Journal of Education and Learning Reviews, 3 (1): January-February 2026 ISSN: 3057-0387
Website: https://so19.tci-thaijo.org/index.php/JELS/about
Article ID: e2774

Patterns of Metacognitive Reading Strategies of Secondary Students in Research-Oriented Learning Contexts

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Received 20/12/2025	Revised 25/12/2025	Accepted 09/01/2026

Abstract

Background and Aim: Metacognitive awareness of reading strategies is crucial for teachers, as it enables them to understand how students plan, monitor, and evaluate their reading. This awareness informs targeted instruction, strategy modeling, and scaffolding for complex texts, supporting deeper comprehension and research literacy. While prior research has extensively examined these strategies among university students in EFL contexts, limited attention has been given to how secondary students apply metacognitive strategies when reading scholarly texts in research-oriented instruction. Addressing this gap, the present study examines the levels and differences in global, problem-solving, and support reading strategies among secondary students enrolled in a research course.

Materials and Methods: A quantitative descriptive design was employed to assess students' metacognitive reading strategies. The sample consisted of 350 students from a secondary institution in Baguio City, Philippines, selected using cluster sampling. The adapted Metacognitive Awareness of Reading Strategies Inventory (MARSI) was used to measure global, problem-solving, and support strategies. Data were collected via a questionnaire administered online with informed consent. Descriptive statistics and Huynh–Feldt–corrected repeated-measures ANOVA were used to analyze strategy levels and differences.

Results: The repeated-measures ANOVA revealed statistically significant differences in the extent to which students employed the three types of metacognitive reading strategies. The analysis indicated that students did not use all strategies equally, but rather demonstrated a distinct hierarchical pattern. Post hoc comparisons showed that problem-solving strategies were used significantly more frequently than global strategies, while global strategies were used significantly more than support strategies (problem-solving > global > support). This pattern highlights that when engaging with scholarly texts, students tend to prioritize immediate comprehension and problem-solving tactics over broader evaluative strategies and supportive practices like note-taking or consulting references, which may impede comprehensive understanding of scholarly texts.

Conclusion: Students actively employ metacognitive strategies when reading scholarly texts, with problem-solving strategies dominant, global strategies moderate, and support strategies least used. The study proposes the Global–Problem-Solving–Support (G–P–S) model as a framework for understanding the interdependence of the different metacognitive strategies for effective reading of scholarly texts. Findings highlight the need for explicit instruction to strengthen global and support strategies. Teachers may design guided research-reading activities to support students in purpose-setting, monitoring comprehension, and synthesizing information, thereby promoting a more balanced use of global, problem-solving, and support reading strategies.

Keywords: Metacognitive Awareness of Reading Strategies, Research Curriculum, Secondary Education, Scholarly Texts, Reading Comprehension, Philippines

Introduction

Metacognitive Awareness of Reading Strategies (MARS) plays a foundational role in research-oriented instruction, where students are expected to engage with complex academic texts, evaluate evidence, and construct new knowledge through inquiry. Research-oriented instruction requires learners to navigate empirical studies, theoretical frameworks, methodological explanations, and discipline-specific literature, which are forms of text that demand advanced comprehension and self-regulated reading behaviors. In such learning environments, MARS becomes essential because it enables students to plan, monitor, and evaluate their reading processes, ensuring that comprehension supports analytical and research tasks.

MARS has been consistently shown to play a crucial role in shaping learners' reading attitudes, motivation, and academic attainment. Studies indicate that students who are more aware of and able to regulate their reading strategies tend to develop more positive attitudes toward reading, as strategic control enhances confidence and engagement with texts (Mahmoodi-Shahrebabaki, 2015). This heightened awareness also strengthens reading motivation, as learners become more purposeful and resilient when encountering challenging academic materials, viewing difficulties as manageable rather

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than discouraging. Beyond affective outcomes, MARS has been empirically linked to academic success; students who effectively employ global, problem-solving, and support strategies demonstrate stronger comprehension and higher academic attainment, as strategic reading enables deeper processing and meaningful learning from scholarly texts (Sheikh et al., 2019).

Moreover, metacognitive reading strategies have been widely recognized as critical contributors to students' reading comprehension, particularly in large-scale international assessments. Using data from the Programme for International Student Assessment (PISA) 2018, Ghimire and Mokhtari (2025) demonstrated that specific metacognitive reading strategies significantly predict both metacognitive reading skills, namely understanding and remembering, summarizing, and assessing credibility, and overall reading achievement among 612,004 fifteen-year-old students across 79 countries. Their cross-national analysis revealed that higher-order, evaluative strategies, such as summarizing in one's own words, checking the accuracy of key ideas, and verifying information sources, were consistently associated with higher PISA reading scores, whereas surface-level strategies were negatively related to performance.

Complementing these global findings, Bernardo and Mante-Estacio (2023) focused on the Philippine context, where students ranked last in PISA 2018 reading, and found that metacognitive reading strategies explained a substantial proportion of variance in Filipino students' English reading proficiency beyond socioeconomic and home background factors. Notably, their results revealed a misalignment between students' perceived usefulness of strategies and their actual effectiveness, underscoring gaps in learners' metacognitive awareness. Together, these studies highlight the pivotal role of effective metacognitive reading strategy instruction and point to the need for targeted, context-sensitive pedagogical interventions to improve reading outcomes.

The integration of Metacognitive Awareness of Reading Strategies (MARS) into research-oriented instruction carries profound implications for learning outcomes, particularly in academic and research-focused contexts. Students with higher levels of metacognitive awareness are better equipped to navigate complex scholarly literature, critically evaluate sources, identify gaps in existing knowledge, and construct well-reasoned arguments in their own research. By actively engaging in planning, monitoring, and evaluating their reading processes, learners can approach texts more strategically, anticipate potential challenges, and select appropriate strategies to ensure comprehension and retention. Beyond improving reading comprehension, the use of metacognitive strategies fosters higher-order cognitive skills, including critical thinking, synthesis of information, and analytical reasoning. It also strengthens research literacy, enabling students to discern credible sources, integrate evidence effectively, and apply knowledge across contexts.

Objectives

This study primarily aims to measure the students' patterns of metacognitive awareness of reading strategies in a research-oriented instruction. Specifically, it seeks to attain the following objectives:

1. To determine the students' level of global reading strategies.
2. To determine the students' level of problem-solving reading strategies.
3. To determine the students' level of support for reading strategies.
4. To determine the difference in the level of metacognitive strategies employed by students.

Literature Review

In the literature, problem-solving strategies consistently emerge as the most frequently employed across learners and contexts, highlighting their central role in addressing comprehension challenges. Hong-Nam (2014) found that high school ELLs in the United States relied heavily on problem-solving strategies to resolve comprehension difficulties as they occurred, such as rereading unclear passages or adjusting reading pace. Similarly, Abu-Snoubar (2017) reported that Jordanian university students favored problem-solving strategies, as did Iranian ESP learners (Khoshsima & Samani, 2015), Turkish EFL university students (Yüksel & Yüksel, 2012), and Indonesian university students (Deliany &

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Cahyono, 2020). Popandopulo et al. (2023) also observed that both secondary and university students predominantly used problem-solving strategies, indicating that learners across educational levels and cultural contexts tend to prioritize immediate comprehension-repair techniques over broader planning or supportive strategies. The consistent dominance of problem-solving strategies suggests that learners naturally gravitate toward strategies that directly address comprehension challenges, yet it also underscores the potential need for balanced strategy instruction that encourages proactive planning and reflective evaluation. This tendency may reflect learners' focus on short-term task completion rather than long-term comprehension development. Consequently, without instructional intervention, students may remain less aware of strategies that support deeper engagement and critical analysis of texts.

Global strategies, which encompass planning, monitoring, and evaluating reading, were generally applied to a moderate extent. Hong-Nam (2014) reported moderate use of global strategies among high school ELLs, while Abu-Snoubar (2017) and Khoshsima and Samani (2015) observed that global strategies were used less frequently compared with problem-solving strategies. Yüksel and Yüksel (2012) found that Turkish university students engaged in global strategies moderately, particularly through activities such as previewing texts, summarizing key points, and adjusting reading rate according to text difficulty. Across these studies, global strategies were less consistently employed than problem-solving strategies, which suggests that students may require explicit guidance in higher-order planning and monitoring techniques to optimize comprehension, particularly when interacting with complex or research-oriented texts. The limited use of global strategies may hinder students' ability to approach reading tasks strategically and purposefully. Strengthening these strategies could support more efficient navigation of academic texts and promote sustained comprehension across extended reading tasks.

Support strategies, including note-taking, paraphrasing, and consulting references, were generally the least utilized, though some variation was evident across contexts. Hong-Nam (2014) found minimal use of support strategies among high school ELLs, whereas Abu-Snoubar (2017) observed that support strategies were used more frequently than global strategies among Jordanian university students, reflecting differences in instructional context or task demands. In Oman, Al-Mekhlafi (2018) reported that support strategies were the most frequently employed, followed by problem-solving and global strategies, indicating that learner characteristics, educational practices, or cultural factors may influence strategy preferences. Deliany and Cahyono (2020) noted that Indonesian university students employed support strategies alongside global strategies extensively, and Popandopulo et al. (2023) highlighted variability in support strategy use across educational levels. These findings demonstrate that while support strategies are often underutilized relative to problem-solving strategies, contextual and instructional factors can significantly shape their adoption, reinforcing the need for targeted teaching interventions that foster comprehensive strategy use. Support strategies can play a crucial role in promoting deeper processing and retention of information when appropriately integrated into instruction. Encouraging their systematic use may help learners externalize cognitive processes and sustain comprehension during demanding academic reading tasks.

In summary, the reviewed studies reveal both consistent trends and notable variations in students' use of metacognitive reading strategies. While problem-solving strategies are generally reported as the most frequently used, the ranking and level of global and support strategies differ across educational contexts, learner characteristics, and instructional settings. The observed variations point to important gaps in the existing literature, particularly regarding how instructional design, learner characteristics, and task demands interact to shape students' metacognitive strategy use. Moreover, there is a noticeable scarcity of research situated in research-intensive and academic literacy–focused settings, where advanced reading tasks place greater demands on strategic and self-regulated reading. Addressing these gaps through further empirical investigation is essential to identify the conditions that foster a more balanced and effective use of global, problem-solving, and support strategies. A deeper understanding of these dynamics can inform evidence-based instructional practices, enabling teachers to design targeted interventions and scaffolding strategies that enhance students' metacognitive awareness. Ultimately, such pedagogical intervention can contribute to improved and stronger engagement with scholarly texts and the development of research literacy necessary for success in higher education levels.

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Conceptual Framework

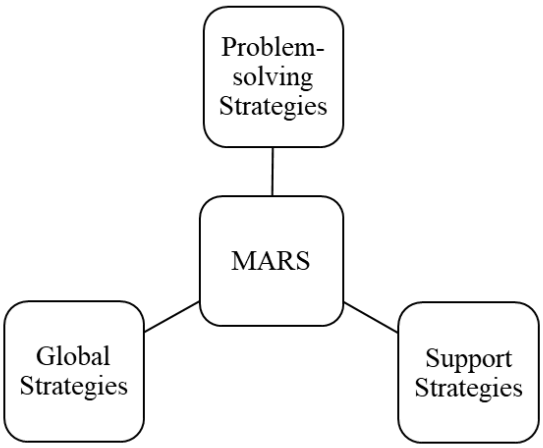

Figure 1: Metacognitive Awareness of Reading Strategies

Figure 1 illustrates the structure of the Metacognitive Awareness of Reading Strategies (MARS) framework. Mokhtari & Reichard (2002) define MARS as the conscious knowledge and self-regulation of the strategies students use before, during, and after reading to comprehend a text. At the center of the figure is MARS, representing learners' overall metacognitive awareness of the strategies they use while reading. Surrounding it are the three major categories of reading strategies that collectively constitute metacognitive awareness, which include global, problem-solving, and support strategies, reflecting the cognitive demands of research-oriented instruction.

Global reading strategies involve planning and monitoring one's overall approach to a text, such as setting a reading purpose, previewing content, activating prior knowledge, and evaluating whether the text meets reading goals. In addition, problem-solving strategies are employed when comprehension breaks down and include adjusting reading speed, rereading difficult sections, focusing more closely on the text, and inferring the meanings of unfamiliar words to restore understanding. Finally, support reading strategies consist of practical techniques that aid comprehension and retention, such as taking notes, paraphrasing, summarizing, highlighting key information, using reference materials, and discussing the text with others.

According to Mokhtari and Reichard (2002, these strategies form an interdependent system: global strategies guide the overall reading process, problem-solving strategies address immediate comprehension challenges, and support strategies consolidate understanding and provide evidence for self-monitoring. When learners integrate all three types effectively, they are able to read more efficiently, comprehend complex materials more deeply, and engage in higher-order academic or research tasks with greater confidence. This synergy highlights the importance of instruction that simultaneously develops planning, monitoring, problem-solving, and support skills, rather than emphasizing any single category in isolation.

Methodology

1. Research Design

This study aims to measure the patterns of metacognitive awareness of reading strategies employed by students in reading scholarly texts. Thus, this study employed a quantitative approach, specifically a descriptive research design. This design describes students' level of global reading strategies, problem-solving reading strategies, and support reading strategies needed in a research-oriented learning environment.

2. Respondents

The study involved students enrolled in a research course at a secondary institution in Baguio City, Philippines. A cluster sampling technique was used, whereby seven sections were randomly selected from the thirty available sections, resulting in a sample of 350 students. This sample size is

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sufficient to represent a population of 1,500 students, as determined using Cochran's formula with a 95% confidence level and an assumed population proportion of 50%.

3. Research Instrument

This study adapted the Metacognitive Awareness of Reading Strategies Inventory (MARSI) developed by Mokhtari and Reichard (2002) to assess students' levels of metacognitive awareness of reading strategies. The instrument was modified to ensure alignment with the reading of scholarly texts in the context of research tasks. Items were paraphrased to reflect this specific context; for example, the original item "I have a purpose in mind when I read" was changed to "I read scholarly texts with a clear research purpose in mind," ensuring that the questions were directly relevant to research-focused reading activities.

In addition, the original 5-point Likert scale was modified to a 4-point scale to address potential central tendency bias, which can occur when respondents select the neutral middle option to avoid making a definitive judgment. The 4-point scale encourages more decisive responses, thereby increasing the discriminative power of the instrument and reducing ambiguity in respondents' answers. The adapted instrument underwent rigorous content validation, achieving an S-CVI of ≥ 0.80, and was subsequently subjected to reliability testing, with Cronbach's alpha exceeding the recommended threshold of 0.70, indicating that the instrument is both valid and reliable for assessing metacognitive reading strategies in a research-focused context.

4. Data Collection Procedure

Before data collection, formal approval was obtained from the school administration to ensure institutional support and adherence to ethical requirements. Students were informed in detail about the purpose of the study, the data collection procedures, and their rights as research participants, including the right to refuse participation or withdraw at any point without any academic consequences. Informed consent was secured from all participants before their involvement, and participation was entirely voluntary, with assurances that no incentives or coercion were involved.

During data collection, a structured questionnaire was administered through an online platform during regular class time to ensure consistent implementation and accessibility. Participants were provided with standardized instructions and sufficient time to complete the questionnaire. After data collection, all responses were anonymized, and no personally identifiable information was retained. The data were stored securely in password-protected files and accessed only by the researchers for research purposes, in strict accordance with established ethical standards to ensure confidentiality and data protection.

5. Data Analysis

The collected data were analyzed using descriptive and inferential statistical techniques. Mean scores were computed to determine the levels of students' metacognitive awareness of reading strategies for each MARS subscale as well as for the overall MARS score. To examine whether there were significant differences in the extent to which students employed the different categories of reading strategies, a Huyhn and Feldt analysis was conducted, since Mauchly's Test showed $p \leq 0.05$. This procedure was appropriate given that the same group of participants responded to all strategy categories, allowing for within-subject comparisons of strategy use. The Huynh–Feldt correction helped reduce the risk of inflated Type I error associated with violations of sphericity in repeated-measures analyses. All statistical analyses were conducted using an appropriate statistical software package, with the level of significance set at $\alpha = .05$.

The following table was used for interpretation:

Weighted Mean	Mean Range	Qualitative Description
4	3.26–4.00	High
3	2.51–3.25	Moderate
2	1.76–2.50	Low
1	1.00–1.75	Very Low

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Results and Discussion

1. Global Reading Strategy

Table 1 Global Reading Strategy

Indicators	Mean
1. I read scholarly texts with a clear research purpose in mind.	3.23
2. I activate my prior knowledge to help me interpret scholarly readings.	3.40
3. I preview research articles (e.g., abstract, headings, and conclusions) before reading in detail.	3.14
4. I evaluate whether the content of the scholarly text aligns with my research purpose.	3.39
5. I initially skim scholarly texts by examining their length, structure, and organization.	3.04
6. I determine which sections of a research text require close reading and which can be read selectively.	3.07
7. I examine tables, figures, charts, and diagrams to enhance my understanding of the research findings.	3.13
8. I use contextual clues within the text to clarify complex ideas or terminology.	3.38
9. I rely on typographical features (e.g., headings, italics, boldface) to identify key concepts and arguments.	3.16
10. I critically analyze and evaluate the arguments, methods, and evidence presented in scholarly texts.	3.17
11. I monitor my understanding when I encounter contradictory or inconsistent information in the text.	3.24
12. I anticipate the focus or argument of a scholarly text as I read.	3.03
13. I move back and forth within the text to identify relationships among concepts, arguments, and findings.	3.15
Overall Mean	3.19

The overall mean for global reading strategies was 3.19, which corresponds to a moderate level of utilization according to the table. This indicates that learners generally engage in global metacognitive behaviors while reading scholarly texts, but such engagement is not yet systematic or consistently high. At the item level, the highest means were for activating prior knowledge (M = 3.40, High), evaluating alignment between the text and research purpose (M = 3.39, High), and using contextual clues to clarify complex ideas (M = 3.38, High). This suggests that learners emphasize meaning-making and relevance evaluation during reading. In contrast, lower means were observed for previewing texts (M = 3.14, Moderate), initial skimming (M = 3.04, Moderate), and anticipating arguments (M = 3.03, Moderate), showing less consistent use of pre-reading and planning-oriented strategies.

The high use of strategies such as activating prior knowledge, evaluating alignment with research purposes, and using contextual clues suggests that learners are capable of engaging deeply with the content and making sense of scholarly texts. However, the lower use of pre-reading and planning strategies, such as previewing texts, initial skimming, and anticipating arguments, indicates a gap in strategic preparation before reading. This implies that instruction should not only reinforce comprehension-focused strategies but also explicitly teach pre-reading and planning techniques. Encouraging learners to preview texts, set reading goals, and anticipate arguments can enhance their overall reading efficiency and help them approach scholarly texts more systematically and proactively, ultimately fostering stronger metacognitive regulation and academic success.

These findings align with prior research indicating moderate use of global strategies, where learners favor comprehension-supporting strategies over deliberate planning (Hong-Nam, 2014; Khoshsima & Samani, 2015). Compared to university-level EFL learners who exhibit high utilization of global strategies (Abu-Snoubar, 2017; Al-Mekhlafi, 2018; Deliany & Cahyono, 2020), the moderate use observed here may be attributed to the respondents being secondary students with limited exposure

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to scholarly texts. Secondary students typically encounter fewer research-oriented readings, often working with simpler or shorter texts that do not require extensive analysis, evaluation, or synthesis. They also have fewer opportunities to practice pre-reading strategies, goal setting, or anticipatory evaluation, which limits their development of systematic global strategy use and reinforces reliance on comprehension-focused strategies.

Overall, the moderate use of global strategies highlights a developmental gap in metacognitive regulation. While learners show emerging awareness of meaning-making and relevance evaluation, their limited use of pre-reading planning suggests strategy deployment remains reactive rather than systematic. This underscores the need for explicit instruction and guided practice in global strategies, such as goal-setting, pre-reading planning, and anticipatory evaluation, to better prepare students for academic reading demands.

2. Problem-Solving Reading Strategy

Table 2 Problem-Solving Reading Strategy

Problem-Solving Reading Strategies	Mean
1. I verify whether my initial interpretations or predictions about the text are accurate.	3.16
2. I read complex research texts slowly and carefully to ensure accurate comprehension.	3.25
3. I consciously refocus when I lose concentration while reading scholarly materials.	3.33
4. I adjust my reading speed based on the complexity of the research content.	3.33
5. When the text becomes challenging, I increase my level of attention and analytical focus.	3.52
6. I pause periodically to reflect on the meaning and implications of what I am reading.	3.18
7. I visualize concepts, processes, or relationships to aid retention and understanding.	3.43
8. When scholarly texts become difficult, I reread relevant sections to improve comprehension.	3.56
9. I infer the meaning of unfamiliar academic terms or concepts using contextual information.	3.08
Overall Mean	3.31

The overall mean for problem-solving reading strategies was 3.31, which corresponds to a High level of utilization. This indicates that learners are capable of recognizing comprehension difficulties and applying strategies to overcome them, reflecting active engagement with scholarly texts. Item-level analysis shows the most frequently used strategies were rereading difficult sections (M = 3.56, High), increasing attention when texts became challenging (M = 3.52, High), and visualizing concepts or processes (M = 3.43, High). Other strategies, such as refocusing attention (M = 3.33, High) and adjusting reading speed (M = 3.33, High), also demonstrate frequent use, indicating learners' ability to adapt their reading behaviors in response to comprehension challenges.

The high use of problem-solving strategies such as rereading difficult sections, increasing attention during challenging texts, visualizing concepts, refocusing, and adjusting reading speed indicates that learners are capable of actively monitoring and regulating their comprehension. This suggests they possess a functional level of metacognitive awareness and can respond effectively to immediate difficulties in understanding scholarly texts. However, the reliance on reactive strategies highlights the need to complement these skills with proactive metacognitive practices, such as pre-reading planning, goal setting, and predicting content, to foster more strategic and self-directed reading. Educators should provide structured opportunities to integrate problem-solving strategies with planning and evaluation, enabling learners to approach complex academic texts more systematically and efficiently.

These results are consistent with previous studies that highlight problem-solving strategies as the most frequently employed metacognitive reading strategies (Hong-Nam, 2014; Abu-Snoubar, 2017; Yüksel & Yüksel, 2012; Popandopulo et al., 2023). The prominence of problem-solving strategies among respondents may be due to the complex nature of scholarly texts, which naturally trigger

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adaptive responses. In other words, when learners encounter texts that contain dense information, unfamiliar vocabulary, complicated arguments, or unfamiliar structures, they are compelled to adjust their reading behaviors to maintain comprehension. This includes rereading difficult sections, slowing down, visualizing concepts, or refocusing attention. The inherent difficulty of the texts acts as a prompt for students to apply problem-solving strategies, making these adaptive behaviors a direct response to the cognitive demands of academic reading rather than a habitual or pre-planned strategy.

In sum, the high utilization of problem-solving strategies indicates that secondary students possess functional metacognitive awareness and actively regulate comprehension. However, the predominance of reactive strategies highlights the need to integrate problem-solving with proactive planning and evaluative reflection to promote more balanced and strategic reading development.

3. Support Reading Strategy

Table 3 Support Reading Strategy

Indicators	Mean
1. I take structured notes while reading research texts to support comprehension and synthesis.	2.75
2. When a scholarly passage is difficult, I read it aloud to enhance understanding.	3.03
3. I summarize key points of the text to reflect on its main arguments and findings.	3.01
4. I discuss scholarly readings with peers or mentors to validate and deepen my understanding.	2.97
5. I highlight, underline, or annotate important information in research texts for later reference.	3.14
6. I consult reference materials (e.g., dictionaries, glossaries, methodological sources) to clarify meaning.	2.89
7. I paraphrase scholarly ideas in my own words to ensure accurate understanding.	3.20
8. I generate research-oriented questions that I seek to answer while reading scholarly texts.	3.15
Overall Mean	3.02

The overall mean for support reading strategies was 3.02, which corresponds to a Moderate level of utilization. This suggests that learners occasionally use external aids and reflective techniques to aid comprehension, but not consistently. The most frequently employed strategies were paraphrasing scholarly ideas (M = 3.20, High), generating research-oriented questions (M = 3.15, Moderate), and annotating important information (M = 3.14, Moderate), indicating efforts to consolidate meaning and engage with key concepts. Conversely, structured note-taking (M = 2.75, Moderate) and consulting reference materials (M = 2.89, Moderate) were less commonly used, suggesting limited familiarity with systematic documentation.

This pattern implies that although learners are beginning to engage with supportive reading practices, their use of these strategies remains developmental and inconsistent. The limited reliance on structured note-taking and reference consultation suggests that students may not have received explicit instruction or sufficient opportunities to practice organizing information systematically and integrating supplementary sources into their reading processes. Without guided practice, learners are less likely to internalize these strategies as habitual tools for academic reading and research. As a result, instructional interventions should deliberately focus on developing support reading strategies through explicit modeling, scaffolded activities, and repeated application across subjects. Emphasis should be placed on teaching structured note-taking techniques (e.g., outlining, concept mapping, and synthesis tables), establishing effective annotation systems that promote critical engagement with texts, and encouraging strategic use of reference materials to clarify concepts and verify understanding.

These findings align with previous research showing that support strategies are generally used less frequently than problem-solving strategies (Hong-Nam, 2014; Khoshsima & Samani, 2015; Yüksel & Yüksel, 2012). Compared with university students, secondary students' moderate use of support

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strategies may be attributed to their exposure to simpler texts that place fewer demands on synthesis, documentation, and extended analysis. At the secondary level, reading tasks often emphasize basic comprehension rather than critical engagement, reducing the need for strategies such as structured note-taking, summarization, and consulting reference materials. In addition, support strategies are not always explicitly taught or systematically reinforced in secondary curricula, limiting students' opportunities to practice organizing information, integrating external sources, and reflecting on texts in depth. As a result, secondary students tend to rely on more immediate, comprehension-focused strategies rather than developing habitual use of support strategies required for academic and research-oriented reading.

Overall, the moderate use of support strategies indicates that secondary students are in the early stages of developing skills to externalize, organize, and extend understanding of scholarly texts. While emerging engagement is seen through paraphrasing, annotation, and question generation, the limited use of structured strategies suggests selective rather than habitual application. Explicit instruction in note-taking, source consultation, and reflective strategies can enhance research literacy and promote deeper engagement with academic texts.

4. Difference in the Patterns of Strategy Use

Table 3: Difference in the Patterns of Strategy Use

Huynh–Feldt ANOVA Results

Source	SS	df	MS	F	p	Partial η²
Groups	10.88	1.87	5.83	58.85	< .001	0.16
Error	55.27	558.31	0.10			

Post Hoc Tukey-HSD Results

Group	Mean	SE	df	Q-crit	Crit
Global Strategies	3.19	0.02	598	3.31	0.06
Problem-solving Strategies	3.31				
Support Strategies	3.02				

The ANOVA result shows $F(1.87, 558.31) = 58.85$, $p < 0.001$, indicating a statistically significant difference in the extent to which students employ different reading strategies. This means that at least some of the strategy categories (Global, Problem-Solving, Support) are used at significantly different levels by the students. In addition, the partial Eta² = 0.164 suggests that approximately 16% of the variance in students' reading strategy use is accounted for by the type of strategy. According to conventional benchmarks, this represents a substantial effect, indicating that the type of reading strategy has a significant impact on students' reading behavior. The pattern of strategy use suggests that students adjust their reading strategies depending on the demands of the text.

Furthermore, the Tukey-HSD analysis showed that all pairwise differences are statistically significant. Problem-solving strategies (M = 3.43) are employed most frequently, particularly when texts are complex or challenging, such as rereading difficult passages, visualizing concepts, or reflecting on their meaning. Global strategies (M = 3.19) are consistently applied to plan, monitor, and evaluate comprehension, helping students align reading with their research purpose. Support strategies (M = 3.02) are used more selectively, often when additional scaffolding is needed, such as taking notes, summarizing, or consulting references.

The hierarchical pattern of reading strategy use observed in the present findings is strongly corroborated by prior research, which consistently reports significant differences in the extent to which learners employ the three categories of metacognitive reading strategies. Across multiple studies, problem-solving strategies emerge as the most frequently utilized category, reflecting learners' tendency to engage actively with texts by rereading difficult sections, adjusting reading speed, and intensifying attention when comprehension difficulties arise (Hong-Nam, 2014; Khoshsima & Samani, 2015; Deliany & Cahyono, 2020; Popandopulo et al., 2023; Yüksel & Yüksel, 2012). This dominant reliance on problem-solving strategies indicates that learners prioritize immediate, text-based regulation

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of comprehension, responding reactively to challenges rather than preemptively planning their reading process.

Global strategies, encompassing planning, monitoring, and purpose-setting activities, are typically reported as the second most frequently employed category. This suggests that learners exhibit moderate engagement in overarching metacognitive behaviors, such as previewing texts, setting reading goals, and evaluating the relevance of information during reading (Hong-Nam, 2014; Khoshsima & Samani, 2015; Popandopulo et al., 2023). While these strategies support more strategic and efficient reading, their moderate use indicates that learners may not consistently integrate proactive planning and monitoring into their reading processes, potentially limiting their ability to anticipate comprehension difficulties or fully organize information from complex texts.

In contrast, support strategies, which include techniques such as note-taking, summarizing, paraphrasing, and consulting reference materials, are most often ranked lowest in frequency of use. Several studies have reported that learners rely less on these strategies compared to problem-solving and global strategies (Hong-Nam, 2014; Yüksel & Yüksel, 2012). Although exceptions exist, such as Al-Mekhlafi (2018) and Abu-Snoubar (2017), where support strategies were used more frequently, the prevailing trend highlights a tendency for learners to prioritize strategies that directly address immediate comprehension needs rather than those that require reflective post-reading activities or external resource integration. Limited use of support strategies may affect learners' ability to consolidate understanding, retain information, and engage in critical analysis of scholarly texts, which are essential skills in research-oriented learning contexts.

Knowledge Contribution

The G-P-S Model in Reading Scholarly Texts

This study revealed that students predominantly rely on problem-solving strategies compared to global and support strategies. While this demonstrates that learners are capable of addressing immediate comprehension difficulties, the imbalance in strategy use suggests potential limitations in their reading of scholarly texts. Problem-solving strategies alone focus on repairing comprehension breakdowns as they occur, but without sufficient use of global strategies to plan, monitor, and evaluate reading, students may approach texts in a reactive rather than systematic manner. Similarly, limited use of support strategies, such as note-taking, paraphrasing, or consulting references, may hinder the consolidation of understanding. Scholarly texts are inherently complex, often requiring anticipatory planning, critical evaluation, synthesis, and integration of multiple ideas. Therefore, the dominance of problem-solving strategies, when not balanced with global and support strategies, may reduce the overall effectiveness

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of reading scholarly texts, limiting comprehension depth and the ability to engage in higher-order research or academic tasks.

To address this imbalance, the G-P-S Model visually represents the interdependence of global, problem-solving, and support reading strategies, emphasizing that these strategies should function as a coordinated system rather than in isolation. In an interdependent system, the three types of strategies operate synergistically to facilitate comprehension, creating a cohesive, adaptive, and metacognitively aware approach to reading. Global strategies, including planning, previewing, and monitoring comprehension, guide the overall reading process, helping learners establish clear objectives, anticipate potential challenges, and evaluate the relevance and significance of information within scholarly texts. When comprehension difficulties arise, problem-solving strategies, such as rereading complex sections, adjusting reading speed, or seeking clarification, allow learners to respond effectively and maintain understanding. At the same time, support strategies, including note-taking, paraphrasing, and annotating key ideas, help consolidate learning, reinforce memory, and provide a tangible record of engagement with the text.

The G-P-S Model, therefore, provides a practical framework for teachers to design instruction that balances the three strategy types, promotes strategic and reflective reading behaviors, and supports the development of research literacy in secondary learning contexts. By using the model as a guide, teachers can move beyond isolated strategy instruction and instead scaffold students' metacognitive development through integrated, research-oriented reading tasks. For example, instruction can explicitly embed global strategies through pre-reading activities that emphasize goal setting, text previewing, and anticipatory questioning; reinforce problem-solving strategies during reading through guided monitoring, think-alouds, and comprehension checks; and strengthen support strategies through structured note-taking templates, annotation protocols, and reflective synthesis tasks. In secondary learning contexts, where students are still developing research literacy, the G-P-S Model can help teachers align strategy instruction with the cognitive demands of scholarly texts, fostering more systematic, reflective, and autonomous reading practices.

Recommendations

Teachers may incorporate guided research-reading training programs within the research curriculum to foster a balanced and strategic use of global, problem-solving, and support reading strategies among students. Such programs can provide structured and scaffolded opportunities for learners to practice and internalize these strategies in the context of authentic research tasks. For instance, global strategies can be emphasized through exercises that train students to plan their reading, set clear research purposes, monitor comprehension, and evaluate the relevance of information within scholarly texts. Problem-solving strategies can be reinforced by teaching learners how to recognize comprehension breakdowns and respond adaptively, such as through rereading, adjusting reading speed, or increasing focus on challenging passages. Meanwhile, support strategies can be developed by guiding students in effective paraphrasing, annotating key ideas, generating research-oriented questions, and consulting references to consolidate understanding and facilitate knowledge construction.

By integrating these strategies into a systematic training program, teachers can encourage students to move beyond ad hoc reading practices and adopt more deliberate, reflective, and independent reading behaviors. Such instruction not only enhances immediate comprehension of scholarly texts but also builds students' long-term metacognitive awareness, enabling them to transfer these skills across disciplines and research contexts. Furthermore, guided practice allows teachers to diagnose strategy use gaps, provide timely feedback, and model the integration of different strategy types, thereby fostering a more comprehensive approach to academic reading. Over time, students develop greater confidence in tackling complex texts and become more capable of self-assessing their comprehension and strategy use. In addition, this approach promotes a culture of reflective learning, where students actively monitor their progress and adjust strategies to optimize understanding. Ultimately, incorporating guided research-reading training in the curriculum equips students with the strategic, self-regulated reading skills necessary for successful engagement with complex texts, supporting both their academic performance and research literacy development.

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