

The Impact Of Prediction And Self-Questioning Strategies On ESL Learners' Reading Comprehension

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Abstract— This study investigates the effects of metacognitive methods, especially prediction and self-questioning, on the reading comprehension of ESL students participating in the Diploma in English for Professional Purposes program at ESOF Metro College in Kalutara. The study addressed the issue of restricted engagement with complicated texts by looking into whether these tactics may improve learners' understanding and confidence. To collect quantitative and qualitative data, a mixed-methods approach was used, which included pre- and post-tests, questionnaires, and semi-structured interviews. Pre- and post-tests assessed improvements in comprehension levels, while surveys and interviews investigated learners' perspectives on the tactics. The findings demonstrated a significant improvement in reading comprehension, with overall test scores improving by 14.3% and underperforming students gaining an additional 17.3%. Statistical analysis proved the efficacy of the techniques. The qualitative findings revealed enhanced awareness of reading processes, increased confidence, and problems encountered during the initial implementation of the approaches. Learners said that prediction and self-questioning enabled them to interact more actively with texts and think critically about their meaning. The study concluded that metacognitive methods aid ESL learners greatly, particularly those who struggle with complicated content, and suggests incorporating them into professional ESL programs. It also advises future research into technology-based solutions to aid plan implementation and long-term learning results.

Keywords— Metacognitive strategies; Prediction; Self-questioning; Reading comprehension; ESL learners; Mixed-methods research; Learner confidence; Professional English programs; Diploma in English for Professional Purposes; Critical reading

I. INTRODUCTION

Reading comprehension is a vital skill for ESL learners in professional diploma programs, where texts often contain specialized vocabulary and complex structures. At ESOF Metro College in Kalutara, students must interpret academic articles, technical manuals, and industry documents that demand both linguistic and cognitive proficiency. These texts

necessitate inference and the utilization of novel knowledge (Grabe, 2009).

Metacognitive strategies, particularly prediction and self-questioning, help learners manage cognitive load and engage more deeply with such texts. Prediction activates prior knowledge and supports retention, while self-questioning fosters critical thinking and self-monitoring during reading. Though widely studied in general ESL contexts, their application in professional ESL education remains under-researched (Ghimire, 2025).

This study examines the impact of prediction and self-questioning on the reading comprehension of ESL learners in a professional diploma program. Using pre- and post-tests alongside surveys and interviews, the study evaluates how these strategies influence both comprehension outcomes and learner perceptions, with the goal of enhancing ESL curricula in professional settings (Hashmi, 2024; Khurram, 2023).

1.3 Problem Statement

Although metacognitive strategies have been shown to enhance reading comprehension in general ESL education, their use in professional contexts—where texts demand both linguistic skill and domain-specific reasoning—has received limited attention.

Professional ESL learners face specific obstacles:

- **Cognitive Load:** Dense texts with specialized concepts can overwhelm learners lacking background knowledge.
- **Limited Prior Knowledge:** ESL learners often cannot rely on contextual inference to aid comprehension.
- **Passive Reading Habits:** Many learners default to translation or memorization rather than analytical engagement.
- **Instructional Gaps:** Existing ESL programs may underemphasize metacognitive training.

This study addresses the lack of research into how prediction and self-questioning can support comprehension in professional ESL settings. It

investigates both measurable outcomes and learner perceptions to assess the impact of these strategies.

Research Questions:

1. How do prediction and self-questioning strategies affect reading comprehension among ESL learners in a professional diploma program?
2. How do learners perceive the usefulness of these strategies in understanding complex texts?

1.4 Aim and Objectives

Aim: To assess the effectiveness of prediction and self-questioning strategies in improving reading comprehension among professional ESL learners.

Objectives:

1. To measure comprehension gains through pre- and post-tests.
2. To explore learners' perceptions via surveys and interviews.
3. To recommend ways to integrate these strategies into professional ESL curricula.

II. REVIEW OF LITERATURE

2.1 Overview of Metacognitive Strategies

Metacognitive strategies refer to learners' awareness and regulation of their own thought processes (Flavell, 1979). These include the ability to plan, monitor, and evaluate one's understanding during reading—skills critical for success in complex academic and professional settings (Baker & Brown, 1984; Vandergrift & Goh, 2012).

In ESL education, metacognition becomes especially valuable when learners engage with discipline-specific materials, such as technical reports or legal documents. These materials often require more than basic language skills; they demand strategic reading, inference, and conceptual synthesis (Zimmerman & Schunk, 2011).

2.2 Prediction and Self-Questioning as Core Strategies

Prediction involves using prior knowledge to anticipate the content or structure of a text. It supports reading efficiency and helps manage cognitive load (Grabe, 2009; Pressley et al., 1992). In professional contexts, it enables learners to focus attention on relevant sections (e.g., forecasting key ideas in a legal clause or financial summary).

Self-questioning requires learners to ask critical questions during reading (King, 1991). It promotes reflection, deeper understanding, and integration of new information. Recent studies (Goh, 2015; Chen &

Zhao, 2020) show its effectiveness in helping learners comprehend dense scientific or professional texts.

Together, these strategies enhance learner autonomy, comprehension, and critical thinking—skills essential for navigating professional literature (Zimmerman & Schunk, 2011).

2.3 Challenges in Professional ESL Reading

Professional ESL learners face several common barriers:

- **Unfamiliar terminology and dense sentence structures** (Grabe, 2009)
- **Limited prior domain knowledge**, which inhibits inference
- **Passive reading habits** (rote memorization, direct translation)
- **Instructional gaps** in metacognitive training (O'Malley & Chamot, 1990)

Prediction and self-questioning directly address these issues. They help students build cognitive frameworks for approaching unfamiliar texts and encourage active reflection that improves both retention and confidence.

2.4 Addressing a Research Gap

Although studies have confirmed the benefits of metacognitive strategies in general ESL contexts (Pressley et al., 1992; Grabe, 2009), few have examined their application in **English for Specific Purposes (ESP)**, especially for adult learners in fields such as business, law, and healthcare (Ghimire, 2025).

This study addresses that gap by evaluating the impact of prediction and self-questioning on professional ESL learners at ESOF Metro College. It contributes practical insights for instructors and curriculum developers seeking to prepare learners for real-world, domain-specific reading tasks.

III. METHOD

3.1 Research Framework and Design

This study employed a **mixed-methods design** to assess the impact of prediction and self-questioning strategies on ESL learners' reading comprehension. Combining quantitative (pre- and post-tests) and qualitative (surveys and interviews) data allows for a comprehensive understanding of both performance outcomes and learner experiences (Creswell & Plano Clark, 2018).

A sample of 30 intermediate-level ESL learners from ESOF Metro College was selected. These students had no prior exposure to metacognitive reading strategies, making them ideal candidates for measuring the intervention's impact (Oxford, 2017).

3.2 Quantitative Component

The quantitative phase involved **pre- and post-tests** designed to assess reading comprehension improvements. The tests included academic and professional texts and assessed prediction and self-questioning in action.

- **Statistical Analysis:** Paired sample t-tests were used to determine if improvements in scores were statistically significant (Fraenkel & Wallen, 2019).

3.3 Qualitative Component

To explore learner perceptions, the study conducted:

- **Semi-structured interviews** that explored participants' experiences using the strategies.
- **Surveys** with Likert-scale and open-ended questions to capture attitudes, perceived effectiveness, and challenges.

Thematic analysis (Braun & Clarke, 2006) was used to identify key patterns in learner responses. Strategies such as triangulation, inter-coder reliability, and member checking enhanced the credibility of findings.

3.4 Study Setting and Participants

The study was conducted at ESOF Metro College in Kalutara over **eight months**, with instruction and data collection embedded into regular Saturday classes.

- **Sample:** 30 intermediate-level learners enrolled in the Diploma in English for Professional Purposes.
- **Inclusion Criteria:** Participants had no prior training in metacognitive strategies and committed to completing the full intervention.
- **Rationale:** The sample size met the minimum threshold for both statistical significance and qualitative data saturation (Guest et al., 2006; Creswell, 2014).

3.5 Instruments and Data Collection

- **Reading Tests:** Comprised of two short professional texts with comprehension questions designed to assess prediction and self-questioning use.
- **Interview Guide:** Included questions on strategy use, obstacles, and perceived value.
- **Survey:** Measured learners' attitudes via scaled responses and allowed for open-ended reflection.

3.6 Data Analysis

- **Quantitative:** Paired t-tests compared pre- and post-test scores.

- **Qualitative:** Thematic analysis was conducted using Braun and Clarke's framework (2006), identifying recurring themes in learner experiences.

To ensure trustworthiness:

- **Triangulation** verified consistency across data sources.
- **Inter-coder reliability** minimized bias.
- **Member checking** ensured that interpretations reflected participants' perspectives.

3.7 Ethical Considerations

The study followed ethical research standards:

- Informed consent was obtained from all participants.
- Participation was voluntary, with the right to withdraw.
- Data was anonymized and securely stored to maintain confidentiality (BERA, 2018; Resnik, 2020).

IV. RESULTS AND DISCUSSION

4.1 Introduction to Data Collection and Analysis

This chapter delineates the findings from the investigation about the influence of prediction and self-questioning tactics on reading comprehension among ESL learners at ESOF Metro College, Kalutara. The data analysis encompasses both quantitative and qualitative results to furnish a comprehensive grasp of the research objectives. Pre-test and post-test outcomes assess advancements in reading comprehension, whilst student feedback from semi-structured interviews elucidates their experiences with the tactics.

4.2 Quantitative Findings

4.2.1 Pre-Test and Post-Test Comparison

The study aimed to evaluate the effect of prediction and self-questioning tactics on the reading comprehension of ESL learners. Pre-test and post-test scores were utilized to assess reading enhancement. The average pre-test score was 58.2%, signifying moderate initial understanding, whereas the average post-test score increased to 72.5%, demonstrating a 14.3% enhancement. This enhancement aligns with research on metacognitive methods in ESL instruction, indicating that prediction and self-questioning can substantially improve reading comprehension by fostering learners' active engagement with texts (O'Malley & Chamot, 1990; Pressley, 2002).

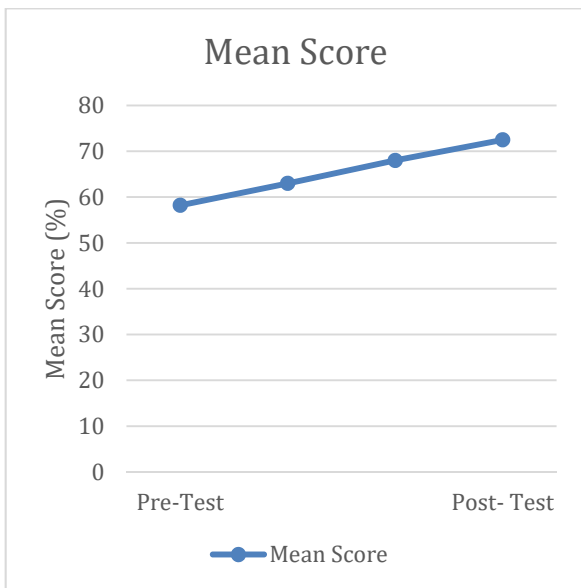
The reduction in standard deviation (from 8.4 in the pre-test to 7.9 in the post-test) indicates a decrease in

variability of student performance, suggesting that these strategies may have contributed to a more uniform comprehension level among participants, thereby enhancing the consistency of the learning process. Research indicates that metacognitive methods, such as prediction and self-questioning, enhance students' awareness and regulation of their learning, resulting in improved performance consistency (Paris & Jacobs, 1984).

TABLE I. PRE-TEST AND POST-TEST COMPARISON

Test Type	Mean Score (%)	Standard Deviation
Pre-Test	58.2%	8.4
Post-Test	72.5%	7.9

FIGURE 01. PRE-TEST VS. POST-TEST MEAN SCORES



4.2.2 Statistical Significance

A paired sample t-test was used to ascertain whether the observed enhancement in reading comprehension was statistically significant. The findings indicated a p-value of 0.003, signifying that the variation in reading scores from the pre-test to the post-test was statistically significant at the 0.05 level. The enhancement in reading comprehension was improbable to be coincidental, therefore offering robust evidence for the efficacy of the metacognitive methods.

The notable disparity corresponds with prior studies on the advantages of metacognitive methods in enhancing reading comprehension. Research conducted by O'Malley and Chamot (1990) demonstrated that the explicit instruction of metacognitive strategies can markedly enhance comprehension in ESL learners, particularly when these tactics are designed to actively include students in the reading process. Pressley (2002) asserts that techniques such as prediction and self-questioning

enable learners to manage their cognitive processes, resulting in significant enhancements in comprehension.

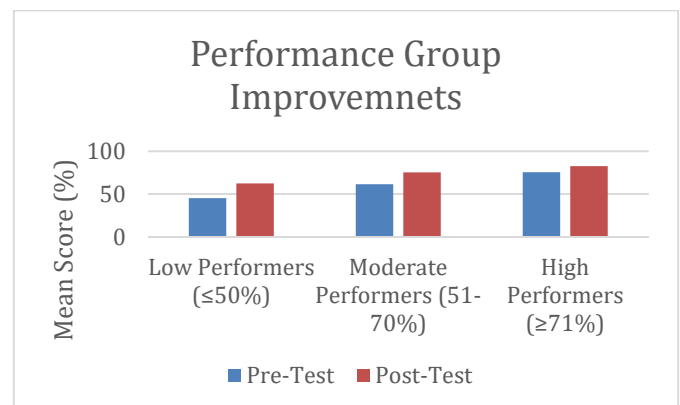
4.2.3 Breakdown by Performance Groups

To examine the intervention's effects on various learner groups, students were classified according to their pre-test results into three performance categories: low performers, middle performers, and high performers. This classification facilitated the examination of how different levels of reading comprehension proficiency were influenced by prediction and self-questioning tactics.

Table 02 Breakdown by Performance Groups

Performance Group	Pre-Test Mean (%)	Post-Test Mean (%)	Improvement (%)
Low Performers (≤50%)	45.1%	62.4%	+17.3%
Moderate Performers (51-70%)	61.3%	75.2%	+13.9%
High Performers (≥71%)	75.4%	82.6%	+7.2%

Figure 03



Low Performers (≤50%): The low-performing group, with pre-test scores of 45.1%, exhibited the most substantial enhancement, with post-test scores

increasing to 62.4%, or a 17.3% rise. This finding aligns with the research conducted by Paris and Jacobs (1984), who posited that struggling readers benefit significantly from metacognitive methods. These tactics seem to have facilitated greater engagement with the text among low-performing students, equipping them with the skills to improve content prediction and formulate pertinent questions, both of which are recognized as enhancing reading comprehension (Vygotsky, 1978).

Moderate Performers (51-70%): Moderate performers, with pre-test scores of 61.3%, exhibited an enhancement of 13.9% following the intervention, elevating their post-test scores to 75.2%. This moderate improvement highlights the efficacy of prediction and self-questioning techniques in enhancing the reading comprehension abilities of learners with an existing foundational competency. According to O'Malley and Chamot (1990), learners with prior knowledge gain from these tactics, which serve to polish and enhance their existing skills.

High Performers (≥71%): High performers, exhibiting robust reading abilities with a pre-test mean score of 75.4%, demonstrated the least enhancement of 7.2%. This still signifies a beneficial outcome, as their post-test mean score rose to 82.6%. Although the proportional enhancement was modest, it is significant that high-achieving students continued to gain from the tactics. Pressley (2002) asserts that even proficient learners can improve their comprehension and cognitive methods through metacognitive skills such as prediction and self-questioning, which enrich their understanding and promote more reflective interaction with intricate texts.

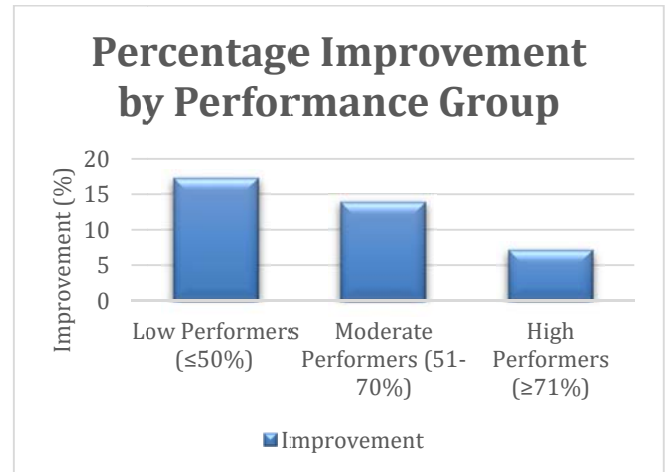
4.2.4 Summary of Quantitative Findings

The quantitative research offers compelling evidence for the efficacy of prediction and self-questioning tactics in enhancing reading comprehension among ESL learners. The 14.3% enhancement in reading comprehension corroborates the conclusions of other research on metacognitive methods (O'Malley & Chamot, 1990; Pressley, 2002). The tactics significantly benefited low-performing students, evidenced by a 17.3% improvement, highlighting their ability to mitigate reading comprehension deficits among struggling learners. This discovery corresponds with the work of Paris and Jacobs (1984), who highlighted that readers facing difficulties derive the greatest advantage from organized, strategy-oriented interventions.

Although high-performing students exhibited minimal change, their ongoing advancement substantiates that metacognitive methods are advantageous for all competence levels, as evidenced by Pressley (2002). The statistical significance of these findings, validated by the paired sample t-test, indicates that the enhancements in reading comprehension were attributable to the intervention rather than random variation.

These findings underscore the significance of including metacognitive methods like as prediction and self-questioning into ESL reading instruction, especially for learners with diverse skill levels. Evidence indicates that these tactics can substantially improve reading comprehension, especially for low-performing students who benefit the most from such treatments.

Figure 04



4.3 Qualitative Findings

The qualitative analysis in this study was based on students' reflections and replies obtained through semi-structured interviews. Thematic analysis (Braun & Clarke, 2006) identified three principal themes that summarize students' experiences with prediction and self-questioning tactics: heightened awareness of reading strategies, improved reading confidence, and initial challenges in adjusting to these strategies. These topics illustrate the beneficial effects and the difficulties faced by students throughout the execution of these metacognitive procedures.

Table 03

Qualitative Findings

Elaboration on Themes and Direct Quotes

1. Benefits of Metacognitive Strategies

The theme "Benefits of Metacognitive Strategies" arose from comments that emphasized the advantageous effects of prediction and self-questioning on understanding and memory retention.

- **Active Engagement:** A participant remarked, "I anticipated that the article would address climate change, and upon its discussion, my comprehension improved as I had already contemplated the subject." This remark illustrates how prior engagement with the text—via prediction—enhanced the learner's reading experience, rendering it more pertinent and cohesive. Prediction fosters mental preparedness, hence enhancing active engagement with the material.

- **Enhanced Retention:** A learner remarked, "Anticipating the subsequent segment of the text facilitated my recollection of information from prior lessons that I could connect with." This illustrates that prediction not only facilitates student engagement with the text but also assists in the recollection of previously acquired information, hence enhancing knowledge retention.

- **Contextual Comprehension:** Prediction is crucial in establishing the context of the material. For example, when learners anticipate a subject (such as climate change) in a reading passage, it activates their cognitive processes to concentrate on that particular context, facilitating comprehension of the text.

- **Clarification, Focus, and Oversight:** The response illustrates that self-questioning, shown by the inquiry, "What is the author attempting to convey?" motivates students to engage in profound contemplation and enhances their comprehension of the material as they read. This reflective activity elucidates misunderstanding and augments comprehension by engaging students in critical analysis during reading.

- **Link to Prior Knowledge:** "Self-questioning facilitated my retention of the main concepts, enabling me to relate them to information acquired the previous week." This underscores the significance of self-inquiry in connecting new material to prior knowledge, so cultivating a more profound and cohesive comprehension of the text.

2. Obstacles in Strategy Implementation

The theme "Challenges in Strategy Adoption" emerged as participants articulated the obstacles they faced in implementing prediction and self-questioning tactics while reading.

- **Initial Challenge and Disruption of Reading Flow:** One participant remarked, "Initially, I struggled to pause and pose questions to myself during reading." I was accustomed to reading continuously. This demonstrates that the practice of uninterrupted reading can hinder learners' ability to pause and participate in self-questioning, especially during the initial phases of employing these tactics.

- **Temporal Constraint:** A further issue noted was the constraint of time: "It was difficult to anticipate when the text was particularly complex, and I lacked sufficient time for contemplation." This comment emphasises that time limitations in reading assignments might impede the successful application of prediction, particularly when the content is complex or difficult.

3. Recommendations for Enhancement

The theme "Suggestions for Improvement" arose from replies in which learners proposed enhancements to the use of prediction and self-questioning tactics.

- **Directed Practice and Explicit Instructions:** "Perhaps the instructor could provide us with examples of how to formulate predictions and pose enquiries prior to commencing the reading." This indicates that students might gain from direct instruction and illustrations on the application of these strategies in actual reading activities. Explicit instructions may enhance learners' comprehension of how to include prediction and self-questioning into their reading practices.

- **Increased Practice Time:** "Additional time to practice these strategies during class would be beneficial." The necessity for additional practice time was a persistent issue. Students believed that increased class time focused on implementing these tactics will improve their proficiency in utilising them effectively.

Thematic Structure:

Table 04 *Thematic Structure*

Theme	Codes
Benefits of Metacognitive Strategies	Active Engagement, Improved Retention, Contextual Understanding, Clarification, Connection to Prior Knowledge, Focus and Monitoring
Challenges in Strategy Adoption	Initial Difficulty, Interrupting Reading Flow, Time Pressure
Suggestions for Improvement	Guided Practice, More Time, Clear Instructions

Elaboration on Thematic Structure:

- **Benefits of Metacognitive tactics:** This theme includes the overall favourable influence that both prediction and self-questioning tactics have on understanding. Terminologies like "Active Engagement" and "Improved Retention" illustrate that learners gain advantages from a deeper interaction with texts and the integration of new material with existing knowledge, hence augmenting retention.

- **Obstacles in Strategy Implementation:**

This subject illustrates the challenges that learners encounter when incorporating these tactics into their reading practices. Codes like "Initial Difficulty" and "Time Pressure" indicate the challenges of altering established reading habits and implementing these tactics under time constraints.

- **Recommendations for Enhancement:**

Students proposed pragmatic methods to improve the implementation of these tactics, such as increased

guided practice and additional time for application in the classroom. Terminology such as "Guided Practice" and "Clear Instructions" implies that systematic assistance would facilitate students' adoption of these practices.

4.3.1 Increased Awareness of Reading Strategies

A notable discovery from the interviews was the heightened knowledge among students of the potential of reading strategies to improve their comprehension. Before employing prediction and self-questioning techniques, numerous students indicated a more passive reading approach—merely reading the book without actively interacting with the content. This passive reading behavior frequently resulted in a shallow comprehension, wherein students might read the words yet fail to apprehend the underlying significance or establish connections within the text. Nevertheless, the implementation of prediction and self-questioning tactics enabled students to engage with the material more deliberately and meaningfully.

A student shared this sentiment, stating: *"Before, I just read without thinking. Now, I ask myself questions, and I understand better."*

This sentence indicates a transition from passive reading to an engaged, contemplative practice. This interaction aligns with research on metacognitive reading strategies. Pressley and Afflerbach (1995) assert that readers employing metacognitive methods such as anticipating and self-questioning can effectively monitor and modify their understanding during reading, leading to enhanced comprehension. Research indicates that prediction facilitates the activation of prior information in readers, thereby enhancing reading efficacy (Kintsch & Rawson, 2005).

Moreover, students started to demonstrate an increasing understanding of how to engage with various text formats. Some individuals reported deliberately employing methods such as forming predictions based on headers or keywords, while others said that they would pause after reading a section to engage in reflective questioning. This deliberate application of reading strategies demonstrates a degree of metacognitive awareness, as students actively contemplated and utilized strategies to enhance their comprehension of the information. Metacognitive awareness is recognized as crucial for proficient reading comprehension (Baker & Brown, 1984).

4.3.2 Enhanced Reading Confidence

A further pattern that surfaced from the qualitative data was increased reading confidence. Students indicated an increase in confidence and empowerment when employing the tactics of prediction and self-questioning. The capacity to anticipate subsequent content in a passage empowered students to feel more in command of their reading experience, particularly when facing unfamiliar or difficult literature. This

sensation of control mitigated the anxiety frequently linked to reading challenging texts and afforded students a sense of authority over the content.

One participant articulated this sense of empowerment, noting: *"When I predict what might come next, I feel more in control of the reading."*

The notion that anticipation enhances a perception of control is consistent with findings in metacognitive research. Garner (1987) posits that prediction tactics can alleviate anxiety and enhance learners' self-efficacy by allowing them to foresee subsequent developments in the text. The perception of control over their reading process enhances students' confidence in their abilities, potentially resulting in improved overall performance. Research on self-regulated learning indicates that students who perceive they can affect their learning outcomes achieve higher academic success (Zimmerman, 2002).

The self-questioning strategy enhanced confidence by prompting students to actively assess their understanding. Through contemplation of the text and posing inquiries such as, "What message is the author attempting to communicate?" or "How does this correlate with my existing knowledge?", students enhanced their awareness of their comprehension and were able to identify and rectify knowledge deficiencies prior to progressing. This self-assessment method improved their sense of accomplishment as they observed enhancements in their comprehension, so reinforcing their confidence. Paris & Paris (2003) assert that self-questioning tactics foster active involvement and enable learners to evaluate their understanding, hence enhancing confidence.

The children increasing confidence transcended the classroom environment. Numerous individuals indicated that the tactics positively influenced their overall learning methodology. They felt better prepared to tackle various academic objectives, not alone in reading comprehension but also in other domains of learning that necessitate critical thinking and self-reflection. Research indicates that metacognitive methods, such as self-questioning, enhance learners' capacity to address diverse educational obstacles (Veenman, Van Hout-Wolters, & Afflerbach, 2006).

4.3.3 Initial Difficulties in Adapting to the Strategies

Although the advantages of the tactics were apparent, numerous students also noted initial challenges in adjusting to self-questioning and prediction. The obstacles were mostly due to the unfamiliarity with the tactics and the effort needed to incorporate them into their reading regimen. For several students, the practice of pausing to contemplate and inquire throughout reading was novel and disconcerting. They said that recalling the use of methods was challenging, particularly during rapid reading periods or when they were more habituated to uninterrupted reading of texts.

As one student explained: *"At first, it was difficult to stop and ask myself questions. I'm used to just reading straight through the text."*

These comments indicate that the metacognitive aspect of self-questioning may initially interrupt the seamless progression of reading. This is not unusual, as the activity of consciously scrutinizing one's cognitive processes while reading necessitates a heightened level of cognitive involvement. Brown and Palincsar's (1989) research indicates that students frequently encounter difficulties upon their initial exposure to metacognitive methods. They highlight that early pain is common when learners acclimate to a new, more intentional mode of thinking during reading.

Nonetheless, despite these preliminary challenges, the majority of students indicated that through practice, they gained more proficiency with the tactics and acknowledged their significance. Gradually, the tactics integrated into the reading process, leading to enhanced reading comprehension among students. This trend indicates that, akin to any new ability, the implementation of metacognitive methods necessitates time and consistent practice for complete internalization. O'Malley and Chamot's (1990) research demonstrates that the utilization of metacognitive methods by learners enhances progressively with sustained practice and instruction.

Furthermore, several students observed that the advantages of self-questioning and prediction grew more evident with prolonged utilization. Participants noted that as participants became more adept at pausing to ponder and anticipate, they recalled knowledge more effectively and engaged with texts at a deeper level. This indicates that the initial difficulties in implementing these tactics were integral to the learning process, and that persistence resulted in enhanced success over time. This corresponds with the conclusions of McKeown and Beck (2009), who contend that learners require time to attain competency in metacognitive methods, although consistent practice results in substantial enhancements in comprehension and retention.

In conclusion, the qualitative data indicate that the implementation of prediction and self-questioning tactics markedly influenced students' reading experiences. Although students initially encountered difficulties with the unfamiliar tactics, they ultimately developed a heightened awareness of reading as a cognitive activity, bolstered their confidence in engaging with texts, and surmounted initial challenges through practice. These conclusions correspond with the extensive literature on metacognitive tactics, indicating that although the initial implementation of these techniques may be difficult, their enduring advantages for reading comprehension and student engagement are significant. These findings highlight the necessity of offering continuous assistance and motivation as students develop the application of metacognitive methods in their reading.

4.4 Discussion

4.4.1 The Effectiveness of Prediction and Self-Questioning

This study's findings indicate that both prediction and self-questioning tactics significantly enhance reading comprehension in ESL learners. The significant enhancement in post-test scores, especially the 14.3% overall rise in reading comprehension, underscores the efficacy of these metacognitive tactics.

Prediction, the act of predicting subsequent content in a book, and self-questioning, which prompts learners to pause and contemplate their comprehension, have been extensively researched and demonstrated to enhance reading comprehension by actively involving students with the material. Recent research indicates that prediction improves reading comprehension by assisting learners in concentrating on significant information and the structure of the text (Afflerbach, 2018; Otero & McNamara, 2018). Likewise, self-questioning has demonstrated efficacy in aiding students to elucidate their understanding, establish links with existing knowledge, and assess their comprehension throughout reading (Pressley et al., 2007; Zhang & Li, 2020).

In this study, students who utilized these tactics exhibited a heightened level of engagement with the content. The rise in post-test scores corresponds with Afflerbach's (2018) findings, which indicate that readers who actively engage with a book through prediction and inquiry tend to retain more information and exhibit enhanced comprehension levels. By posing inquiries regarding the text and anticipating subsequent developments, students seem to cultivate an enhanced sense of agency over the subject, resulting in higher comprehension.

The statistically substantial enhancement in scores, corroborated by the paired sample t-test ($p = 0.003$), emphasizes the efficacy of these measures. The p-value demonstrates that the observed enhancement in reading comprehension is not attributable to chance, so reinforcing the assertion that prediction and self-questioning are efficacious instructional strategies for ESL learners.

4.4.2 Greater Impact on Low Performers

This study's most notable finding is that low-performing students exhibited the most substantial enhancement in reading comprehension, demonstrating a 17.3% increase from pre-test to post-test. This outcome aligns with previous studies, suggesting that struggling readers derive the greatest advantage from systematic reading strategies such as prediction and self-questioning (Zhang & Li, 2020; Otero & McNamara, 2018).

Struggling readers frequently lack the metacognitive awareness required to efficiently process and understand texts. Through the implementation of prediction and self-questioning

techniques, these students are directed to actively oversee and contemplate their grasp, so enhancing their understanding (Swanson & Sachse-Lee, 2000). The significant enhancement noted in the low-performing group can be ascribed to the scaffolding impact of metacognitive methods, which offered a systematic approach for individuals to interact with and analyze the material.

This discovery underscores the significance of integrating metacognitive methods in ESL courses, particularly for underperforming students. Students may encounter difficulties in reading comprehension due to insufficient techniques for text processing; nevertheless, prediction and self-questioning can provide them with vital tools to enhance their reading proficiency. Research by Zhang & Li (2020) and Otero & McNamara (2018) substantiates that low-performing students gain from explicit instruction in metacognitive tactics, since these methods facilitate their development into more engaged and self-aware readers.

4.4.3 Performance of Moderate and High Performers

Although low-performing students exhibited the most substantial improvement, moderate and high-performing students also achieved benefits, albeit to a lesser degree. The moderate group exhibited a 13.9% enhancement, whereas the high-performing group demonstrated a 7.2% increase. These findings correspond with research indicating that high-achieving students continue to gain from metacognitive methods, while the extent of the enhancement may be less significant (Pressley et al., 2007).

For moderate and high-achieving children, these tactics certainly enhance their pre-existing reading comprehension abilities. Although they are proficient in text processing, prediction and self-questioning promote deeper contemplation of the content, resulting in a more nuanced comprehension and potentially enhanced information retention. Prediction can assist even high-achieving students in cultivating critical thinking abilities by prompting them to foresee and evaluate diverse options within the text (Otero & McNamara, 2018).

The minimal enhancement in the high-performing group indicates that their current reading skills are likely effective, and although metacognitive strategies are advantageous, they may require less assistance in these domains. Nonetheless, the ongoing application of these tactics can sustain or further improve reading skills, especially in intricate books that need advanced cognitive and comprehension abilities.

4.4.4 Challenges in Strategy Adoption

While the overall results indicate a beneficial effect, several students encountered initial challenges in acclimating to the tactics, especially self-questioning. According to the qualitative findings, some students said that they initially encountered difficulties in

pausing and reflecting during reading. This aligns with the observations of Veenman et al. (2021), who indicated that students may first oppose metacognitive procedures due to unfamiliarity or discomfort with these methods.

Studies indicate that metacognitive tactics such as self-questioning necessitate students to adopt a more active and reflective reading approach, representing a substantial departure from passive reading practices (Zhang & Li, 2020). For numerous ESL learners, particularly those unaccustomed to actively interacting with literature, this shift might be challenging. Nonetheless, the majority of students ultimately deemed the tactics beneficial and reported heightened confidence in their reading, suggesting that with practice, these strategies may enhance their effectiveness.

This difficulty highlights the necessity of delivering continuous assistance and teaching when implementing these tactics in ESL classes. Educators must be equipped to assist students in implementing these tactics, offering scaffolding and demonstrating their effective application.

4.4.5 Educational Implications

This study's findings have major implications for ESL instruction, particularly in terms of reading comprehension. The findings highlight the necessity of explicitly teaching metacognitive techniques, notably prediction and self-questioning, to help students comprehend complicated texts.

These tactics should be consistently implemented in reading courses, particularly for students who struggle with comprehension. Prediction engages prior knowledge and allows learners to anticipate content, whereas self-questioning increases engagement by encouraging active monitoring and critical thinking. For underperforming pupils, these strategies are critical tools for gradually improving comprehension.

However, learning these talents takes time. Learners who are inexperienced with metacognitive processes may first struggle. As a result, teachers must provide guided practice and frequent feedback to help students use these tactics effectively and independently.

Cognitive Load Theory (Sweller, 1988) provides a useful perspective for understanding these issues. According to the hypothesis, learners have a limited working memory capacity, therefore tasks with high linguistic or conceptual complexity can overwhelm them. Metacognitive methods help to regulate cognitive load by focusing attention on important information, decreasing irrelevant processing, and structuring comprehension.

Prediction helps students set expectations and eliminate ambiguity, but self-questioning sharpens focus and regulates comprehension. Using direct instruction in these strategies, instructors can help

students understand and recall complicated content more successfully.

Integrating technology can increase the effectiveness of these tactics. AI-powered solutions, such as the planned ReadSmart ESL app, can offer individualized practice, real-time feedback, and adaptive help tailored to individual learning needs. These platforms enable students to engage in prediction and self-questioning outside of the classroom, promoting autonomy and lifetime learning practices.

To optimize efficacy, educators must provide adequate practice opportunities, personalized feedback, and encourage student reflection on technique use. This reflective approach increases metacognitive awareness and helps pupils become more adept and autonomous readers.

4.4.6 Future Research Directions

This study has yielded significant insights into the effects of prediction and self-questioning tactics on ESL learners; however, other avenues for future research exist. Future research could investigate the enduring impacts of these tactics on reading comprehension. This would assist in ascertaining whether the enhancements observed in this study are maintained over time. Longitudinal study may elucidate whether these tactics result in enduring modifications in learners' reading habits and attitudes.

Moreover, subsequent research could investigate the interplay of these tactics with additional variables, like learners' motivation, language proficiency, or previous reading experiences. Examining how these elements affect the efficacy of prediction and self-questioning tactics may yield a more refined comprehension of their optimal use and timing.

Finally, investigations into the application of technology to facilitate metacognitive learning, shown as the ReadSmart ESL software, warrant further expansion. Examining the effectiveness of digital tools in facilitating prediction and self-questioning tactics may yield significant insights on the integration of technology in ESL training to improve reading comprehension.

This study's findings demonstrate that prediction and self-questioning tactics significantly enhance reading comprehension in ESL learners, particularly aiding low-performing students the most. The statistical significance of the findings, along with favorable student input, endorses the integration of these tactics into ESL curriculum. Nonetheless, difficulties in implementing these tactics underscore the necessity for continuous support and practice. Subsequent research ought to investigate long-term impacts, the influence of other variables, and the capacity of technology to augment metacognitive learning.

4.5 Technological Applications and Future Directions

The evolution of educational technology offers promising opportunities to improve learning outcomes by integrating AI-powered reading platforms into ESL (English as a Second Language) instruction. The ReadSmart ESL app is a mobile application developed to assist ESL learners by integrating metacognitive strategies such as prediction and self-questioning. This app employs advanced AI to deliver customized, interactive experiences that enhance engagement with reading materials and offer immediate, significant feedback to learners.

Figure 05 (Image – AI)



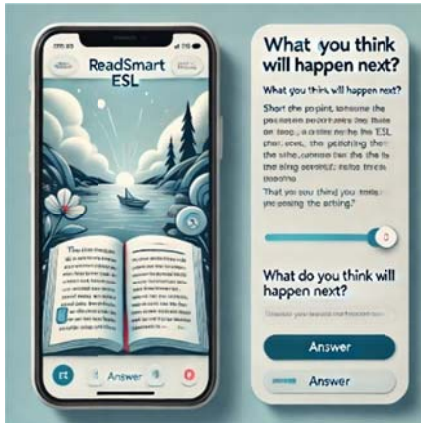
App Concept: "ReadSmart ESL" – AI-Powered Reading Comprehension App

The ReadSmart ESL application aims to improve reading comprehension for ESL learners by employing structured metacognitive tactics. The application seeks to facilitate student engagement with readings and promote reflective knowledge through the utilization of prediction and self-inquiry. These strategies enhance comprehension and foster independent learning through real-time feedback and encouragement. This AI-driven application is especially beneficial for students engaging in independent study beyond the classroom, providing customized support and an extensive educational experience.

Core Features:

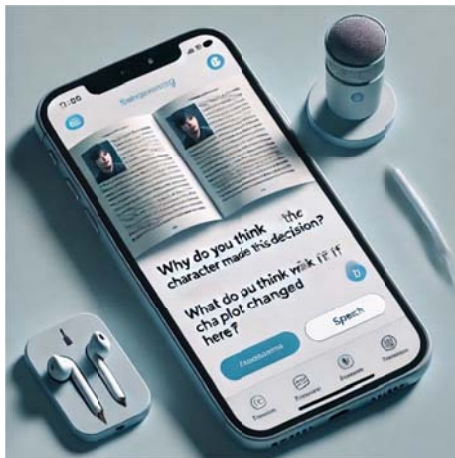
1. **Interactive Reading with Predictive Prompts:** Users receive concise, captivating reading excerpts. At critical junctures in the narrative, the application halts and inquires, "What do you anticipate will occur next?" This prompts learners to actively anticipate the subsequent events or consequences in the passage. The application subsequently evaluates their responses, providing customized recommendations or feedback to facilitate their predictions, so promoting critical thinking and enhanced engagement with the reading.

Figure 06 – (Image – AI)



2. **Self-Questioning Exercises:** Upon finishing a paragraph, the app encourages users to contemplate their comprehension by responding to self-questioning prompts such as, "What motivated the character's decision?" or "What would occur if the plot were altered at this point?" Users may respond in writing or verbally, while the AI offers tailored comments, enhancing metacognitive abilities and encouraging additional contemplation. These tasks are especially advantageous for learners to assess their grasp and reinforce their learning.

Figure 07 – (Image – AI)



3. **Gamification & Progress Tracking:** To sustain learner motivation, ReadSmart ESL integrates gamification elements. Students receive badges for completing reading exercises, responding to prediction prompts, and excelling in comprehension quizzes. The application features a progress dashboard that enables users to monitor advancements in reading comprehension over time, offering visual feedback and promoting ongoing practice.

4. **AI Chatbot for Real-Time Reading Support:** An AI chatbot provides real-time reading assistance by clarifying challenging language, summarizing texts, and creating tailored self-questioning prompts based on the material. This feature emulates the function of an educator or peer, providing tailored, immediate assistance and guaranteeing that learners receive guidance while facing difficulties.

5. **Performance Analytics for Research:** Besides improving learning, the application gathers data on essential metrics such reading length, prediction accuracy, comprehension quiz scores, and the frequency of self-questioning interaction. This data can evaluate the effects of prediction and self-questioning tactics, offering significant insights into learner engagement, strategy efficacy, and areas for enhancement. Researchers can utilize this data to compare the development of users who actively employ metacognitive tactics against those who do not, thereby enhancing the understanding of how these strategies affect reading comprehension outcomes.

Figure 08 – (Image – AI)



Technological Framework and Development Methodology:

No-Code/Low-Code Prototyping:

Platforms like as Thunkable, Adalo, and Glide provide rapid development with AI integration, making them suitable for early testing and user feedback.

Custom Development (for Scalability):

For a more complex solution, consider React Native or Flutter for cross-platform development, with Firebase or Node.js handling backend services like user data and real-time feedback. AI capabilities, such as predictive prompts and chatbot responses, can be powered by the GPT API (OpenAI) or Google NLP.

Sequential Development Procedure:

□ Define Core Features:

Identify necessary functions—AI-based prediction and self-questioning, gamification, feedback, and progress tracking—to align with instructional objectives.

□ Choose Development Path:

Begin with no-code/low-code to get quick feedback, or use bespoke development for complete functionality and control.

□ Design User Interface:

Use Figma or Adobe XD to create an intuitive, user-friendly interface with clear text, compelling visuals, and simple navigation.

□ Develop Core Features:

Include:

- AI-generated prompts for prediction and reflection
- Firebase integration for data storage and real-time feedback
- Gamification options (badges, incentives, and progress tracking)

□ Integrate Analytics:

Track indicators such as reading time, quiz scores, and strategy interaction to evaluate educational effectiveness and conduct research.

□ Beta Testing and Launch:

Test the app with ESL students, collect comments, improve functionality, and then release it on platforms like as Google Play and the App Store.

Research Integration:

The ReadSmart ESL software serves both as a learning aid and a research platform. It captures useful data—reading length, prediction accuracy, and comprehension scores—to aid studies on the efficacy of metacognitive methods. AI-driven feedback offers adaptive learning and individualized support, assisting researchers in determining which approaches work best for particular learner profiles and competence levels. Insights can help modify future iterations and enhance outcomes.

Figure 09 – (Image – AI)



4.6 Implications for Professional ESL Education

The study emphasizes the significance of explicitly teaching metacognitive techniques, particularly prediction and self-questioning, in professional ESL programs. These strategies improve reading comprehension, encourage active participation, and promote independent learning, especially among students who struggle with complicated texts.

Key recommendations for ESL programs:

- Incorporate interactive reading tasks:

Encourage students to predict future material or consider alternate outcomes. This active approach improves understanding and participation.

- Train educators in self-questioning instruction:

Provide teachers with specific tools for guiding students in asking critical questions about the text, allowing them to check comprehension and analyze more thoroughly.

- Leverage technology-based tools:

Outside of the classroom, apps such as ReadSmart ESL provide AI-driven support, rapid feedback, and tailored learning to supplement traditional training.

By incorporating these tactics into the curriculum, ESL programs can help students improve their metacognitive skills, allowing them to read more successfully and independently.

Note:

All the images above are drafts related to the creation of the app. These visuals are based on my personal estimations and ideas on how to develop the relevant app. Please note that these images have been generated using AI technology and are not final representations of the app. They are conceptual in nature and intended for brainstorming and planning purposes.

V. CONCLUSION

This study examined the impact of prediction and self-questioning—two metacognitive strategies—on reading comprehension among ESL learners enrolled in professional diploma programs. The findings indicate a statistically significant improvement in comprehension following strategy-based instruction, with low-performing students showing the greatest gains. These outcomes underscore the effectiveness of metacognitive strategies not only in academic ESL contexts but also in vocational and professional settings.

Quantitative data confirmed a 14.3% average increase in post-test scores ($p = 0.003$), while qualitative data revealed that students experienced greater engagement, retention, and confidence when using the strategies. The findings strongly support integrating metacognitive training into ESL instruction to foster active, reflective, and independent reading behaviors.

Moreover, the study introduces the potential of AI-enhanced platforms like ReadSmart ESL to deliver personalized metacognitive support, particularly in self-directed learning environments.

5.2 Contributions to Research and Practice

This research contributes to the expanding field of ESL metacognition by:

- Extending the application of prediction and self-questioning to professional ESL education.
- Demonstrating strategy effectiveness across proficiency levels, especially for low performers.
- Highlighting the role of technology in supporting metacognitive instruction, with practical design guidance for AI-based tools.

These insights help bridge the gap between theory and practice, suggesting scalable models for blended or digital ESL instruction that integrate cognitive strategy training.

5.3 Recommendations

For Educators

- Provide explicit instruction in prediction and self-questioning, with modeling and guided practice.
- Use authentic, profession-specific texts to contextualize strategy use.
- Facilitate reflective and collaborative activities (e.g., group discussion, think-alouds) that encourage strategy transfer.

For Institutions

- Offer professional development on teaching metacognitive strategies effectively.
- Support classroom implementation with structured curricula and strategy-infused reading tasks.
- Invest in or pilot AI-enhanced tools like ReadSmart ESL to offer supplemental, adaptive instruction.

For Policymakers

- Integrate metacognitive strategies into national ESL standards and curricula.
- Fund long-term research on cognitive strategy instruction in vocational ESL programs.
- Create guidelines for educational technology that promote metacognitive development in diverse ESL populations.

5.4 Limitations

While promising, this study has several limitations:

- **Sample Size and Scope:** The research was limited to 30 participants from a single institution, which constrains generalizability.

- **Short Intervention Period:** Only two sessions were delivered, preventing conclusions about long-term impact.
- **Reliance on Self-Reported Data:** Qualitative insights may reflect subjective bias.
- **Context-Specific Focus:** Findings may not apply to school-aged learners or academic-track ESL students.

5.5 Future Research Directions

To build on these findings:

- Conduct longitudinal studies to assess the retention and transfer of metacognitive strategies over time.
- Examine AI-driven interventions in diverse, self-paced learning environments.
- Explore synergistic effects of combining prediction and self-questioning with other strategies like summarizing and visualization.
- Assess differentiated impact across proficiency levels to tailor instruction accordingly.
- Develop adaptive instructional frameworks for various ESL contexts (academic, vocational, informal).

Final Remarks

This study reinforces that prediction and self-questioning are powerful, adaptable tools that significantly improve ESL learners' reading comprehension. Their integration into professional ESL instruction can promote not only better academic performance but also critical thinking, learner autonomy, and confidence—skills essential for lifelong learning in globalized, information-rich environments.

With proper support and innovation—especially through AI-enhanced tools—these strategies can be scaled to reach diverse ESL populations, ensuring that all learners, regardless of proficiency, are empowered to read with purpose and understanding.

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