The Role of Metacognitive Strategies in Enhancing Reading Comprehension for Second and Foreign Language Learners

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Abstract. Reading comprehension in a second or foreign language presents significant challenges that extend beyond linguistic proficiency. This paper examines the critical role of metacognitive strategies in helping learners overcome these challenges. Metacognition empowers learners to transition from passive decoders to active, strategic readers. The paper synthesizes theoretical frameworks that underpin metacognition in reading, detailing key strategies such as planning, monitoring, and evaluating comprehension. It explores various instructional methods to cultivate these skills in the SL/FL classroom. By reviewing evidence from empirical studies, the analysis confirms that metacognitive training not only improves reading comprehension performance but also fosters greater learner autonomy and self-regulation. The findings hold significant pedagogical implications, advocating for a shift in curriculum design and teacher education to prioritize the development of metacognitive awareness.

Keywords: Metacognitive Strategies, Reading Comprehension, Second/Foreign language learning

1 Introduction

1.1 Background: The Challenge of Reading in a Second/Foreign Language

Acquiring the ability to read proficiently in a second or foreign language is a complex and often arduous undertaking. Unlike reading in a native language, where many lower-level processes such as word recognition and syntactic parsing are largely automatic, SL/FL learners confront a dual cognitive burden. They must simultaneously grapple with unfamiliar vocabulary, complex grammatical structures, and different rhetorical conventions while trying to construct meaning from the text. This increased cognitive load can impede comprehension, leading to a fragmented and superficial understanding. Consequently, many learners develop passive reading habits, focusing on word-for-word translation rather than engaging in the active, meaning-making process that characterizes skilled reading. This challenge is not merely a matter of linguistic deficit but is fundamentally tied to the strategic processes that readers employ to manage their understanding.

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1.2 Problem Statement

The central problem addressed by this paper is the frequent disconnect between traditional SL/FL reading instruction and the development of effective comprehension skills. Pedagogical approaches have often overemphasized bottom-up skills, such as vocabulary drills and grammar exercises, at the expense of top-down, strategic processing. Learners may be taught what the text says but not how to independently make sense of it. This gap leaves learners ill-equipped to handle unfamiliar texts, monitor their comprehension, or repair understanding when it breaks down. This paper, therefore, investigates how the cultivation of metacognitive strategies can bridge this pedagogical gap.

1.3 Significance of Metacognitive Strategy Research

Research into metacognitive strategies is of paramount significance because it offers a pathway to transform language education, moving it beyond traditional paradigms toward an approach that fosters independent and lifelong learners. Shifting the focus to include metacognition necessitates a fundamental rethinking of educational goals and practices, emphasizing the development of learners' ability to control and direct their own learning processes (Coleman et al., 2016)[1]. This focus is particularly crucial in SL/FL contexts where learners must become self-regulated to navigate the inherent complexities of language acquisition. The importance of this approach is validated by empirical evidence showing that successful and proficient language learners are often characterized by their frequent use of metacognitive strategies (Hitt & Véliz, 2015)[2].

1.4 Thesis Statement

This paper argues that the explicit instruction and systematic integration of metacognitive strategies are essential for significantly enhancing reading comprehension, fostering self-regulation, and promoting learner autonomy among SL/FL students. By equipping learners with the tools to plan, monitor, and evaluate their own reading processes, educators can help them transcend linguistic barriers and become more proficient and confident readers.

2 Theoretical Framework of Metacognition in Reading

Metacognition, often defined as "thinking about thinking," provides the theoretical foundation for understanding how learners can actively manage and improve their reading comprehension. It is a higher-order cognitive process that enables individuals to become aware of their own cognitive functions and to use this awareness to regulate their learning. For second and foreign language (SL/FL) learners, who face the dual challenge of decoding language and constructing meaning, the development of metacognitive abilities is not merely beneficial but essential for achieving proficiency and autonomy.

2.1 Defining Metacognition: Knowledge and Regulation

Metacognition is broadly conceptualized as comprising two primary, interacting components: metacognitive knowledge and metacognitive regulation.

Metacognitive knowledge refers to what individuals know about their own cognition and learning processes. This knowledge can be categorized into three distinct types: declarative, procedural, and conditional (Abdelshiheed et al., 2023) [3].

- Declarative Knowledge is knowledge about oneself as a learner and the factors that influence learning.
- Procedural Knowledge is knowledge of how to execute cognitive tasks and learning strategies.
- Conditional Knowledge represents the most sophisticated level of metacognitive awareness. It is the knowledge of when and why to apply specific strategies. A reader with strong conditional knowledge understands that different reading purposes and text types demand different approaches. Bridging the gap between knowing what a strategy is and knowing when and why to use it is a critical step toward developing autonomous, strategic learners (Abdelshiheed et al., 2023) [3].

Metacognitive regulation, the second core component, involves the active control and management of one's learning. Drawing from frameworks used to understand human and artificial cognition, this process can be broken down into a cycle of three key phases: planning, monitoring, and evaluation (Liu & van der Schaar, 2025) [4].

- Planning occurs before a learning task begins. In reading, this involves setting clear goals, activating relevant prior knowledge, and selecting appropriate strategies based on the task's perceived difficulty and purpose.
- Monitoring is the real-time awareness and assessment of one's cognitive processes during the task. For readers, this means continuously checking their level of comprehension, identifying points of confusion, and recognizing when their understanding breaks down.
- Evaluation takes place after the learning task is complete. It involves reflecting on the outcome of the reading process and the effectiveness of the strategies employed. This reflection feeds back into metacognitive knowledge, refining it for future tasks.

These two components—knowledge and regulation—are deeply intertwined. A learner's knowledge about strategies (declarative, procedural, conditional) directly informs their ability to effectively plan, monitor, and evaluate their reading process.

2.2 Core Metacognitive Reading Strategies

Metacognitive regulation is operationalized through the conscious application of specific strategies. These strategies are deliberate, goal-oriented actions that help readers take control of their comprehension process. It involves conscious strategies for planning, monitoring, and evaluating comprehension. Planning strategies (before reading) include setting a purpose, previewing, and activating prior knowledge. Monitoring

strategies (during reading) involve self-questioning, identifying and repairing comprehension failures, and summarizing and paraphrasing. Evaluation strategies (after reading) include summarizing the whole text and self-reflection.

Research on proficient language learners confirms the importance of such an approach. Studies have found that successful students in demanding academic programs are frequent users of cognitive and, notably, metacognitive strategies, indicating a strong correlation between strategic processing and language learning success (Hitt & Véliz, 2015)[2].

2.3 The Role of Metacognition in Second Language Acquisition

For SL/FL learners, reading presents a cognitive load that is substantially higher than for first-language readers. They must simultaneously decode unfamiliar linguistic features—vocabulary, syntax, and discourse structures—while also performing the complex task of constructing meaning. In this context, metacognition serves several critical functions.

First, metacognitive strategies act as a powerful compensatory mechanism. When faced with inevitable gaps in their linguistic knowledge, strategic learners can use metacognitive skills to manage the challenge. For example, instead of abandoning a text upon encountering unfamiliar vocabulary, a metacognitively aware reader will monitor their confusion and deploy a strategy, such as guessing from context or deciding whether the word is essential for overall comprehension. This transforms reading from a potentially frustrating exercise into a manageable problem-solving activity.

Second, metacognition is instrumental in fostering learner autonomy and self-regulation. Language learners who develop metacognitive awareness become less dependent on teachers for guidance and feedback. They learn how to plan their own learning, monitor their own progress, and identify their own areas of difficulty.

2.4 Conceptual Models of Metacognition for Adaptability and Learning

Recent theoretical work, particularly from research in artificial intelligence, provides powerful conceptual models for understanding the ultimate aim of metacognitive development: adaptability (Johnson et al., 2024)[5]. The ability to successfully navigate novel tasks and unfamiliar environments is central to both human intelligence and advanced AI (Valiente & Pilly, 2024)[6]. Metacognition is the mechanism that makes this adaptability possible. A key concept is the distinction between extrinsic and intrinsic metacognition (Liu & van der Schaar, 2025)[4]. Extrinsic metacognition relies on external prompts and fixed, often teacher-designed procedures. In contrast, intrinsic metacognition is an internalized, self-generated ability to reflect on and adapt one's own learning processes. The goal of metacognitive instruction is to cultivate this intrinsic capacity, enabling learners to generalize their skills and sustain their self-improvement over time.

This leads to a view of metacognition as an iterative cycle of learning. As proposed in frameworks for autonomous systems, an effective learner continuously assesses their own competence on a given task, uses that self-awareness to guide the selection of

strategies, and then evaluates the outcome to refine future attempts (Valiente & Pilly, 2024)[6]. This cycle highlights the dynamic and flexible nature of metacognition, moving beyond a static list of strategies to a continuous process of self-improvement.

3 Instructional Methods and Interventions for Developing Metacognitive Reading Skills

The transition from understanding metacognition as a theoretical construct to applying it in the classroom requires a deliberate focus on instructional design. Developing learners' metacognitive abilities is not a passive process but an active endeavor that hinges on explicit instruction, structured support, and targeted interventions.

3.1 The Importance of Explicit Strategy Instruction

The effective integration of metacognitive strategies into a learner's reading process is contingent upon direct and explicit instruction. The assumption that students, particularly SL/FL learners, will spontaneously acquire complex "thinking skills" through mere exposure to texts is a significant pedagogical fallacy. Many educational systems continue to operate within a framework that prioritizes content delivery over cognitive process development, inadvertently neglecting the very skills that enable lifelong learning (Coleman et al., 2016)[1] . To overcome this, a paradigm shift is necessary, one that places metacognitive development at the forefront of instructional practice.

Explicit instruction involves a systematic approach where the educator deconstructs and demystifies the metacognitive process. This includes several key stages: naming the specific strategy, explaining the purpose and benefit of the strategy, and modeling its application through think-aloud protocols. This is followed by guided practice, where students apply the strategy with teacher support and peer collaboration, and finally, independent practice, where they use the strategy on their own. Central to this process is a discussion of when and why to use particular strategies, helping learners build a conditional knowledge base for strategic action.

3.2 Scaffolding Metacognitive Development in the Classroom

Once strategies are explicitly introduced, their development must be supported through pedagogical scaffolding—a system of temporary supports that enables learners to accomplish tasks they could not manage independently. Scaffolding operates on the principle of a gradual release of responsibility, moving learners from high levels of teacher support toward autonomous strategy use. This process ensures that cognitive demands are manageable, building learner confidence and competence concurrently. In the context of metacognitive reading, scaffolds can take many forms, including checklists, graphic organizers, question prompts, and structured collaborative learning activities like reciprocal teaching.

Research into metacognitive scaffolding highlights that the nature of the support provided significantly influences its effectiveness. For instance, studies comparing

different forms of scaffolding—such as structuring scaffolds that organize a task, problematizing scaffolds that encourage learners to identify issues, and epistemological scaffolds that prompt learners to reflect on the nature of their knowledge and understanding—have yielded important insights. Evidence suggests that epistemological scaffolds can produce a higher degree of social, constructive metacognitive activity and lead to more robust evaluation and reflection among learners.

3.3 Technology-Enhanced Metacognitive Support Tools

The proliferation of digital technologies has opened new frontiers for delivering metacognitive support, offering personalized and scalable solutions that can complement traditional classroom instruction. Technology-enhanced tools are particularly valuable in SL/FL contexts, where learners require frequent and immediate feedback to navigate linguistic hurdles. These tools can act as powerful external scaffolds, automating certain metacognitive functions and providing on-demand assistance that helps learners monitor their comprehension and regulate their reading process. Research demonstrates that positive perceptions of such AI-driven tools are linked to enhanced learning motivation and more frequent use of metacognitive strategies (Yao & Liu, 2025)[7].

Several innovative tools exemplify this potential. For example, systems like GazeReader utilize webcams and machine learning to track a reader's gaze, automatically detecting moments of confusion signaled by rereading or long fixations on unknown words (Ding et al., 2023)[8]. By identifying the precise sources of comprehension breakdown, such tools help learners execute a key metacognitive monitoring strategy: recognizing when and where they are struggling. This type of support system helps SL/FL readers to learn independently, especially when direct access to an educator is limited. By providing just-in-time support for monitoring comprehension and repairing understanding, these technologies serve as powerful adjuncts to instruction, helping to internalize the metacognitive cycle of planning, monitoring, and evaluating.

3.4 The Efficacy of Adaptive vs. Static Interventions

As metacognitive interventions become more sophisticated, particularly in technology-enhanced learning environments, a crucial distinction emerges between static and adaptive approaches. Static interventions apply a uniform, one-size-fits-all model of support, providing the same prompts, strategies, and feedback to all learners regardless of their individual proficiency or real-time needs. While potentially beneficial, this approach risks being ineffective for a significant portion of learners—it may be too rudimentary for advanced students or too complex for struggling ones. In contrast, adaptive interventions dynamically tailor support to the individual, adjusting the type and intensity of scaffolding based on the learner's ongoing performance and evolving metacognitive state.

Empirical evidence strongly suggests the superiority of adaptive interventions in fostering robust metacognitive skills. In a landmark study comparing the two approaches, researchers utilized a static, classifier-based system for one group and an adaptive system powered by Deep Reinforcement Learning (DRL) for another (Abdelshiheed et al.,

2023)[9]. The static intervention provided fixed support based on an initial assessment of students' metacognitive abilities, whereas the DRL-based system continuously monitored and responded to dynamic changes in student behavior. The results were telling: the static interventions only benefited a subset of students who already possessed some prerequisite knowledge of the target strategy. The adaptive DRL-based interventions, however, successfully closed the metacognitive skills gap among all students in the group. This finding indicates that interventions that can intelligently respond to a learner's Zone of Proximal Development for metacognitive skills are far more effective at promoting not only skill acquisition but also long-term retention and transfer. Consequently, the future of effective metacognitive training lies in the development and implementation of such personalized, adaptive systems.

4 Evidence of Effectiveness: Outcomes of Metacognitive Strategy Training

The theoretical value of metacognitive strategies is substantiated by a growing body of empirical evidence demonstrating their tangible benefits for second and foreign language learners. Research interventions consistently show that training learners to become more aware and deliberate in their reading processes yields significant, multifaceted improvements. These outcomes extend beyond immediate gains in comprehension to encompass the development of learner autonomy, the transfer of skills to new contexts, and an overall enhancement of self-regulated learning capabilities.

4.1 Improvements in Reading Comprehension Performance

The most direct and widely documented outcome of metacognitive strategy instruction is a marked improvement in reading comprehension. When learners are explicitly taught to plan, monitor, and evaluate their reading, they move from being passive recipients of text to active constructors of meaning. This strategic engagement allows them to more effectively navigate the linguistic and conceptual challenges inherent in SL/FL texts. Although not always focused exclusively on reading, the principle is highly transferable: teaching learners to be aware of different strategies and to know when to deploy them leads to better outcomes.

For example, research has shown that providing students with practice in alternative problem-solving approaches, such as mixing backward-chaining with forward-chaining strategies, not only improves their performance on the immediate task but also brings them to the level of peers who were already metacognitively aware (Abdelshiheed et al., 2023)[10]. Applied to reading, this suggests that learners who are taught a repertoire of strategies (e.g., rereading, questioning, summarizing, using context clues) and guided on when each is most appropriate are better equipped to overcome comprehension breakdowns. They learn to identify the source of their confusion—be it lexical, syntactic, or conceptual—and apply a targeted "fix-up" strategy, leading to a deeper and more accurate understanding of the text.

4.2 Fostering Learner Autonomy and Self-Regulation

Beyond enhancing comprehension scores, a core achievement of metacognitive strategy training is the cultivation of learner autonomy and self-regulation. By equipping learners with the tools to manage their own learning, such instruction reduces their dependence on teachers and fosters a sense of ownership over the reading process. The goal is to internalize the strategies so that learners can function as independent, self-directed readers. Evidence suggests that targeted interventions can successfully guide learners toward more autonomous strategic decisions, adapting to their metacognitive development over time (Abdelshiheed et al., 2023)[3]. This shift from external regulation (by a teacher or a system) to internal self-regulation is the hallmark of a mature learner.

This process is closely linked to the development of learning resilience. As learners become more adept at using metacognitive strategies, their confidence in their ability to handle difficult texts increases, which in turn strengthens their motivation and persistence (Yao & Liu, 2025)[7]. The cognitive mechanisms that underpin strategy discovery, though subject to individual differences, are fundamental to this process of becoming a self-regulated learner (He & Lieder, 2025)[11]. Learners who can monitor their own understanding, identify problems, and independently select and apply corrective strategies are not just better readers; they are more effective and resilient learners in general.

4.3 The Transfer of Metacognitive Skills to New Domains

A critical indicator of deep learning is the ability to transfer acquired skills and knowledge to novel contexts. Effective metacognitive strategy instruction has been shown to achieve this, demonstrating that the benefits are not confined to the specific tasks or texts used during training. Research provides strong evidence that metacognitive skills acquired in one domain can be successfully transferred to another. For instance, studies have shown that metacognitive awareness trained within a logic tutor can be effectively applied weeks later in a completely different domain, such as a probability tutor (Abdelshiheed et al., 2023)[9]. This demonstrates that what is being learned is not merely a task-specific procedure but a more generalizable metacognitive skill set.

This transfer is possible because metacognitive strategies operate at a level above specific content knowledge. They are concerned with the process of learning itself. When students learn how to self-assess their understanding, plan an approach to a complex problem, and evaluate the effectiveness of their chosen method, they are acquiring a portable toolkit for learning. Interventions designed to bridge the gap between knowing about a strategy (declarative knowledge) and knowing how and when to use it (procedural and conditional knowledge) have been shown to prepare students for future learning, even in different contexts (Abdelshiheed et al., 2023)[3]. For SL/FL learners, this means that strategies honed during reading practice can potentially benefit other language skills, such as listening comprehension or writing, and even academic tasks outside of language learning.

4.4 Methodologies for Assessing Metacognitive Strategy Use

Assessing the use and effectiveness of internal cognitive processes like metacognition presents a methodological challenge. Since these processes are not directly observable, researchers rely on a combination of direct and indirect measures to build a comprehensive picture of a learner's strategy use. Common assessment tools include think-aloud protocols, where learners verbalize their thoughts while reading; structured interviews; and self-report questionnaires that ask learners to reflect on their strategy use.

More advanced methodologies leverage technology to capture behavioral data that can serve as proxies for metacognitive activity. For instance, multimodal analysis frameworks can assess comprehension by integrating data from various sources, such as eye-tracking patterns, written summaries, and oral recitations (Barnwal, 2021)[12]. Eye-tracking can reveal moments of confusion (e.g., regressions, long fixations) and the application of monitoring strategies, while the quality of summaries can reflect the effectiveness of evaluation strategies. Analyzing these diverse data streams allows researchers to infer the underlying cognitive and metacognitive processes at play during reading. Furthermore, examining performance data within learning systems can reveal how individuals learn and apply strategies, shedding light on the individual differences that shape metacognitive development (He & Lieder, 2025)[11]. The combination of these methods provides a more robust and nuanced assessment of metacognitive strategy use than any single measure could achieve alone.

5 Discussion and Implications

The evidence presented underscores the profound impact of metacognitive strategies on the reading abilities and overall learning capacity of SL/FL students. The findings from empirical research not only validate the theoretical importance of metacognition but also provide a clear direction for pedagogical practice and educational tool design.

5.1 Synthesis of Findings on Metacognitive Strategy Efficacy

The collective evidence strongly indicates that metacognitive strategy training is a high-impact educational intervention. The benefits are threefold. First, it directly improves reading comprehension by transforming learners into active, strategic participants in the meaning-making process. Second, it fosters learner autonomy and self-regulation, which are essential for long-term academic success and lifelong learning. By internalizing strategies for planning, monitoring, and evaluation, learners become less reliant on external guidance and more capable of managing their own learning challenges (Abdelshiheed et al., 2023)[3]. Third, and perhaps most significantly, these skills are transferable. The ability to apply metacognitive awareness to new tasks and domains demonstrates that the instruction cultivates a fundamental "learning to learn" competence, which is a principal goal of modern education (Abdelshiheed et al., 2023)[10]. In essence, metacognitive strategy instruction does not just teach students how to read a specific text; it teaches them how to become proficient and adaptable learners.

5.2 Addressing Learner Variability and Individual Differences

While the efficacy of metacognitive strategy instruction is well-established, it is crucial to acknowledge that a one-size-fits-all approach is insufficient. Learners are not a homogenous group; they bring diverse backgrounds, proficiency levels, cognitive abilities, and learning preferences to the classroom. Research highlights that there are significant individual differences in the cognitive mechanisms through which individuals discover and apply new strategies (He & Lieder, 2025)[11]. Some learners may intuitively grasp and use strategies with minimal prompting, while others may require more explicit, sustained, and scaffolded support. Factors such as prior educational experiences, motivation, and existing metacognitive awareness can all mediate the effectiveness of an intervention. This variability implies that instruction must be flexible and adaptive. Educators need to diagnose learners' existing strategic knowledge and tailor instruction accordingly, offering different levels of support and a variety of strategies to suit diverse needs.

5.3 Pedagogical Implications for SL/FL Educators and Curriculum Design

The research findings carry significant implications for classroom practice and curriculum development. The primary takeaway for educators is the necessity of moving beyond an implicit hope that students will "pick up" reading strategies on their own. Instead, explicit and systematic strategy instruction should be an integral part of SL/FL reading curricula. This represents a paradigm shift from a traditional focus on linguistic inputs (e.g., grammar, vocabulary) to a more balanced approach that also develops the cognitive processes of learning (Coleman et al., 2016)[1].

For this to be effective, educators require training in how to teach these strategies. This includes modeling strategies through think-alouds, providing guided practice with appropriate scaffolding, giving specific feedback on strategy use, and designing activities that encourage reflection. Curricula should be structured to introduce, practice, and reinforce a core set of metacognitive strategies over time, gradually releasing responsibility to the learners. Integrating specific instructional designs, such as mixing practice with different types of problem-solving strategies, can effectively build metacognitive awareness (Abdelshiheed et al., 2023)[10]. Ultimately, this pedagogical shift is essential for creating 21st-century classrooms that equip students with the self-regulatory skills necessary for lifelong learning.

5.4 Implications for Educational Technology Development

Educational technology, particularly AI-powered systems, offers powerful new avenues for fostering metacognitive skills. Technology can provide the personalized, adaptive, and scalable support that can be challenging for a single teacher to deliver in a large classroom. Intelligent Tutoring Systems (ITSs) can be designed to provide real-time, adaptive metacognitive interventions that teach students not just what to do, but how and when to apply a strategy based on their performance (Abdelshiheed et al., 2023)[3]. Such systems can model expert processes, provide targeted hints, and prompt

learners to reflect on their choices, thereby scaffolding the development of autonomous decision-making.

Furthermore, technology can create environments where learners feel more comfortable engaging with and using AI tools, which has been shown to be positively associated with the use of metacognitive strategies and the development of learning resilience (Yao & Liu, 2025)[7]. The implication for developers is to design tools that are not merely content-delivery platforms but are learning companions that actively support the metacognitive process. By analyzing user data through methods like multimodal analysis, these tools can offer insights into a learner's reading behavior and provide feedback that promotes metacognitive reflection and growth, thereby enhancing the overall learning experience (Barnwal, 2021)[12].

6 Conclusion

This paper argues that deliberate cultivation of metacognitive strategies is critical for enhancing reading comprehension in SL/FL learners. Metacognition—knowledge and regulation of cognitive processes—transforms learners from passive decoders into active, strategic readers. Through planning, monitoring, and evaluating, they navigate linguistic challenges, improving comprehension, autonomy, and confidence.

Research supports explicit instruction: modeling, scaffolding, and guided practice help learners identify breakdowns and use repair strategies. Technology integration, especially adaptive interventions, proves more effective than static approaches for developing transferable metacognitive skills (Abdelshiheed et al., 2023) [9].

Ultimately, metacognitive awareness is central to fostering adaptable, effective learners (Johnson et al., 2024)[5]. By teaching students to "think about their thinking," educators cultivate self-regulated, lifelong learners. The implication is clear: integrating metacognitive strategy instruction is essential for academic success and sustained language acquisition.

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