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Artificial Intelligence on Foreign Language Learning Strategies and Self-Regulated Learning: A Qualitative Systematic Review

Hamid Bahador[1], Masoud Taghipour[2], Atousa Mirzapour Kouhdasht[3]

[1] Department of English Language and Literature, Faculty of Humanities, Velayat University, Iranshahr, Iran. bahador_hamid@yahoo.com

[2]Corresponding Author, Department of English Language and Literature, Faculty of Persian Literature and Foreign languages Allameh Tabatabai University, Tehran, Iran. masoudtaghipour78@gmail.com

[3]Department of English Language and Literature, Faculty of Persian Literature and Foreign languages Allameh Tabatabai University, Tehran, Iran. atousamirzapour@gmail.com

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Abstract

This qualitative systematic review is a follow-up to the transformative role of AI in the acquisition of foreign languages, focusing on LLS and SRL. It aims to map how AI-mediated tools reshape strategy use across cognitive, metacognitive, and social dimensions, and to identify patterns of learner agency in different EFL/L2 contexts. Using the PRISMA criteria for inclusion and exclusion, 28 studies (from 2023 to 2025) have been synthesized. A qualitative thematic synthesis was conducted to align reported findings with established LLS taxonomies and Zimmerman's cyclical SRL phases, enabling comparison across diverse tools and study designs. It has looked at how GenAI, interactive chatbots, and adaptive learning systems contribute to linguistic competence, such as writing, speaking, and listening skills, and strategic behaviors. The review found that AI significantly enhances metacognitive awareness and autonomy through real-time feedback and personalized pathways. Across studies, gains were most consistent for accuracy-oriented tasks and revision processes, while higher-order discourse quality showed more mixed improvement and depended on learners' critical engagement with AI feedback. However, the synthesis has identified a crucial "AI Paradox" when technology fosters independence while simultaneously risking dependency. The review concludes that the effectiveness of AI stands upon teacher scaffolding and the development of critical AI literacy among learners.

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Introduction

Foreign language education is currently going through a sea change in light of the rapid development and integration of artificial intelligence. This transition from traditional computer-assisted language learning to a more sophisticated "Intelligent CALL" era, where natural language processing and machine learning allow for unprecedented levels of personalization, as noted by Son et al. (2025). For decades, however, language pedagogy was encumbered by "one-size-fits-all" methodologies that inadequately addressed the unique cognitive demands, diverse proficiency levels, and multiple motivational states of individual learners. The lack of intensive, individualized practice prevents mastery and thus generally leads to an inability to overcome common barriers, such as high levels of communication anxiety and a lack of authentic interaction a (Aijun ,2024; Liu & Zhao,2025).

AI technologies, from LLMs like ChatGPT to more specialized applications like Praktika, offer a partial answer to such persistent challenges by the provision of personalized learning pathways, adaptive content, and individualized feedback systems (Creely, 2024). However, the proliferation of these tools creates an imperative for a careful reconsideration of how they impact the underpinning mechanisms of acquisition, namely LLS and SRL. LLS refers to the discrete set of actions and techniques which students use to enhance their progress of acquiring L2 competence, whereas SRL describes a far broader, recursive process in which learners "self-regulate" by deliberately orienting their cognitive, affective, and behavioral resources toward the attainment of goals (Zimmerman, 2002).

More theoretically, the integration of AI is profoundly rooted in several foundational frameworks. According to the view afforded by Vygotsky's (1978) Zone of Proximal Development, AI represents a kind of digital "capable peer" that offers the scaffolding necessary for learners to carry out tasks that lie just beyond their current independent capacity. Within this digital ZPD, AI tools offer "just-in-time" support that can be gradually faded as the learner develops proficiency, a process referred to as adaptive scaffolding. Moreover, Zimmerman's cyclic model of SRL includes the forethought phase, performance phase, and self-reflection phase, which are realized by AI interfaces that prompt learners to establish goals, monitor progress through real-time feedback, and reflect on linguistic output.

The psychological dimension of AI adoption is intricately linked to Self-Determination Theory (SDT), which posits that learners thrive when their basic needs for autonomy, competence, and relatedness are met. In AI-enhanced educational settings, these needs can be effectively addressed; learners experience increased autonomy by self-directing their educational paths through personalized learning experiences offered by AI tools. Xia et al., (2023) emphasize that the satisfaction of needs for autonomy and competence are essential mediators of self-regulated learning, especially when interacting with AI systems that provide relevant automated feedback for task mastery This concept of autonomy resonates with Wang et al., (2025) who highlight the intrinsic motivation that arises in students who feel they have

control over their learning, suggesting that this motivation leads to enhanced engagement in AI-driven environments.

Moreover, the facilitation of autonomy through AI tools, particularly in resource-constrained settings, underscores an important democratic aspect of educational technology. Kundu and Bej argue that AI can enable independent English as a Foreign Language (EFL) learning where teacher input is limited, although they caution against potential dependency on AI if not designed thoughtfully (Kundu & Bej, 2025). This concern aligns with findings that emphasize a balance between autonomy and higher engagement in learning; without adequate support, learners might slip into complacency rather than developing true self-direction in their educational pursuits (Hartnett, 2015).

Despite the promising potential of AI to enhance the educational experience, critiques surrounding an over-reliance on technology dominate discussions among educators. Concerns about diminishing original thinking and the reduced role of instructors in the learning process have emerged alongside the rapid adoption of generative AI tools like ChatGPT. For instance, while conversations surrounding AI integration suggest it can stimulate idea exchange and foster engagement (Yakin et al., 2023), there are also risks that may lead to a degradation of critical thinking and diminished emphasis on the human element of education (Du & Alm, 2024). Thus, maintaining a balance between utilizing AI as a facilitative tool and ensuring the integrity of the educational relationship between learners and instructors is crucial, calling for strategic implementation that prioritizes skill development alongside technological integration. Overall, while AI tools offer the capacity to fulfill learners' psychological needs and improve engagement, the associated challenges of reliance on technology must be carefully navigated to maintain the depth and richness of the educational experience.

The current digital era calls for a shift towards "21st-century learning, emphasizing critical thinking and student agency. The clear growth of "informal AI-mediated learning" outside the classroom is blurring the lines between formal and informal education. This systematic review is, therefore, very timely and necessary to synthesize recent empirical evidence, mapping how AI redefines strategic learning and to what extent it empowers or creates a new kind of technological dependency for the learners. This review investigates 28 core records to give an all-rounded understanding of the linguistic, strategic, and psychological outcomes of the AI revolution in language education. Based on the aforementioned context, this review addresses the following research questions:

- How do AI tools impact the development of specific language skills (writing, speaking, listening, and vocabulary)?
- In what ways does AI influence the use and evolution of language learning strategies (metacognitive, cognitive, and social)?
- To what extent does AI-assisted feedback and interaction facilitate the various phases of the self-regulated learning cycle?

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Review of Literature

Self-regulated learning

Aiming at understanding individual differences in learning (Dörnyei & Ryan, 2015; Oxford, 2017; Zimmerman, 2002) and grounded in educational psychology, self-regulated learning is defined as the learners' proactive use of cognitive, metacognitive, affective, behavioral, and environmental processes to attain academic goals (Brown, 2014; Zimmerman & Schunk, 2011). Recent studies in the informal digital learning environments have confirmed the role of self-regulated learning as a critical factor in predicting language learners' use of effective AI chatbots such as ChatGPT (Chiu et al., 2023; Kohnke, 2023; Xia et al., 2023). According to Panadero (2017, this process, as most self-regulated learning models (e.g., Pintrich, 2000; Winne & Hadwin, 2008; Zimmerman, 2013) suggest, includes a cyclical three-phase mental activity of preparatory, performance, and appraisal/self-reflection phases.

In a preparatory phase, or what is known as the forethought stage according to Zimmerman and Moylan (2009), the learners select a specific plan of what and how they want to learn. In the performance stage, students purposefully try to implement their pre-planned plans in the current actions (Ziegler, 2014). Self-regulated learners, employing appropriate metacognitive strategies, control their cognitive, affective, and environmental processes of learning to achieve their predetermined learning goals (Zimmerman, 2013). As a result, through performance phase processes, successful self-regulated learners try to use more efficient strategies and self-monitor their application and outcomes of learning strategies.

Zimmerman (2008) reiterates that the learners judge and evaluate their own performance during appraisal. Later, they assess their success or failure and attribute their learning outcomes to controllable/uncontrollable factors, leading to differences in satisfaction regarding their performance. Individuals' future learning will heavily depend on constructive or destructive inferences they draw as they prepare (Zimmerman, 2013).

In the present study, self-regulated learning is defined and operationalized as the use of ChatGPT for six dimensions of SRL in digital wilds (Sauro & Zourou, 2019). This domain, as recognized by Lai and Gu (2011), includes goal attainment, resource seeking, affect, metacognition, culture, and social regulation, which are rooted in socio-cognitive models of SRL (Zimmerman, 2013).

AI and Language Learning Strategies

The incorporation of Artificial Intelligence (AI) in education has brought transformative alterations to language learning strategies. AI tools are being used more and more to improve thinking skills, personalize learning methods, and support self-regulated learning. This review of the studies relates to the impact of AI on language learning strategies.

Studies reveal that AI-assisted language learning (AALL) tools and adaptive learning systems increase student engagement and learning outcomes through real-time feedback (Feng, 2024, and Amin, 2023). But a key concern with the AALL systems is their influence on

cognitive load, the mental effort made by users in processing. It is essential to understand how these systems can optimize learning efficiency while minimizing cognitive overload, as they can be effective tools to be used in schools (Feng, 2024). According to Nghi & Nguyen (2024), the real-time feedback mechanism of AI can help offload extraneous cognitive load, allowing learners to engage in the essential cognitive processes needed for language learning. This effectiveness is especially noteworthy in adaptive learning environments tailored to meet individual learners' needs, as it maximizes engagement while generating positive educational outcomes (Nghi & Nguyen, 2024; Li & Lin, 2025).

Personalization and Self-Regulated Learning

With the help of AI technology, the content and strategy used for each learner can be customized. The approach enables students to interact meaningfully with the language for acquisition and retention (Amin, 2023; Li & Lin, 2025). Further, the academic use of AI tools for intelligent learning encourages self-regulated learning (SRL) that involves goal-setting, monitoring, and self-regulation strategy adjustment, which is unique to the learning situation (Wei, 2023; Jin et al., 2023).

As learners actively engage with the material and monitor their progress, they take control of their learning and become initiators in the learning process (Wei, 2023). The use of AI enables strategies that promote learners' awareness of their learning and adjustment of their learning based on the feedback they receive, which may improve self-regulated learning by nature (Li & Lin, 2025; Jin et al., 2023). Even though AI has benefited language learning strategies, there are difficulties in effectively integrating it into the educational setting. According to Kianinezhad (2023) and Msafiri et al. (2025), the perceived usefulness of AI tools, the training of teachers, and addressing different levels of technology proficiency among students are important issues. In addition, ChatGPT and other technologies provide new ways of interacting, but there is also a call for pedagogies that support their effective use in language teaching (Horn, 2024).

Method

Design

This study employed a qualitative systematic review design to synthesize recent empirical evidence regarding AI's impact on language acquisition. The methodology follows the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines to ensure a transparent, rigorous, and replicable selection and analysis process. See Figure 1 for a schematic representation of the PRISMA compliance.

To identify relevant literature, a comprehensive search was conducted across several major academic databases, including Scopus, Google Scholar, ERIC, and various journals specializing in Computer-Assisted Language Learning (CALL). The search strategy utilized keywords such as "artificial intelligence," "language learning strategies," "self-regulated

learning," "generative AI," and "metacognition." The scope was limited to papers published or available as "Article in Press" between 2023 and 2025 to capture the impact of recent Large Language Model advancements. A total of 28 core records were identified and included for full synthesis.

Studies were selected for inclusion based on their focus on English as a Foreign Language (EFL) or Second Language (L2) learners . The intervention required the active use of AI tools, such as ChatGPT, Grammarly, QuillBot, or specialized speaking/listening platforms like Praktika. Outcomes of interest included changes in linguistic proficiency or the development of strategic competence (SRL and LLS). Only empirical studies—including qualitative, quantitative, and mixed-methods research—and systematic or scoping reviews were considered.

Selection Process and Data Extraction

The selection process involved a multi-stage screening of the 28 records provided. No article was excluded because all of them were selected first via ChatGPT before moving to their respective databases. It was done in order to expedite the search in the databases. Each record was reviewed for relevance to the core research questions. Data extraction was conducted meticulously to capture participant demographics, the specific AI tools utilized, the theoretical frameworks employed (e.g., ZPD, SDT, TAM), and the primary linguistic or strategic outcomes reported. Contexts ranged from geographical hubs in East Asia (China, Japan, and Vietnam) to the Middle East (Oman, Saudi Arabia). See Figure 1 for a schematic representation of the PRISMA compliance.

Data Synthesis

A qualitative thematic synthesis was utilized to interpret the findings. This involved identifying recurring themes across the records and categorizing them into domains such as linguistic performance, strategic shifts, and the psychological mechanisms of regulation. Quantitative data from quasi-experimental studies were used to provide statistical support for the qualitative themes identified in the literature.

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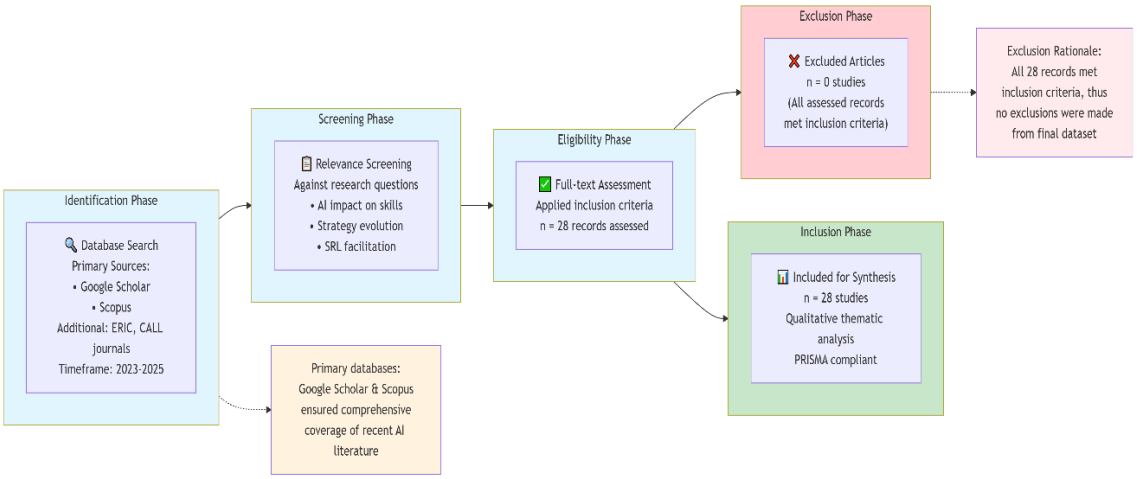

Figure 1 *PRISMA Flow Diagram of the Study Selection and Synthesis Process*

Results

This section presents the synthesis of findings from 28 selected studies, examining the multifaceted impact of artificial intelligence on foreign language learning. The results are organized into three core domains: (1) the influence of AI on specific linguistic skills, (2) shifts in language learning strategies, and (3) the facilitation of self-regulated learning processes. Each subsection demonstrates how AI tools—ranging from generative AI and adaptive platforms to interactive chatbots—reshape learner engagement, strategic behavior, and metacognitive development, while also highlighting emerging tensions and paradoxes within AI-mediated language education. Across the corpus, evidence comes from mixed-methods, quasi-experimental, and qualitative designs, with outcomes most often triangulated through writing rubrics, survey-based strategy inventories, and interview data; nevertheless, intervention durations are typically short, so reported gains should be interpreted as proximal rather than long-term effects.

Impact on Linguistic Skills

The synthesis shows that the integration of AI has a profound influence on the four main language domains. The most documented area is writing, where the tools, like ChatGPT, are used for idea generation, while systems like Grammarly and QuillBot are employed for stylistic refinement (Al-Raimi et al., 2024; Wang, 2024). In CLIL contexts, AI-assisted feedback functions as a self-regulatory mechanism that allows students to independently correct grammatical and lexical errors (Campos, 2025). In speaking and listening, AI has significantly lessened communication anxiety. Chatbots and platforms like Praktika offer non-threatening environments for oral practice, enabling learners to focus on pronunciation clarity (Fitriati & Williyan, 2025; Guzmán Alvarado & Naranjo Andrade, 2025). AI-driven listening systems

have redefined auditory cognition through the monitoring of learner anxiety in real-time and the provision of adaptive, strategy-based support that eventuates in higher proficiency gains (Liu & Li, 2025). Vocabulary adaptation is facilitated through systems like CILS, which adjust content in relation to the learner's cultural background (Xia et al., 2024). Beyond accuracy and style, several studies suggest that AI-supported drafting cycles increase learners' noticing of recurrent errors and promote faster revision loops, especially when feedback is immediate and task-specific (Campos, 2025; Wang, 2024). Reported benefits in speaking also extend to fluency and interactional confidence, as learners can rehearse turn-taking and pragmatic routines with a low-stakes interlocutor (Fitriati & Williyan, 2025). However, findings are less consistent for higher-order discourse features (e.g., argumentation quality and coherence), which appear to improve most when learners engage critically with feedback rather than accepting revisions verbatim (Creely, 2024; Shi et al., 2025).

Shifts in Language Learning Strategies

Research indicates the shift from the traditional cognitive strategy towards the integration of AI-integrated strategies. The most used metacognitive strategy identified is "searching other references" and the use of AI feedback to check on learning progress (Ramli et al., 2025). AI-integrated strategies have been adopted to supplement the traditional Oxford SILL strategies used in the Omani contexts, while the usage pattern is influenced by gender and academic level (Jomaa et al., 2025). Explicit LLS instruction within technology-enhanced environments significantly increases students' overall strategic competence (Kupchyk & Litvinchuk, 2025). Notably, learners also develop emergent "prompting" and "iterative querying" behaviors that function as new cognitive/metacognitive strategies: they refine prompts, compare multiple AI outputs, and cross-check suggestions against external sources before final submission (Liu et al., 2025; Ramli et al., 2025). Some evidence suggests that this strategic repertoire is unevenly distributed, with more proficient or strategically trained learners benefiting more from AI feedback, while others default to surface-level correction and over-trusting AI recommendations (Shi et al., 2025).

Facilitation of the Self-Regulated Learning Cycle

AI tools support every stage of Zimmerman's SRL cycle. In the forethought phase, chatbots assist in goal setting and planning by generating structured outlines (Abdallah, 2025). At performance, real-time feedback acts as an external monitor, guiding students to adjust their output of linguistic product as they work (Liu et al., 2025; Mohebbi, 2025). In reflection, AI evaluations enable students to compare performance against objective standards (Campos, 2025). New validated instruments confirmed that students increasingly regulate AI application and task processing (Liu et al., 2025). Where platforms provide analytics, AI-mediated logs, and progress indicators, operationalize monitoring by making revision history and error patterns visible, supporting self-evaluation and calibration of effort (Liu et al., 2025). At the same time, SRL may become partially "outsourced" to the tool when learners rely on automated

suggestions without articulating a rationale, underscoring the importance of scaffolding that gradually fades system support over time (Mohebbi, 2025; Ma & Chen, 2025).

Overall, the results point to a consistent affective advantage (reduced anxiety and increased willingness to communicate) alongside gains in accuracy-oriented performance, while strategic outcomes are most robust when AI use is paired with explicit instruction and reflective prompts. This pattern anticipates the “AI Paradox” developed in the Discussion: AI can amplify autonomy through personalization and feedback, yet may also encourage dependency if learners do not actively regulate and critically evaluate AI input.

Discussion

The evidence synthesis suggests a complex view of the "AI-enhanced learner." On one side, AI represents a strong "dynamic partner" that implements fundamental psychological and pedagogic theories. On such grounds, by fulfilling the first three fundamental needs of Self-Determination Theory (SDT), namely autonomy, competence, and relatedness, the environment powered by AI increased intrinsic motivation and relevance (Ma & Chen, 2025; Zhai & Nezakatgoo, 2025). For this reason, the role of the learner moves from being a passive information-receiver to an active agent able to build knowledge cooperatively with an intelligent system. Hence, the "co-regulation" between human and machine represents a revolutionary approach in the pedagogic domain, since it is possible to implement an individualized, "just-in-time" support, feasible just in one-to-one tutoring, evidence of which had remained extremely costly (Abdallah, 2025; Son et al., 2025).

Nevertheless, a critical appraisal of these outcomes reveals an important "AI Paradox." Although these AI applications are intended to promote "independent learners" and "learners" themselves, at a different level, they could also manifest a considerable "technologically dependent" relationship. This has been aptly warned against by both Aijun (2024) and Creely (2024) in terms of "short-cutting" outcomes due to GAI’s ease of use for producing "high-quality text," such that "learners undergo a cognitive struggle to acquire" processes. This applies especially to composition assignments. The "technologically dependent" relationship also manifests an important transition in terms of “AI-assisted editing” versus “AI-composition” at a "point of diminishing returns," mainly when an "AI-produced composition produces an outcome" rather than a "learners’ metacognitive processes of reflection and revision," which ultimately leads to negligible "technologically dependent outcomes" in terms of "learners’ linguistic acquisition skills" themselves (Shi, et al. 2025).

One of the most important aspects of contemporary research is that it recognizes and explores the tensions between cognitive engagement and sociocultural factors. In noting this, Wang (2024) illustrates that it is not just cognitive processes that need to be addressed, but that it is firmly rooted within the social structures of the classroom. As an example of this within Japan, university students make use of AI to “verify” their own compositions, with this social tool of validation serving to enhance feelings of security (Wang, 2024). This affective

advantage of communication anxiety reduction is one of the most prevalent findings throughout research (Guzmán Alvarado & Naranjo Andrade, 2025; Liu & Zhao, 2025). As such, it creates an environment that lets students explore and practice their language with little concern for social stigma, which then helps to promote increased efficiency of self-regulation and strategy use that would otherwise be stifled by social embarrassment before an audience of peers and others within their classroom environment (Zhai & Nezakatgoo, 2025).

Nevertheless, the literature also cautions against the risks of "algorithmic rigidity" in AI. As Creely (2024) shows, GAI models may reproduce narrow cultural stories, even fossilizing the way language is expressed, potentially reducing the sophisticated cultural comprehension at the heart of genuine language expertise. Moreover, "there is a balance" in research on AI; on one hand, we know the effectiveness of AI in aid of task-related strategies (grammar checks, for example), but on the other hand, we know less about its effects on "self-assessment and emotion regulation" developments (Zhang et al., 2025).

Significantly, however, the "black box" approach of AI feedback is missing. While a human educator can give reasons for an amendment informed by the learner's individual trajectory, AI feedback is generic and probabilistic by its very nature. Without AI critical literacy competence (Shi et al., 2025), learners lack the capacity to evaluate either its truth or biases. Interestingly, and somewhat ironically, the correlation between AI usage and metacognition is frequently described as "weak," except insofar as the learner already possesses strategic competence (Ramli et al., 2025). This is to say that AI does not produce self-regulatory learners but rather strengthens those who already possess self-regulatory competence.

The most important issue for discussion would be the constantly varying role of the human teacher. The overwhelming view in the last 28 files accessed is the fact that AI is a "mind tool" (Abdallah, 2025) in nature and not a substitute for the human mind. The need for the "human touch" in the optimal process of learning and in the concept of teacher scaffolding in the learning processes of students cannot be overridden (Ma & Chen, 2025). The teachers must learn to move beyond being the source of feedback in the academic processes and instead become the facilitators of critical AI literacy (Shi et al., 2025). The concept would include the need for the effective prompting of the AI systems by the students. The need for the assessment of the feedback provided by the AI systems regarding the contents being studied must be free from biases or "hallucinations" in nature. This ensures academic integrity is upheld by the students despite the use of the AI systems for assistance.

However, there is a risk of "learning loss" (Aijun, 2024) due to over-reliance. If there is not an obvious learning requirement in terms of having to rationalize the recommendations made by the AI tool, one ends up using a crutch instead of a learning bridge. Future learning environments would thus need to rest on a blended platform where low-level, corrective feedback in high-frequency questioning would be taken care of by "the machine," while "the human teacher would concentrate on higher-level thinking, nuance in culture, which a machine, with whatever level of interactivity, would never be able to simulate."

Several limitations characterize the current evidence base. There is a geographical concentration of studies in East Asia and the Middle East, primarily focusing on English majors at the tertiary level. This limits generalizability to other age groups and non-academic settings. Additionally, the majority of empirical data are cross-sectional, relying on self-reported surveys; there is a lack of objective, long-term performance tracking to confirm if gains are sustained without the technology. Finally, the specific cognitive processes involved in a student's interaction with AI are often inferred rather than directly observed.

For pedagogy, AI should be integrated as a "dynamic partner" rather than a mere efficiency tool. For example, instead of just having students use Grammarly to correct errors, teachers could design activities where students compare AI feedback with peer feedback, discussing the reasoning behind different suggestions. Teachers must be retrained as facilitators of AI literacy, guiding students to navigate automated feedback critically. This could involve workshops where teachers and students practice "interrogating" ChatGPT outputs—e.g., identifying potential biases in its responses or evaluating the appropriateness of its suggested vocabulary for a specific audience.

For curriculum design, there is a need for explicit instruction on language learning strategies within technology-enhanced environments to prevent technological dependency. For instance, a curriculum module could teach students the "prompt engineering" strategy for brainstorming essay ideas with AI, followed by a "cross-verification" strategy where they check AI-generated facts against reliable sources. Institutions must establish ethical frameworks that promote transparency and integrity while acknowledging the inevitability of AI integration. An example framework could require students to submit an "AI Use Statement" with assignments, detailing how tools like ChatGPT were used for idea generation versus editing, much like a citation.

Fostering critical AI literacy and strategic competence will ensure that AI serves as a tool for empowerment rather than a shortcut that diminishes cognitive effort. Practical examples include "AI reflection journals" where students document their decision-making process when using AI for a writing task, or "collaborative debugging" sessions where the class works together to improve a poorly performing AI prompt for a speaking practice chatbot.

Conclusion

This qualitative systematic review has synthesized 28 recent empirical and theoretical records to evaluate the impact of artificial intelligence on language learning strategies and self-regulated learning. e. It is apparent that the AI system is acting as a catalyst and is changing the way that linguistic skills for writing, speaking, and listening will develop, and this will now be managed by adaptive AI that builds substantial metacognitive and autonomy skills for students. Learning strategies for students have now been changing with an increased adoption rate for AI-based strategies that emphasize the importance of interactive and automated analysis and assessment. However, this trend will be affected by the validation and digital literacy skills of the students.

Future studies must therefore be based on quasi-experimental and longitudinal approaches that monitor the long-term effects and impact that AI is having on the acquisition and sustainability of self-regulation strategies for language learning. Future research needs should therefore cover the EFL central paradigm and linguistic and cultural and linguistic contexts that have not been explored. Future studies will also have the responsibility to investigate new instruments that have been designed for measuring the quality and impact of critical AI engagement and technostress outcomes for students and the impact that AI is having on the affective side and well-being for students.

Authors' Contributions

All authors participated equally in conducting the research and preparing the manuscript.

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Generative AI statement

The authors state that they used Gen AI in creating this manuscript. They employed AI tools such as ChatGPT and Grammarly for proofreading and language editing. All intellectual content and interpretations are solely the authors' responsibility.

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Appendix

Table of Included Studies

Source	Target Language / Context	Participants	Main Outcomes
Aijun (2024)	Foreign Language	General Review	Identified benefits (efficiency) and risks (over-reliance).
Wang (2024)	EFL / Japan	79 Univ. Students	Interplay of cognitive engagement and sociocultural validation.
Dinh et al. (2025).	EFL / Vietnam	English Majors	High acceptance; impact on communication strategies.
Jomaa et al. (2025).	EFL / Oman	152 Univ. Students	Shift from traditional to AI-integrated strategies.
Ali (2023)	EFL / Saudi Arabia	Univ. Students	Use of metacognitive/affective online strategies.
Campos (2025)	CLIL / Japan	Univ. Students	AI feedback as an SRL mechanism in writing.
Ramli et al. (2025).	ESL / Malaysia	241 Undergraduates	Frequent use of the "Searching other references" strategy.
Fitriati & Williyan (2025).	EFL / Indonesia	12 Participants	Prioritization of pronunciation/fluency in presentations.
Xia et al. (2024).	Cross-Cultural	General Framework	AI facilitates vocabulary adaptation for culture.
Shi et al. (2025).	Higher Ed	General GAI	Link between AI literacy, writing performance, and well-being.
Abdallah (2025)	EFL / Egypt	Student Teachers	Reinforcement of Zimmerman's SRL cycle.
Mohebbi (2025)	Language Education	Systematic Review	AI enables learner independence and self-regulation.
Ma & Chen (2025).	General Language	Review	Importance of teacher scaffolding and SDT theory.

Liu et al. (2025).	Higher Ed / China	1,195 Students	Development of an instrument for strategic AI use.
Zhai & Nezakatgoo (2025).	EFL / China	310 Undergraduates	Enhanced metacognitive strategies and motivation.
Liu & Li (2025).	Listening	Article in Press	Redefining auditory cognition through real-time monitoring.
Al-Raimi et al. (2024).	EFL / Oman	Univ. Students	Significant gains in writing organization and style.
Son et al. (2025).	CALL / TESOL	Review	AI's profound impact on language teaching trends.
Guzmán & Naranjo (2025).	EFL / Ecuador	Systematic Review	Significant reduction in communication anxiety.
Liu & Zhao (2025).	Informal Learning	Scoping Review	Growth of self-directed AI use out-of-class.
Creely (2024)	General Language	Review	Challenges of standardization and cultural narratives.
Hasanah et al. (2025).	Arabic / Indonesia	30 Students	Significant improvement in student autonomy.
Kupchyk & Litvinchuk (2025)	EFL / Ukraine	66 Students	Increase in strategic competence profiles.
Zhang et al. (2025).	L2 Education	Scoping Review	Identified research imbalances in skill coverage.
Nykyporets et al. (2025).	Higher Education	General Review	Operationalization of the ZPD in higher education.
Ali et al. (2025).	TESOL	Review	AI transformation of classroom instruction/assessment.
Chumpavan et al. (2024)	Digital Era	Documentary Res.	Strategies to maximize technology potential.
Al-Yafaei et al. (2024).	EFL / Oman	Omani Learners	Exploration of writing skill improvement.