engagement both inside and outside the classroom. Recent studies show that self-initiated activities, such as engaging with authentic materials and independent practice, contribute significantly to improved language proficiency and motivation (Tsang & Consoli, 2025; Indrayani et al., 2024). However, the effectiveness of such autonomy increasingly depends on learners' ability to regulate their behavior within digitally mediated environments. Research further indicates that multitasking and digital distractions can reduce focus and self-regulatory capacity, thereby hindering effective independent learning (Deng et al., 2024).

Despite its importance, fostering independent learning remains challenging, particularly in technology-rich environments. Learners often struggle to maintain concentration, manage cognitive resources, and sustain intrinsic motivation. Theories of cognitive load suggest that excessive reliance on digital tools may increase extraneous cognitive load and reduce deep learning and critical engagement (Skulmowski & Xu, 2022). Thus, independent learning is not only shaped by learner intention but also by how effectively digital tools are managed to support cognitive processes. These challenges highlight the need for a more critical understanding of how technology influences learner autonomy.

In recent years, Artificial Intelligence (AI) has emerged as a transformative tool in education, offering affordances such as automated feedback, personalized learning, and language assistance. AI-powered tools have been shown to enhance students' writing quality, motivation, and confidence in language learning (Song & Song, 2023; Dwivedi et al., 2021). However, the increasing use of AI raises concerns regarding its potential impact on learners' cognitive development and independence. Systematic reviews indicate that over-reliance on AI may reduce critical thinking, problem-solving abilities, and active engagement (Zhai et al., 2024; Deckker & Sumanasekara, 2025). This dual role positions AI as both a facilitator and a potential barrier to the development of independent learning.

This issue becomes more significant within the context of Indonesia's Merdeka Belajar policy, which emphasizes student-centered learning, autonomy, and the development of critical and creative thinking skills. The policy encourages learners to take greater control of their learning processes and adapt to rapidly changing digital environments (Kurniawan, 2023; Ikhsanudin et al., 2022; Mujiburrahman et al., 2025). However, the widespread adoption of AI tools introduces new challenges in achieving these goals, as it may simultaneously enhance efficiency and reduce learner effort. This tension underscores the need to examine whether AI supports or undermines the principles of learner autonomy promoted by the policy. Accordingly, a clearer conceptual and empirical understanding is required to position AI appropriately within autonomous learning frameworks.

Although previous studies have examined the benefits and risks of AI in education, empirical research focusing on students' perceptions of their reliance on AI in relation to



independent learning remains limited. Most studies emphasize cognitive outcomes or technological affordances without deeply exploring learners' lived experiences. To address this gap, this study adopts a perception-based approach that centers on students' experiences in using AI for English learning. This transitional focus leads to the central inquiry of whether AI functions as a constructive support or as a substitute for learners' cognitive efforts. Therefore, this study aims to explore students' perceptions of AI use in English learning and to identify key factors influencing their reliance on AI tools in supporting independent learning practices.

RESEARCH METHODS

This study employed a sequential explanatory mixed-methods design conducted in two consecutive phases at a private university in Gresik, Indonesia, during the 2024/2025 academic year. The quantitative phase involved a survey to identify patterns of students' AI use and independent learning tendencies, followed by a qualitative phase to explain these findings in greater depth. The participants were undergraduate students aged 18–25 who actively used AI tools such as ChatGPT and Grammarly in their learning activities. A total of 30 students were selected through purposive sampling for the questionnaire phase, while five participants were recruited using snowball sampling for in-depth interviews. The research setting is presented concisely to maintain methodological focus while still ensuring contextual clarity. The sample size was intended to provide descriptive insights rather than statistical generalization, with qualitative data strengthening the interpretation of quantitative results.

The study utilized a 23-item Likert-scale questionnaire and a semi-structured interview guide focusing on AI usage, perceived benefits, challenges, and its impact on independent learning. All questionnaire items were confirmed valid ($r > 0.361$) and demonstrated high reliability with a Cronbach's Alpha value of 0.980, indicating strong internal consistency. Data collection was carried out through questionnaire distribution and follow-up interviews, with all participants providing informed consent and their responses anonymized. Quantitative data were analyzed using descriptive statistics to identify trends, while qualitative data were analyzed using thematic analysis involving coding, categorizing, and identifying key themes. To enhance research transparency, a detailed instrument blueprint is recommended to be included as an appendix if required by the target journal. The integration of both data sets was conducted to provide a comprehensive understanding of students' perceptions and experiences regarding AI use in independent learning.

RESULTS AND DISCUSSION

Result

1. Students' AI Dependency and Its Influence on Independent Learning

To address this research question, descriptive statistical analysis was conducted to examine students' levels of AI dependency and independent learning. The analysis aims to provide an overview of how students position AI within their learning processes without overemphasizing numerical repetition. The data are presented in tabular form to highlight central tendencies and score distribution across both variables. This presentation allows readers to interpret patterns of AI use and learner autonomy more efficiently.

Table 1. Descriptive Statistics

Variables	Mean	Median	Std. Deviation	Minimum	Maximum	N
AI Dependency Score	45.2	46.0	8.5	28	65	30
Independent Learning Score	52.8	54.0	7.2	35	72	30

The results presented in Table 1 indicate a general tendency in which students demonstrate moderate engagement with AI alongside relatively strong independent learning capacity. Rather than suggesting dominance of one variable over the other, the data reflect a balanced interaction between AI use and learner autonomy. Variations in scores imply that students differ in how they regulate their learning while using AI tools. Overall, the findings suggest that AI is integrated as a complementary resource within students' independent learning processes.

To provide a clearer visual comparison, the data are also presented in graphical form. This visualization helps readers quickly identify the relative positioning of the two variables without relying solely on tabular data. The figure complements the statistical summary by emphasizing the comparative aspect of the findings. Figure 1 illustrates the mean score comparison between AI dependency and independent learning.

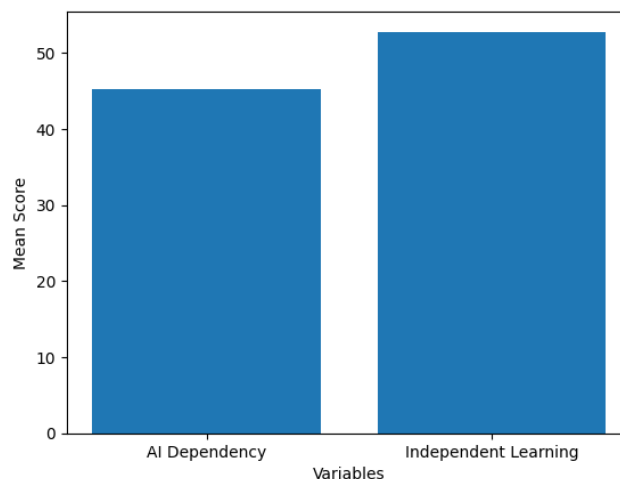


Figure 1. Comparison of AI Dependency and Independent Learning

Figure 1 shows that independent learning remains comparatively stronger than AI dependency, reinforcing the pattern observed in the descriptive analysis. This suggests that students are able to maintain autonomy while incorporating AI into their learning routines. The visual representation supports the interpretation that AI does not replace independent effort but rather functions as a supportive tool. Thus, both forms of presentation consistently indicate a balanced learning dynamic.

2. Students' Perceptions of the Benefits and Challenges of AI in English Learning

The questionnaire results indicate that students generally hold positive perceptions of AI use in English learning. AI tools are perceived as effective in improving efficiency, providing immediate feedback, and enabling flexible learning beyond the classroom. Students report that AI supports writing accuracy, vocabulary development, and overall comprehension through its instant and responsive features. These benefits encourage learners to engage in more self-directed learning practices.

From a motivational perspective, AI contributes to increased engagement and confidence. Students feel that AI makes learning more interactive and encourages more frequent practice, particularly in productive skills. However, concerns about overreliance also emerge, as some students acknowledge reduced critical thinking and independent problem-



solving when relying too heavily on AI. In addition, practical challenges such as occasional inaccuracies and dependence on internet access are identified.

Findings from the interviews further enrich these results by providing deeper insights into students' experiences. Participants describe using AI for writing correction, idea generation, pronunciation practice, and translation. One participant noted, "AI helps me correct my grammar and pronunciation instantly," highlighting its role in facilitating reflective learning. At the same time, another participant admitted, "Sometimes I depend on AI too much," indicating awareness of potential overreliance. Overall, the findings suggest that while AI is perceived as a supportive and motivating tool, its effectiveness depends on how learners regulate and balance its use.

Discussion

The findings of this study demonstrate that the integration of AI in English language learning significantly contributes to enhancing students' learning quality and autonomy. This result is consistent with the work of Mekheimer (2025) and Zamorano (2025), who highlight the role of AI in improving writing proficiency, revision practices, and linguistic accuracy. Students in this study benefited from immediate and continuous feedback, which enabled them to independently detect and correct errors. More importantly, this study extends prior findings by emphasizing that AI-mediated feedback not only improves performance outcomes but also reshapes students' learning behaviors toward more reflective and self-monitoring practices. This interpretation is further supported by Takona (2024), who emphasizes that mixed-methods approaches enable a more comprehensive understanding of learning phenomena by integrating behavioral patterns with experiential insights.

Furthermore, the positive relationship between AI use and learner autonomy identified in this study aligns with Sujannah et al. (2025) and Ironsi and Bostanci (2026), who report that AI fosters self-directed learning. Students demonstrated the ability to regulate their own learning processes, including planning, monitoring, and evaluating their progress. The flexibility offered by AI tools allows learning to occur beyond classroom boundaries, supporting continuous engagement. Unlike earlier studies that predominantly emphasize positive outcomes, the present findings highlight that autonomy development is conditional upon learners' active engagement rather than mere exposure to AI tools.

From a language development perspective, the findings corroborate those of Silor and Silor (2025) as well as Ahmed (2025), who report improvements in reading comprehension, writing accuracy, and vocabulary acquisition through AI-supported learning. AI enables access to diverse learning resources and offers personalized feedback tailored to learners' needs. This adaptability supports differentiated instruction and accommodates varying proficiency levels among students. However, this study refines previous conclusions by demonstrating that the effectiveness of AI is closely linked to learners' metacognitive awareness and their ability to strategically utilize feedback.

Despite these advantages, the findings also reveal critical concerns regarding overdependence on AI, supporting the arguments of Meiristiani and Nindya (2025). Excessive reliance on AI may lead to reduced critical thinking, creativity, and independent problem-solving abilities. Additionally, Hasanah and Degeng (2025) emphasize that insufficient AI literacy can exacerbate these risks. Importantly, the present study shows that students are not merely passive users; rather, they exhibit an emerging critical digital awareness that helps mitigate the negative impacts of AI dependency.



From a theoretical standpoint, the findings reinforce the concept of instructional scaffolding as discussed by Chueng and Heng (2025), where AI acts as a temporary support system in the learning process. AI assists learners in achieving higher levels of understanding before gradually reducing dependence on external support. Moreover, Yeşil (2026) and Chen and Alibakhshi (2026) suggest that AI contributes to the development of cognitive and metacognitive strategies. Building on these perspectives, this study emphasizes that AI-driven scaffolding is most effective when it promotes active cognitive engagement rather than passive reliance.

Finally, the role of AI in enabling personalized and adaptive learning environments is evident, as supported by Dekhakhena (2025). AI systems can tailor instructional content, feedback, and learning pathways based on individual learner profiles, leading to more efficient learning experiences. This adaptability enhances both motivation and engagement among students. However, this study critically underscores that personalization alone is insufficient without self-regulation, as learners who lack control over their AI usage are more prone to dependency and reduced cognitive effort. In summary, the findings collectively indicate that AI serves as a facilitative yet conditional tool, where its effectiveness in supporting independent learning depends on learners' ability to balance technological assistance with active cognitive engagement and self-regulation.

CONCLUSION

The findings of this study indicate that students demonstrate a balanced use of AI alongside relatively strong independent learning abilities. AI is generally perceived as a beneficial tool that enhances learning efficiency, improves writing accuracy, and provides immediate feedback that supports self-directed learning. In addition, students view AI as an accessible and motivating resource that facilitates flexible and personalized learning experiences. These findings emphasize that AI plays a meaningful role in strengthening learner autonomy when it is used as a supportive and reflective learning tool rather than as a shortcut. This implies that the effectiveness of AI in education is not inherent in the technology itself, but in how learners actively engage with it to support their own learning processes.

However, the study also reveals that excessive reliance on AI may pose challenges to the development of critical thinking, creativity, and independent problem-solving skills. This highlights the dual role of AI as both a facilitator and a potential barrier to deep learning, depending on how it is utilized. Therefore, the effectiveness of AI integration depends on students' ability to regulate its use and engage with it critically. From a practical perspective, educators and institutions are encouraged to design instructional strategies that integrate AI with metacognitive guidance, promote critical use of technology, and provide structured support to prevent overdependence. Future research is recommended to explore long-term impacts through longitudinal designs and to examine pedagogical strategies that integrate AI with metacognitive training and teacher guidance, ensuring more balanced and responsible use in language learning contexts.

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