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A Systematic Analysis of Self-Regulated Learning in Artificial Intelligence-Supported English Language Learning

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Abstract: *The rapid development of Artificial Intelligence (AI) has introduced various innovations in English language learning, including its potential to support the development of Self-Regulated Learning (SRL). However, studies examining the integration of AI and SRL remain fragmented across different research contexts, resulting in a lack of comprehensive understanding of their relationship. This study aims to systematically analyze the implementation of SRL in AI-supported English language learning and to identify the contributions of AI to the development of learners' self-regulatory abilities. The study employed a qualitative Systematic Literature Review (SLR) approach. Literature sources were obtained from Scopus, DOAJ, Google Scholar, and AI-assisted platforms, namely SciSpace and Elicit. The selected articles were published between 2016 – 2026 nd were screened according to the PRISMA guidelines using predefined inclusion and exclusion criteria. Data were analyzed through thematic analysis to identify key patterns and themes related to the implementation of SRL in AI-enhanced English language learning. The findings indicate that AI plays a significant role in supporting various dimensions of SRL through educational chatbots, adaptive learning systems, speech recognition technology, and learning analytics. These technologies assist learners in setting learning goals, monitoring progress, conducting self-evaluation, and reflecting on learning strategies continuously. Nevertheless, existing studies predominantly focus on learning outcomes and instructional effectiveness, while the affective, motivational, and social dimensions of SRL have received relatively limited attention. The findings suggest that AI has substantial potential to foster learner autonomy in English language learning when effectively integrated with SRL principles.*

Keywords: Artificial Intelligence, Self Regulated Learning, English Language, Adaptive Learning, Systematic Literature Review

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A. INTRODUCTION

English occupies a strategic position as a global language that is widely used in education, technological advancement, and cross-border communication in an increasingly interconnected era of globalization (Wei, 2023)English proficiency serves not only as an indicator of academic achievement but also as a fundamental competency that supports professional success, career adaptability, and digital literacy in the twenty-first century. However, the process of learning English as a Foreign Language (EFL) continues to face numerous challenges across various educational contexts, including limited exposure to authentic language use, low levels of learner motivation, and the suboptimal implementation of instructional strategies that promote learner autonomy (Liu & Dong, 2023). These challenges underscore the need for more responsive and effective pedagogical innovations, particularly those that integrate contemporary learning approaches to enhance both the quality of the learning process and learning outcomes in English language education while addressing the demands of twenty-first-century education.

The rapid advancement of Artificial Intelligence (AI) in language education has brought about significant changes to contemporary learning paradigms, which were previously dominated by traditional instructional approaches (Kohnke et al., 2023). In English language learning, a wide range of AI-powered technologies, including interactive chatbots, intelligent tutoring systems, automated writing feedback, and speech recognition technologies, have been increasingly adopted to improve the effectiveness and efficiency of the learning process (Dai et al., 2023). These technologies facilitate the creation of adaptive and personalized learning environments by providing immediate, real-time feedback tailored to learners' individual needs and characteristics (D. Yan, 2024). Furthermore, the integration of AI into English language instruction has accelerated the shift from teacher-centered pedagogy to technology-enhanced learning environments, where learners assume a more active role in constructing knowledge while demonstrating greater autonomy and engagement throughout the learning process (Crompton & Burke, 2023).

Self-Regulated Learning (SRL) is a learning construct that refers to learners' ability to independently manage their learning activities through the processes of goal setting, selecting and applying appropriate learning strategies, monitoring learning progress, and evaluating learning outcomes (Panadero, 2022). According to Zimmerman's theoretical framework, SRL comprises three interconnected and cyclical phases: the forethought phase, which involves planning and goal setting; the performance phase, which focuses on the implementation of learning strategies and self-monitoring during the learning process; and the self-reflection phase, which emphasizes the evaluation and reflection of both learning outcomes and the learning process itself (Anthonysamy, 2021). The concept of SRL is particularly significant in foreign language learning, including English language learning, as it requires learners to demonstrate autonomy, consistency, and active engagement beyond formal classroom instruction (Teng, 2023). SRL is widely regarded as an essential factor contributing to the success of English as a Foreign Language (EFL) learners because it enables them to independently regulate their learning strategies and overcome various learning challenges (Bai & Wang, 2024). Furthermore, self-regulation skills play a crucial role in optimizing sustained language proficiency development through systematic monitoring and evaluation of learning progress (Z. Yan, 2025) .

The integration of Self-Regulated Learning (SRL) and Artificial Intelligence (AI) in educational settings offers significant opportunities to enhance learning quality and outcomes. AI technologies facilitate the learning process by providing automated feedback and adaptive learning pathways, which, in turn, strengthen learners' metacognitive awareness and support the development of self-regulated learning skills. Interactions between learners and AI-based systems also promote greater learning autonomy, self-monitoring, and self-correction, particularly in the context of English language learning (Lin, 2023). AI systems that deliver personalized feedback have been shown to increase learner engagement and independence while strengthening learners' abilities to plan, monitor, and regulate their own learning processes (Mohammed, 2024). Moreover, a growing body of research indicates that the integration of SRL and AI positively contributes to the development of metacognitive regulation, enabling learners to reflect on their learning processes and adapt their learning

strategies more effectively (Y. Zhang, 2024). AI-supported SRL strategies have also been found to improve academic achievement and language proficiency, particularly in the areas of cognitive and motivational regulation. Nevertheless, previous studies have reported inconsistencies in behavioral regulation outcomes, suggesting the need for more structured and explicit AI system designs to fully realize the potential of integrating SRL and AI in educational contexts.

The effectiveness of Artificial Intelligence (AI) in supporting Self-Regulated Learning (SRL) presents a complex landscape, with research findings demonstrating both promising outcomes and persistent challenges and inconsistencies (Judijanto, 2025) Numerous studies have reported that AI implementation positively influences the development of SRL behaviors, including significant improvements in academic achievement across diverse learning contexts (Tlili, 2023). However, inconsistent findings have also emerged, particularly regarding learners' increasing reliance on AI technologies, which may reduce their autonomy and self-regulation skills over time (Kasneci et al., 2023). The variability in research outcomes is further influenced by differences in educational contexts, learner characteristics, and the types of AI applications employed, thereby limiting the generalizability of existing findings (Zhai, 2024). In addition, variations in research design-including sample size, intervention duration, and methodological approaches-have contributed to inconsistent evidence regarding the effects of AI across the different phases of SRL. Current research also reveals limitations in the comprehensive theoretical integration of SRL and AI technologies, resulting in an incomplete understanding of how AI supports each phase of the SRL process. Nevertheless, AI continues to demonstrate considerable potential for strengthening self-regulated learning, highlighting the need for more integrated conceptual frameworks and further empirical research to address these inconsistencies and maximize the contribution of AI to educational practice (Chan, 2025).

The integration of Self-Regulated Learning (SRL) into Artificial Intelligence (AI)-supported English language learning remains relatively underexplored, revealing a significant research gap in the existing literature (Mohebbi, 2024) Although numerous studies have examined AI and SRL independently, systematic syntheses that integrate these two domains remain limited (Z. Zhang, 2026). This situation reflects a fragmented research landscape, in which empirical investigations of SRL within AI-supported language learning contexts are still scarce. Furthermore, the current body of literature exhibits a geographical imbalance, with research predominantly conducted in technologically advanced countries, while contributions from developing countries and the Global South remain relatively limited (Özturan, 2025). From a methodological perspective, existing studies also demonstrate notable limitations, particularly the lack of longitudinal and experimental research designs necessary to comprehensively examine the long-term effects of AI on SRL (Guan et al., 2025). Future research should therefore develop more holistic conceptual frameworks that position SRL not merely as a learning outcome but also as a fundamental principle guiding the design of AI-supported learning environments. In addition, research should be extended to diverse educational levels and learning settings, including resource-constrained contexts, to provide a more comprehensive understanding of the effectiveness of AI-supported SRL. Ethical

considerations, such as data privacy and potential algorithmic bias, should also receive greater attention in the development and implementation of AI for language learning. More systematic and integrated research approaches are expected to make substantial contributions to the advancement of effective pedagogical strategies and the improvement of learners' educational outcomes (Xu, 2026).

The primary research gap in the literature on Self-Regulated Learning (SRL) and Artificial Intelligence (AI) in English language learning lies in the absence of a systematic synthesis that integrates these two concepts within a holistic analytical framework supported by thematic mapping. Existing studies remain fragmented, with SRL and AI typically examined as separate constructs or linked only to a limited extent, without thoroughly exploring the relationships between the phases of SRL within AI-supported learning environments. Previous research has predominantly focused either on the effectiveness of AI in language learning or on SRL as an independent learning strategy, leaving the conceptual and empirical integration of these two domains insufficiently developed. Furthermore, differences in research contexts, methodological approaches, and inconsistent findings have prevented the establishment of a coherent understanding of the mechanisms through which AI contributes to strengthening SRL, including potential risks such as learners' overreliance on AI technologies. In addition, comprehensive mapping of research trends, thematic patterns, and emerging directions in this field remains scarce and has not yet been systematically synthesized. Against this backdrop, the novelty of the present study lies in conducting a Systematic Literature Review (SLR) that integrates SRL and AI in English language learning through a comprehensive thematic synthesis. This review not only identifies patterns of AI implementation and its contributions to the development of SRL but also provides a systematic mapping of existing research gaps, thereby establishing a foundation for future research agendas that are more coherent, targeted, and sustainable.

B. METHOD

This study employed a Systematic Literature Review (SLR) using a qualitative descriptive approach to synthesize findings from previous studies and develop a comprehensive understanding of the integration of Self-Regulated Learning (SRL) in Artificial Intelligence (AI)-supported English language learning**.** The SLR method was selected because it enables the systematic, transparent, and rigorous identification, screening, evaluation, and synthesis of existing research, thereby providing a comprehensive overview of research developments, thematic patterns, and emerging trends within the field. The data sources were drawn from several major academic databases, including Google Scholar**,** Scopus**,** the Directory of Open Access Journals (DOAJ)**,** and AI-assisted academic platforms such as SciSpace and Elicit. The use of multiple data sources was intended to broaden the scope of the literature search, improve the accuracy of identifying relevant studies, and ensure the representativeness and credibility of the scientific evidence included in this review.

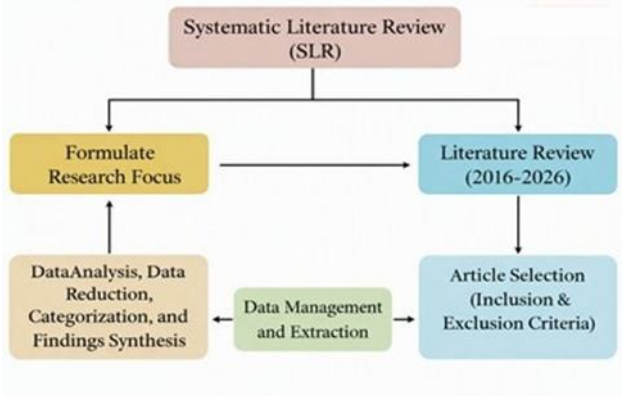

Figure 1. Flow Diagram of the Systematic Literature Review (SLR) Process

Figure 1 illustrates the research workflow adopted in this Systematic Literature Review (SLR). The inclusion criteria comprised scholarly publications published between 2016 and 2026, available in English or Indonesian, focusing on Self-Regulated Learning (SRL), the application of Artificial Intelligence (AI) in language learning, or the integration of both concepts. Eligible sources included peer-reviewed journal articles, conference proceedings, and other indexed scholarly publications. The exclusion criteria eliminated studies that were unavailable in full text, irrelevant to the integration of SRL and AI in English language learning, opinion-based articles lacking a clearly defined research methodology, and non-scholarly publications. The literature search was conducted using combinations of keywords such as Self-Regulated Learning, Artificial Intelligence in Language Learning, and AI-enhanced EFL Learning, together with related synonyms across the selected academic databases to ensure a comprehensive and systematic retrieval of relevant studies.

The literature selection process was conducted through a systematic sequence of stages, including identification, screening, eligibility assessment, and final inclusion of studies that met the predefined inclusion criteria. Data were analyzed using thematic analysis to categorize and interpret the findings according to major themes, including the implementation of Self-Regulated Learning (SRL), the role of Artificial Intelligence (AI) in language learning, and its impact on learners' cognitive and metacognitive development. To ensure the trustworthiness of the findings, this review employed source triangulation by incorporating evidence from multiple academic databases and adhered to the PRISMA guidelines throughout the literature selection process. The reliability of the analysis was further strengthened through consistent coding procedures and repeated verification of the thematic classifications, thereby ensuring that the resulting synthesis was valid, systematic, and academically rigorous.

C. RESULTS AND DISCUSSION

Based on the synthesis of the reviewed literature, the findings indicate that the contributions of Artificial Intelligence (AI) to the development of Self-Regulated Learning (SRL) can be categorized into several major themes that illustrate how AI supports learners' self-regulation in English language learning. These themes include: (1) the general role of AI in supporting SRL, (2) the contribution of AI during the forethought phase, which involves learning planning and goal setting, and (3) the role of AI during the performance phase,

which focuses on monitoring and managing learning activities. These three thematic areas were consistently identified across the studies included in this review, demonstrating that AI facilitates learners in managing their learning processes more independently, purposefully, and sustainably. The thematic classification of these research focuses is presented in Figure 1**.**

Table 1. Classification of Research Findings Based on the Focus of Artificial Intelligence Implementation in Supporting Self-Regulated Learning

No	Research Focus	Researchers in the same field	Research Insights
1.	AI as a Support for Self-Regulated Learning (SRL)	(Lan & Zhou, 2025), (Liu et al., 2025)	Artificial Intelligence (AI) functions as a facilitator of self-directed learning by supporting the development of Self-Regulated Learning (SRL) through personalized learning experiences, adaptive learning recommendations, and data-driven support. The primary research variables are Artificial Intelligence (AI) and Self-Regulated Learning (SRL).
2.	AI in the Forethought Phase (Learning Planning and Goal Setting)	(Horvers et al., 2024), (Lee et al., 2025)	AI-based systems assist learners in setting learning goals, planning effective learning strategies, and selecting personalized learning pathways that align with their individual needs and proficiency levels. These capabilities support the development of Self-Regulated Learning (SRL) by fostering more structured, autonomous, and goal-oriented learning processes. The primary research variables are Artificial Intelligence (AI), Goal Setting, Learning Planning, and Self-Regulated Learning (SRL).

3.	AI in the Performance Phase (Learning Monitoring and Management)	(Jin et al., 2025),(Jin et al., 2025), (Lee et al., 2025), (Jin et al., 2025)	AI-powered chatbots and intelligent learning systems provide real-time feedback that enables learners to monitor their learning progress, identify errors, and adjust their learning strategies accordingly. By facilitating continuous self-monitoring and performance regulation, these technologies enhance the performance phase of Self-Regulated Learning (SRL) and promote more effective, autonomous learning. The primary research variables are AI Feedback, Learning Monitoring, Performance Phase, and Self-Regulated Learning (SRL).

Based on the synthesis presented in Figure 1, the findings demonstrate that Artificial Intelligence (AI**)** makes a significant contribution to supporting the development of Self-Regulated Learning (SRL) across multiple phases of the self-regulation process. At a general level, AI functions as a learning facilitator by providing personalized and adaptive learning experiences through data-driven recommendations and analytics. During the forethought phase, AI assists learners in setting learning goals, planning effective learning strategies, and selecting learning pathways that align with their individual needs and abilities. In the performance phase, AI-powered technologies, such as chatbots and automated feedback systems, enable learners to continuously monitor their learning progress, identify errors, and adjust their learning strategies accordingly. These findings suggest that the integration of AI not only enhances learning outcomes but also strengthens learners' self-regulation by supporting more effective planning, monitoring, and management of the learning process.

1. Implementation of Self-Regulated Learning in Artificial Intelligence-Supported English Language Learning

The synthesis of the reviewed literature indicates that Artificial Intelligence (AI) functions not merely as a supplementary instructional tool but also as a powerful mechanism for fostering multiple dimensions of Self-Regulated Learning (SRL) (Ng et al., 2024). From the perspective of Zimmerman's SRL model**,** AI-powered chatbots primarily support the performance and self-reflection phases by providing continuous feedback that enables learners to monitor, evaluate, and reflect on their learning progress (Wu et al., 2023) Meanwhile, adaptive learning systems facilitate the forethought phase by assisting learners in setting realistic learning goals and designing personalized learning plans that align with their individual needs and proficiency levels. Furthermore, AI applications designed to enhance speaking skills, particularly those incorporating speech recognition technology, enable learners to independently monitor and improve their language performance through real-time identification and correction of linguistic errors (Zou et al., 2023). These findings suggest that the integration of AI creates more personalized, responsive, and learner-centered learning environments that promote autonomy by empowering learners to effectively manage, regulate, and reflect upon their own learning processes.

Although numerous studies have reported the positive contributions of Artificial Intelligence (AI) to the development of Self-Regulated Learning (SRL), most implementations remain primarily focused on strengthening learners' cognitive and metacognitive dimensions, while affective and motivational aspects have received comparatively limited attention (Chiu, 2024). The majority of AI systems are designed to provide academic feedback, performance analytics, and personalized learning recommendations aimed at improving learning outcomes. However, these systems have not yet fully addressed learners' psychological needs, such as managing learning anxiety, sustaining motivation, and fostering resilience when facing challenges in English language learning. Several studies have further suggested that intensive reliance on AI technologies may increase learners' dependence on technological assistance, potentially diminishing their capacity to make autonomous learning decisions (Fan et al., 2025). These findings indicate that the effectiveness of AI-supported SRL depends not only on the technological sophistication of intelligent and adaptive learning systems but also on how these technologies are pedagogically designed and implemented to promote sustainable learner autonomy while preserving learners' active role in regulating and directing their own learning processes (Lai, 2024).

Overall, the synthesis of the reviewed literature demonstrates that Artificial Intelligence (AI) plays a pivotal role in strengthening Self-Regulated Learning (SRL) in English language learning by providing adaptive, personalized, and responsive learning experiences tailored to learners' individual needs. A wide range of AI-powered technologies facilitates essential SRL processes—including planning, monitoring, evaluation, and reflection-thereby fostering learners' self-regulation skills and promoting greater autonomy in managing their learning. Nevertheless, the existing literature indicates that AI implementations predominantly emphasize the enhancement of cognitive and metacognitive dimensions, whereas the affective and motivational components that are equally critical to successful SRL remain insufficiently addressed. Furthermore, the growing tendency for learners to become overly dependent on AI technologies presents an important challenge, as excessive reliance may reduce their ability to make independent learning decisions and effectively regulate their own learning processes. These findings suggest that the effectiveness of AI integration in English language learning depends not only on the sophistication of the technologies employed but also on the design of pedagogical strategies that achieve a balanced integration of cognitive, affective, and motivational support. Such an approach is essential for cultivating autonomous, reflective, and adaptable learners who are well prepared to meet the demands of twenty-first-century education.

2. Contributions of Artificial Intelligence to the Development of Self-Regulated Learning in English Language Learning

The synthesis of the reviewed literature indicates that the role of Artificial Intelligence (AI) in supporting Self-Regulated Learning (SRL) extends beyond its technical function as an instructional tool, contributing substantially to the development of self-regulation skills that form the foundation of autonomous learning (Khalil et al., 2024). From the perspective

of Zimmerman's SRL model**,** AI supports the forethought phase by providing personalized learning recommendations and adaptive learning pathways tailored to learners' needs and proficiency levels, thereby facilitating effective planning and goal setting. During the performance phase, AI-based systems promote continuous learning monitoring through real-time and ongoing feedback, enabling learners to identify their strengths and weaknesses throughout the learning process (Mejeh et al., 2024). In the self-reflection phase, learning analytics generated by AI provide learners with valuable evidence to evaluate the effectiveness of their learning strategies and determine appropriate actions for improvement. Consequently, AI functions as a powerful tool that enhances learners' ability to manage, direct, and reflect on their learning activities more effectively. These findings suggest that AI has considerable potential to accelerate the development of Self-Regulated Learning by delivering personalized, adaptive, and data-driven learning support (Osakwe et al., 2024).

Although numerous studies have confirmed the positive contributions of Artificial Intelligence (AI) to strengthening Self-Regulated Learning (SRL)**,** its implementation continues to face several important limitations. Most current AI technologies primarily emphasize the development of learners' cognitive and metacognitive skills, such as monitoring learning progress, providing feedback, and evaluating performance, whereas affective and motivational dimensions have received comparatively limited attention (Giannakos et al., 2024). This imbalance is particularly significant because successful English language learning is strongly influenced by factors such as motivation, self-confidence, learning resilience, and the ability to manage language-related anxiety. Furthermore, excessive reliance on AI may lead to technological dependency, particularly when learners become accustomed to obtaining answers directly from AI systems rather than developing reflective thinking and independent decision-making skills. Additional challenges involve ethical considerations, including the protection of user data, the transparency of algorithmic decision-making processes, and the potential for bias in AI-generated recommendations. These findings suggest that the successful integration of AI in supporting SRL depends not only on the sophistication of AI technologies but also on pedagogical designs that effectively balance technological support with the development of learner autonomy, responsibility, and reflective capacity (Porayska-Pomsta et al., 2024).

Overall, the synthesis of the reviewed literature demonstrates that the use of Artificial Intelligence (AI) makes a substantial contribution to strengthening Self-Regulated Learning (SRL) in English language learning. Through its adaptive, personalized, and data-driven capabilities, AI enables learners to set meaningful learning goals, monitor their progress, and continuously evaluate and reflect on their learning processes. These findings suggest that the integration of AI has considerable potential to create more autonomous, learner-centered learning environments that foster the development of self-regulation skills. Nevertheless, the existing literature also reveals that AI implementation has predominantly focused on enhancing learners' cognitive and metacognitive abilities, whereas the affective and motivational dimensions—both essential components of effective SRL—have not yet been adequately addressed. Furthermore, issues related to technological dependence, data privacy, and potential algorithmic bias remain significant challenges that require careful

consideration. Therefore, future AI-supported English language learning should adopt a more comprehensive pedagogical approach that integrates cognitive, affective, motivational, and ethical dimensions in a balanced manner. Such an approach would enable AI to function not only as a tool for improving academic performance but also as a means of cultivating autonomous, reflective, and adaptable learners who are well equipped to meet the demands of twenty-first-century education.

3. Trends, Challenges, and Research Gaps in Self-Regulated Learning for Artificial Intelligence-Supported English Language Learning

The synthesis of the reviewed literature indicates that the use of Artificial Intelligence **(AI)** has transformed English language learning into a more adaptive, personalized, and learner-centered educational environment. Within the framework of Self-Regulated Learning (SRL)**,** AI functions as a facilitator that supports the entire self-regulation cycle, encompassing goal setting and planning (forethought)**,** learning implementation and monitoring (performance)**,** and evaluation and reflection on learning outcomes (self-reflection)**.** AI's ability to provide timely and continuous feedback enables learners to monitor their learning progress more effectively, while its personalization features help them identify learning strategies and establish goals that align with their individual needs. However, the predominance of research conducted in technologically advanced countries suggests that current understanding of AI's effectiveness in supporting SRL is largely shaped by educational contexts with well-developed technological infrastructure and high levels of digital readiness (Noori, 2024). Therefore, the contribution of AI to the development of SRL should be interpreted within its specific educational context, taking into account social, cultural, economic, and resource-related factors that vary across learning environments and educational systems (Saqr et al., 2024).

Although a growing body of research confirms that Artificial Intelligence (AI) has considerable potential to strengthen autonomous learning, the existing literature remains largely focused on technological advancement and improvements in academic performance, with relatively limited attention given to the broader pedagogical dimensions of AI integration. Most studies evaluate the effectiveness of AI in terms of learning efficiency, the quality of automated feedback, or improvements in learning outcomes, whereas its long-term influence on the development of Self-Regulated Learning (SRL) has not been examined comprehensively. Furthermore, the motivational, emotional, and social dimensions of learning-which are fundamental components of SRL—continue to receive comparatively little attention (Zawacki-Richter et al., 2019). Another important limitation concerns the insufficient emphasis placed on teachers' readiness as key agents in integrating AI into meaningful instructional practices. Without adequate pedagogical competence, AI technologies risk functioning merely as automation tools rather than as catalysts for fostering learners' autonomy and self-regulation. In addition, ethical concerns, including data privacy, algorithmic transparency, and the potential for algorithmic bias, remain

significant challenges that must be addressed to ensure that AI is implemented in education in a fair, responsible, and learner-centered manner (Celik, 2022).

Overall, the findings of this review demonstrate that Artificial Intelligence (AI) has strong potential to support the development of Self-Regulated Learning (SRL) in English language learning by providing adaptive, personalized, and responsive learning experiences tailored to learners' individual needs. AI-powered features, such as instant feedback, continuous learning progress monitoring, and data-driven learning recommendations, contribute significantly to enhancing learners' ability to plan, regulate, and reflect on their learning processes independently. However, the effectiveness of AI implementation is strongly influenced by contextual factors, including technological readiness, educational environments, teachers' pedagogical competence, and the social and cultural contexts in which learning takes place. The existing literature continues to be dominated by discussions of academic performance enhancement and cognitive regulation, while the affective, motivational, and social dimensions—integral components of Self-Regulated Learning-remain insufficiently explored. Furthermore, ethical issues related to AI adoption, including data privacy, algorithmic transparency, and the potential for algorithmic bias, require careful consideration to ensure the responsible and equitable use of AI in educational settings. Therefore, optimizing AI for English language learning requires a more comprehensive, learner-centered pedagogical approach in which AI functions not only as a tool for improving academic achievement but also as an instrument for fostering autonomous, reflective, and self-directed learners who are capable of regulating their learning in a sustainable manner.

Figure 1. The Self-Regulated Learning (SRL) Framework in AI-Supported English Language Learning

Figure 1 illustrates the synthesis of the reviewed literature, demonstrating that Artificial Intelligence (AI) makes a significant contribution to the development of Self-Regulated Learning (SRL) in English language learning by creating adaptive, personalized, and data-driven learning environments. The integration of AI technologies enables learners to engage more effectively in the core processes of self-regulation, including planning, monitoring, evaluation, and reflection. AI-powered features-such as instant feedback, adaptive learning systems, educational chatbots, and learning analytics-have been consistently shown to strengthen the cognitive and metacognitive dimensions that underpin learner autonomy and self-directed learning. However, the literature also reveals that current AI implementation is predominantly oriented toward improving academic achievement and cognitive regulation, whereas the affective, motivational, and social

dimensions, which are equally essential components of Self-Regulated Learning**,** remain comparatively underexplored. Moreover, the effectiveness of AI-supported learning is influenced by several critical challenges, including learners' overreliance on technology, concerns regarding data privacy and security, algorithmic transparency, the potential for algorithmic bias, and the readiness of teachers and educational institutions to integrate AI effectively into pedagogical practice. Therefore, future AI-supported English language learning should adopt a more comprehensive, learner-centered approach that balances cognitive, metacognitive, affective, motivational, social, and ethical dimensions. In this way, AI can serve not only as a tool for enhancing academic performance but also as a powerful educational instrument for

D. CONCLUSIONS AND SUGGESTIONS

Overall, the synthesis of the reviewed literature indicates that Artificial Intelligence (AI) is a technological innovation with considerable potential to support the development of Self-Regulated Learning (SRL) in English language learning. Through its adaptive, personalized, and data-driven capabilities, AI enables learners to engage effectively in the core processes of self-regulation, including goal setting, progress monitoring, performance evaluation, and reflection on learning strategies. AI-powered technologies-such as educational chatbots, adaptive learning systems, speech recognition technologies, and learning analytics-have demonstrated substantial contributions to strengthening learners' cognitive and metacognitive abilities, which serve as the foundation for autonomous learning. Nevertheless, the existing body of research has primarily focused on improving learning outcomes and evaluating the effectiveness of AI-assisted instruction, leaving a relatively limited understanding of AI's comprehensive contribution to the development of Self-Regulated Learning**.** Furthermore, the affective, motivational, and social dimensions, which play essential roles in successful self-regulation, have not received balanced attention in the design and implementation of AI technologies for English language learning. These findings highlight the need for future research and educational practice to adopt a more holistic approach that integrates cognitive, metacognitive, affective, motivational, and social dimensions, thereby maximizing the potential of AI to foster autonomous, reflective, and lifelong learners.

As a future direction, the literature evaluation reveals several important research gaps that warrant greater attention in subsequent studies. The predominance of research conducted in technologically advanced countries suggests that the effectiveness of Artificial Intelligence (AI) in supporting Self-Regulated Learning (SRL) should be further examined across diverse educational contexts characterized by different social, cultural, economic, and technological conditions, particularly in developing countries. Moreover, empirical studies investigating the role of AI in fostering learners' emotional regulation, learning motivation, self-confidence, and academic resilience remain relatively scarce. Future research should therefore focus on developing AI-supported English language learning models that holistically integrate cognitive, metacognitive, affective, and social dimensions of learning. In addition, longitudinal studies examining the long-term effects of AI on the development of SRL, investigations into teachers' competencies and readiness to implement AI from a pedagogical perspective, and research addressing ethical issues-such as data privacy, algorithmic transparency, and the

potential for algorithmic bias-represent urgent priorities for future inquiry. Addressing these research gaps is expected to facilitate the development of more comprehensive AI integration models that not only enhance academic achievement but also foster autonomous, reflective, adaptable, and lifelong learners who are well prepared to meet the demands of education in the digital era.

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