

ENHANCING READING COMPREHENSION SKILLS FOR NON-ENGLISH MAJORS THROUGH META-COGNITIVE STRATEGIES AT A VIETNAMESE UNIVERSITY

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ABSTRACT

At a Vietnamese university, this study examines how teaching metacognitive strategies affects non-English majors' reading comprehension abilities. One hundred first-year students are split evenly into experimental and control groups in this mixed-methods study, which is based on the theories of self-regulated learning, cognitive load, and metacognitive awareness. While the control group adhered to the regular curriculum, the experimental group received customized training in reading strategy planning, monitoring, and evaluation. The experimental group's reading skill improved statistically significantly, with a substantial effect size (Cohen's $d = 1.84$), according to quantitative data from pre- and post-tests. Improved student autonomy, motivation, and confidence were seen in qualitative data from surveys and interviews, as was improved strategic reading behavior. The results provide significant support for the inclusion of meta-cognitive strategy education in English reading curricula, despite certain enduring obstacles, such as language restrictions and initial difficulties implementing techniques under time constraints. According to the study's findings, teaching non-English majors to read systematically and strategically is a very good way to boost their comprehension and encourage independent study.

Keywords: Meta-cognitive strategies, Reading comprehension, EFL learners, Non-English majors, Learner autonomy.

1. INTRODUCTION

Meta-cognitive strategies (MCS) have been extensively studied and used as a successful way to improve reading comprehension skills in recent years. MCS is a crucial tool that helps students organize, track, and assess their reading activities, according to [1]. These techniques assist students in identifying reading challenges, becoming more conscious of their own thought processes, and modifying their methods accordingly. Building on this framework, [2] broadened the conversation by showing how techniques like questioning, clarifying, and prediction enhance reading efficiency while also fostering learner autonomy and critical thinking abilities. Students who use these techniques to interact with texts gain confidence in their reading skills, which enhances comprehension and memory.

In the Vietnamese education system, the idea of meta-cognition has been getting more and more attention in recent years. [3] stressed that meta-cognition is not just a way to help people learn, but also a key way to improve academic achievement, especially in today's schools. Even if it could be helpful, using MCS in reading comprehension lessons for students who aren't majoring in English is still not well understood. Many college courses still use old approaches that emphasize on passive reading instead than actively interacting with the text. Because of this,

students may not get enough practice using meta-cognitive processes that could greatly improve their ability to understand what they read.

This study's goal is to find out how MCS can help Vietnamese university students who aren't majoring in English improve their reading comprehension skills. The research aims to improve students' reading skills and provide specific teaching methods that promote a student-centered learning environment by using a practical approach. The study hopes to help with the continual development of new ways of teaching that meet the needs of modern education and society by doing this. The study's main goal is to answer the following questions: 1) *What challenges do non-English major students face in developing their English reading comprehension skills?* 2) *To what extent does the use of meta-cognitive strategies (MCS) enhance the reading comprehension skills of non-English major students?*

2. LITERATURE REVIEW

2.1. Theoretical framework

Modern learning and meta-cognition theories explain how MCS help non-English majors grasp what they read in this study. These students struggle to read academic books because they lack language and information processing skills. By examining various key theoretical perspectives, this study reveals how MCS helps people engage with texts, understand them, and learn on their own.

The Self-Regulated Learning (SRL) Model [4] is one of the most important theories that supports the idea that MCS helps with reading comprehension. This model stresses that students should take an active role in controlling their own learning by setting goals, keeping track of their progress, and thinking about how well they are doing. Self-regulated learners use MCS to check how well they grasp what they read, find out where they are having trouble, and change their approach as needed.

Another relevant theory is Cognitive Load Theory [5], which describes learning resource allocation. Intrinsic cognitive load from novel terminology and complicated grammatical structures makes foreign language reading harder. Ineffective reading strategies or distractions may also add cognitive load. MCS including planning (skimming a text before reading), self-monitoring (testing for understanding while reading), and assessment (summarizing essential points) assist learners manage cognitive load. These tactics allow pupils to concentrate on comprehension rather than linguistic obstacles.

In addition to these models, the Meta-cognitive Awareness Inventory (MAI) [7] can assess meta-cognition. Meta-cognition includes knowledge of cognition (awareness of one's learning processes) and regulation of cognition (the ability to govern and change learning procedures). Not only must EFL learners master efficient reading skills, but they must also regulate their reading behaviors to maximize comprehension. This comprises self-questioning, paraphrasing, and context-inference. Non-English majors may struggle with academic texts and need structured methods to traverse them, therefore cognition regulation is crucial.

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2.2. Previous studies

MCS has been extensively studied for its effect on reading skills, particularly in EFL situations. Planning, monitoring, and assessing are known to encourage active reading and self-regulation. MCS has been shown to improve reading comprehension in pupils [10], [11].

Reading comprehension skills are not primarily based on vocabulary or grammar in language teaching and learning, especially EFL. Students must actively govern how they process and engage with written texts. MCS are vital to helping students build capacity. Planning, monitoring, regulating, and evaluating learning involves mental processes. They assist readers become more self-directed, strategic, and responsive to textual problems. Two leading language learning strategy researchers stressed that explicit and systematic MCS education improves readers' control. This includes setting reading goals, choosing tactics, checking comprehension, and changing reading behavior when problems develop. Write questions before reading to explain goals, highlight essential topics while reading to stay focused, and summarize after reading to reinforce learning. These tactics help readers traverse texts and understand them better [12].

MCS-using learners are better at understanding difficult texts and retaining learning over time, according to [13] and [14]. These students regularly self-monitor, identify comprehension gaps, and adjust their methods. They actively engage with the text to satisfy their learning needs. [13] stressed that strategic readers "read to learn," meaning they have defined goals and can successfully extract information.

[9] showed how competent readers change their meta-cognitive methods to each reading job, expanding our understanding. Effective readers adapt to the reading situation, whether that means slowing down to understand an academic piece or skimming a conversation for meaning. This capacity to switch techniques is crucial for EFL learners, who often confront foreign language or complex structures. These students may read passively, miss details, or misinterpret the text without meta-cognitive awareness.

[10] MCS should be integrated into reading instruction, according to [15]. He believes teachers should supply reading materials and help students think while reading and evaluate their

understanding afterward. Think-aloud protocols, reading journals, self-assessment checklists, and peer conversations help students build meta-cognitive awareness. These strategies teach students when to skim, when to read intensively, and how to spot and rectify mistakes [11].

In conclusion, MCS improve short-term reading and long-term learning. They help students manage challenging information and develop lifetime learning abilities through self-regulation, reflection, and active text engagement. Meta-cognitive reading practices can improve language acquisition in today's educational environment, which emphasizes autonomy and adaptability.

3. RESEARCH METHODOLOGY

This mixed-methods study examined how meta-cognitive strategy education affected Tan Trao University non-English majors' reading comprehension. The research uses quantitative and qualitative methodologies to determine how these strategies affect students' reading performance and engagement with texts. The quantitative component uses two intact first-year courses in a quasi-experimental approach. Participants are split into two. Meta-cognitive reading skills are explicitly taught in weekly English 2 courses for the experimental group ($n = 50$). These structured tactics focus on planning, monitoring, and assessing before, during, and after reading. While the control group ($n = 50$) follows the regular English 2 curriculum without strategy-based training.

This study gave both experimental and control groups pre- and post-tests to quantify the effects of meta-cognitive strategy education on reading comprehension. These assessments target the A1 to A2+ competency range based on CEFR descriptors, which matches the course's learning objectives and students' language levels. SPSS (Statistical Package for the Social Sciences), a popular statistical software for assessing learning outcomes, will be used to evaluate pre- and post-test quantitative data [16]. This systematic examination evaluates the intervention's influence on students' reading comprehension statistically and practically.

To complement the quantitative findings, the study includes a qualitative component involving semi-structured interviews with a subset of 8–10 students from the experimental group. These interviews aim to explore students' perceptions of the usefulness and applicability of the strategies, their actual use of the strategies during reading activities, and their personal reflections on motivation, challenges, and learning outcomes. The transcribed data were analyzed using thematic coding, following [17] six-step framework for thematic analysis: (1) familiarization with the data, (2) generating initial codes, (3) searching for themes, (4) reviewing themes, (5) defining and naming themes, and (6) producing the report. This systematic approach ensures that the analysis captures both recurring patterns and nuanced individual perspectives.

This study supplemented experimental data with two questionnaires—a pre- and post-questionnaire before and after the instructional intervention—to better understand students' learning experiences. These devices collected quantitative and qualitative data to assist the mixed-methods design and improve experimental and control group interpretation. Pre-, post-, and semi-structured interview qualitative data will be examined using NVivo, a qualitative data analysis software for systematic coding and interpretation of big datasets [18].

To ensure a comprehensive and credible evaluation, this study adopts a triangulation approach that integrates quantitative and qualitative findings, thereby strengthening the overall validity of the results [19], [20].

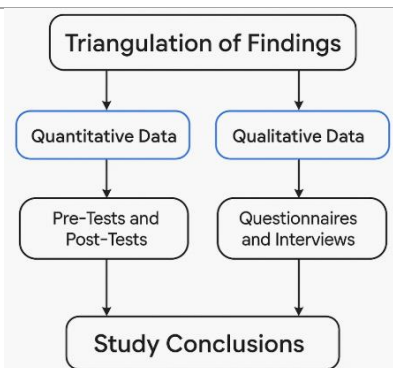


Figure 1. Triangulation of findings: integration of quantitative and qualitative data

4. FINDINGS AND DISCUSSION

4.1. Results of the Pre- and Post-intervention Tests

4.1.1. Descriptive statistics of Pre- and Post-test scores

The study used Cambridge A2-level reading comprehension examinations (maximum score 25) with 15 multiple-choice and 5 short-answer questions to assess student reading comprehension abilities. Pre- and post-intervention examinations were given to experimental and control groups. The descriptive data are in Table 1.

Table 1. Descriptive statistics of Pre- and Post-test Scores for the experimental and control groups

Group	Test	N	Mean Score (/25)	Standard Deviation (SD)	Minimum	Maximum
Experimental	Pre-test	50	12.48	2.13	8	17
	Post-test	50	18.26	2.35	13	23
Control	Pre-test	50	12.66	2.08	9	17
	Post-test	50	13.84	2.17	9	18

Mean scores improved significantly for the experimental group, from 12.48 out of 25 in the pre-test, which corresponds to A1–low A2, to 18.26 out of 25, nearing A2+. This 5.78-point rise, or 23.1% of the total score, shows considerable reading comprehension increases after the intervention. However, the control group only improved by 1.18 points, or 4.7% of the overall score, from 12.66 to 13.84. This shows that non-strategy-based students made little reading comprehension growth.

The experimental group's post-test standard deviation rose from 2.13 to 2.35, showing more score variability. This shows that while most students improved, some made even greater gains, possibly due to their engagement and effectiveness in implementing the MCS taught during the intervention. The control group had a relatively constant standard deviation, shifting just from 2.08 to 2.17, indicating low performance fluctuation and highlighting the stasis in growth among students who did not receive explicit strategy-based training.

In terms of score ranges, the experimental group showed a marked expansion from 8–17

at the pre-test to 13–23 at the post-test, with the highest score increasing by 6 points. This notable shift indicates that several students were able to achieve results approaching the A2+ benchmark, demonstrating substantial individual improvement and highlighting the effectiveness of the meta-cognitive strategy intervention for diverse learners. Conversely, the control group exhibited a nearly static score range, shifting only slightly from 9–17 to 9–18, which further underscores the lack of meaningful progress in the absence of explicit strategy instruction.

These data demonstrate that MCS integration into reading instruction helped the experimental group make significant progress toward CEFR A2+ competency. Traditional methods alone did not increase reading comprehension in the control group, which continued to receive conventional training.

4.1.2. Paired-Sample t-test results and effect size

The experimental and control groups' pre- and post-test scores were compared using paired-sample t-tests to determine if the reading comprehension improvements were statistically significant. Educational intervention research commonly uses this test to track group changes [21]. Cohen's d was determined to quantify effect size, which indicates the intervention's practical value beyond statistical significance [22].

Table 2. Paired-Sample t-test results for Pre- and Post-test scores

Group	Mean Difference	t-value	df	p-value	Cohen's d
Experimental	5.78	18.42	49	< .001	1.84
Control	1.18	4.12	49	< .001	0.41

The experimental group had a significant boost in reading comprehension scores ($t(49) = 18.42$, $p < .001$) and a large effect size (Cohen's $d = 1.84$), indicating the practical effectiveness of meta-cognitive technique education [22]. Although the control group showed a significant difference ($t(49) = 4.12$, $p < .001$), the effect size was small to moderate (Cohen's $d = 0.41$), suggesting that the observed improvement was likely due to natural progress or test familiarity rather than instructional changes. These findings show that metacognitive tactics in reading instruction improved reading comprehension in the experimental group. The intervention's substantial effect size supports its use to improve non-English major students' reading outcomes.

4.1.3. Comparison of Post-test results between the experimental and control groups

Analyzing the experimental and control groups' post-test scores with an independent-samples t-test helped assess meta-cognitive strategy education. The statistical significance of the post-intervention performance difference between groups is determined by this analysis

Table 3. Independent-Samples t-test results for Post-test scores

Group	N	Mean Score (/25)	SD	t-value	df	p-value	Cohen's d
Experimental	50	18.26	2.35				
Control	50	13.84	2.17	10.19	98	< .001	2.02

An independent-samples t-test compared experimental and control group post-test results to assess meta-cognitive strategy education. This analysis determines if the two groups' post-intervention performance differs statistically. This shows that targeted MCS integration caused the experimental group's significant improvement, not chance or broad instructional exposure. Conventional instruction fails to improve non-English major students' reading skills, as seen by the control group's slow growth. These findings support prior research showing that MCS training improves EFL reading skills [10], [23]. They support the idea that specific instruction in planning, monitoring, and assessing methods helps students approach reading tasks more successfully and enhance comprehension.

4.2. Questionnaire findings

4.2.1. Students' initial reading habits and strategy awareness (Pre-questionnaire)

The pre-questionnaire was given to both groups at the start of the semester to assess students' English reading habits, reading comprehension issues, and MCS awareness. Most students reported only reading English texts for assignments. A large percentage of respondents used word-by-word translation and dictionary use as their main reading strategies, indicating a lack of experience with higher-level comprehension approaches including previewing, predicting, and self-monitoring.

Students most often reported insufficient vocabulary, trouble grasping main ideas, and inference difficulties as reading comprehension challenges. Planning (setting reading goals), monitoring (testing comprehension during reading), and assessing (reflecting on understanding after reading) were not well-known. Few pupils consciously used these reading skills. These findings imply that before the intervention, students' reading was mostly passive and surface-level, lacking strategic and reflective techniques for deeper comprehension. This baseline data emphasizes the need to teach meta-cognitive strategies in reading courses to improve students' text engagement.

4.2.2. Changes in strategy use and perceptions after the intervention (Post-questionnaire)

The post-questionnaire at the end of the 10-week intervention revealed changes in students' reading practices and views after MCS integration. The experimental group showed a significant increase in active and strategic reading compared to their pre-questionnaire responses.

Table 4. Changes in reported use of meta-cognitive strategies (Experimental group)

Strategy Type	Pre-questionnaire (%)	Post-questionnaire (%)
Planning (e.g., previewing texts, setting reading goals)	18%	72%
Monitoring (e.g., self-questioning, checking comprehension)	22%	76%
Evaluating (e.g., summarizing, reflecting after reading)	14%	68%
Translation-focused reading	81%	32%

Table 4 shows that students were more likely to examine texts, set goals, and predict content before reading with planning tactics up from 18% to 72%. Monitoring tactics increased from 22% to 76%, suggesting students regularly evaluated their understanding while reading by rereading challenging passages or asking themselves questions. Summarizing key ideas and reflecting on comprehension increased from 14% to 68%, showing a greater tendency to consolidate and appraise information after reading.

Conversely, pupils using word-for-word translation declined from 81% to 32%, indicating a shift from passive to active reading. In the experimental group, 87% of students said the tactics were “helpful” or “very helpful” in boosting reading comprehension, and 82% said they felt more confident reading English literature. Several respondents said the training increased their drive and autonomy, as they felt more in control of their reading. In comparison, the control group showed only small changes: translation-focused reading remained prevalent (74% post-intervention) while strategic techniques were rarely used (less than 30%). These data show that explicit MCS education increased students' knowledge, adoption, and perceived usefulness of these methods, leading to more successful and independent reading.

4.2.3. Students' reported challenges and motivation

The post-questionnaire and semi-structured interviews revealed student problems and motivations for meta-cognitive strategy education, as well as changes in reading strategy use. Despite greater strategy use, many experimental students struggled to apply them. In the post-questionnaire, 63% of students cited low vocabulary as their biggest understanding barrier, while 48% cited difficulties making inferences and connecting ideas in texts. Even after the intervention, 41% of students had trouble focusing on longer reading assignments.

Interviews indicated further nuances: several students said planning and monitoring tactics were helpful but time-consuming to adopt during timed reading activities. One student said, “*At first, using these strategies slowed me down because I had to stop and think about each step, but over time it became easier and felt more natural.*” Another noted that they needed more work outside the classroom to reinforce these methods independently.

Strategy-based training increased motivation and self-confidence in pupils despite these limitations. Eighty-four percent of experimental group respondents felt “more confident” reading English literature than before the course, and 79% were more motivated to read outside of class. Interview feedback showed that the methods' progress and clear guidance increased their English engagement. One student said, “*Now I feel like I have a clear plan when I read. Not feeling lost makes me want to read more.*”

In comparison, control group responses showed minimal motivation or involvement change. Most pupils still relied on translation and found reading “difficult and frustrating” without clear solutions.

Table 5. Reported challenges and motivational factors in reading after the intervention (Experimental group)

Theme	Sub-category	% of Students Reporting	Representative Quotes
Challenges	Limited vocabulary knowledge	63%	"Sometimes I cannot fully understand the main ideas because there are too many unfamiliar words."
	Difficulty making inferences	48%	"It is hard to guess the writer's meaning between the lines, even with the strategies."
	Maintaining focus in longer texts	41%	"I get distracted when reading long passages, even though I try to plan and monitor my reading."
	Time-consuming to apply strategies	36%	"At first, using the strategies slowed me down, but later it became easier and more natural."
	Lack of practice outside the classroom	32%	"I don't have much time to practice reading on my own, so I forget to use the strategies sometimes."
Motivational Factors	Increased confidence in reading	84%	"Now I feel like I have a clear plan when I read. I don't feel lost anymore."
	Greater motivation to engage with texts	79%	"The strategies make reading less scary. I want to try reading more often."
	Feeling of progress and achievement	76%	"Seeing my scores improve motivates me to keep using the strategies."
	Sense of autonomy in reading	72%	"I feel like I can control my reading process and know what to do when I get stuck."

While vocabulary restrictions and method integration under time constraints persisted, explicit MCS training greatly increased students' motivation, confidence, and readiness to read. Structured strategy training and guided practice helped students overcome feelings of hopelessness related with second-language reading, supporting meta-cognitive awareness's motivational benefits [23].

4.3. Semi-structured interview findings

4.3.1. Students' experiences in applying planning, monitoring, and evaluating strategies

The semi-structured interviews showed that experimental group students had favorable experiences planning, monitoring, and assessing their reading activities. These examples show how explicit MCS training affected students reading.

Many students said planning before reading helped them set objectives and expectations. Predicting content by previewing titles, headings, and images and setting goals were mentioned. One student said, *“Before, I just started reading without thinking, but now I take a few minutes to look at the text and decide what to focus on. It simplifies reading.”*

Students noted how monitoring their reading comprehension helped them to spot problems and fix them immediately. They self-questioned, reread difficult passages, and adjusted their reading pace. One participant said, *“Do I understand this part?’ or ‘What does the writer mean?’” It keeps me focused and not lost.”*

Students stressed synthesizing essential points and revisiting the material after reading when evaluating strategies. They said these methods improved comprehension and retention. One student said, *“Summarizing after reading is very useful. It helps me verify my comprehension and recall key points.”*

Figure 2 shows the percentage of experimental students that actively used all three techniques after the intervention. The most common technique was monitoring (76%), followed by planning (72%), and assessing (68%).

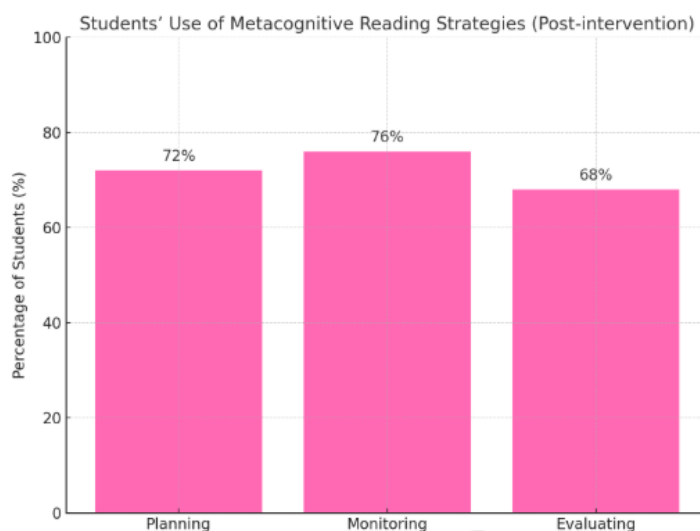


Figure 2. Percentage of students in the experimental group applying meta-cognitive reading strategies post-intervention

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4.3.2. Students' perceptions of the benefits of meta-cognitive strategy instruction

The interviews revealed how students felt meta-cognitive strategy education affected their reading comprehension and learning. Students in the experimental group rated the tactics highly for their cognitive, emotional, and motivational benefits.

Students noted that the tactics greatly increased their comprehension of textual key concepts and supporting details. Planning helped them focus on important material, while monitoring and evaluation helped them uncover comprehension gaps and self-correct. One student said, *“Before, I often read without understanding the main point. With these methods, I can rapidly discover the key idea and understand the text.”* Skimming for pertinent information and prioritizing key topics helped several students read more efficiently.

Students noted the intervention's psychological benefits. They said clear techniques for approaching texts boosted their English reading confidence. One participant said, *“I used to feel anxious when reading English because I didn't know how to start. Now I have a plan and am more confident.”* After the intervention, 79% of experimental students were more motivated to read English texts, indicating that the tactics made reading less daunting.

Meta-cognitive instruction gave students autonomy, another motif. They felt more capable of establishing goals, guiding their learning, and checking progress without the teacher. One participant said, *“These strategies help me take control of my reading. Instead of waiting for the teacher to explain everything, I can solve problems myself.”*

Table 6. Students' perceptions of the benefits of meta-cognitive strategy instruction

Themes	Specific Benefits	% of Students Reporting	Representative Quotes
Enhanced Comprehension	Improved ability to identify main ideas and details	82%	<i>“Before, I often read without understanding the main point. Now I can quickly find the main idea and make sense of the text.”</i>
Reading Efficiency	Better time management and targeted reading	74%	<i>“I can skim for key information instead of translating every word. It saves time and helps me focus.”</i>
Increased Confidence	Greater self-assurance when reading English texts	84%	<i>“I used to feel anxious when reading English, but now I have a plan, and I feel more confident.”</i>
Higher Motivation	Greater willingness to engage with English texts	79%	<i>“The strategies make reading less scary. I actually want to read more now.”</i>
Greater Autonomy	Improved self-direction and independence in reading	72%	<i>“I can control my reading process and solve problems myself instead of always waiting for the teacher.”</i>

These findings suggest that meta-cognitive strategy instruction not only improved students' reading skills but also fostered a more positive and proactive approach to learning, aligning with previous studies highlighting the link between meta-cognitive awareness and increased learner autonomy [10], [23].

4.3.3. Difficulties encountered in applying these strategies

Several important problems were found during MCS deployment to improve reading comprehension among non-English major students. Many pupils had insufficient vocabulary and grammar ability, making it impossible to forecast topic or evaluate understanding. Students have trouble making predictions and judging their comprehension when they struggle with word definitions or sentence patterns [10]. Students used to teacher-centered learning were confused when asked to monitor and change their reading processes. Time, practice, and instructor assistance are needed to switch from passive to active learning [24].

Many university English courses cover many language skills in four periods per week. Limited MCS practice time prevented students from learning these skills [25]. MCS were taught in class, but individual practice materials were rare. Students have little options to reinforce these skills outside of class, restricting their autonomy [26]. Some students felt anxious reading English academic materials, which demotivated and lowered their confidence. Critical thinking strategies like questioning or analyzing content were difficult and scary, preventing regular use [4]. These issues show that MCS integration into reading comprehension training is not possible alone. Instead, students need skill training, methodological changes, and a supportive learning environment to apply these tactics.

4.4. Discussion

4.4.1. Interpretation of quantitative and qualitative findings

The findings from both quantitative and qualitative data provide compelling evidence that explicit instruction in MCS significantly improved the reading comprehension performance of non-English major students in the experimental group.

From a quantitative perspective, pre- and post-test comparisons showed that the experimental group's reading scores improved by 23.1%, from A1–low A2 to A2+ on the CEFR scale. Significant improvement ($t(49) = 18.42$, $p < .001$) and big effect size (Cohen's $d = 1.84$), confirming the intervention's practical effectiveness. However, the control group improved just 1.18 points (Cohen's $d = 0.41$), possibly due to classroom exposure rather than specific strategy education. An independent-samples t-test showed a significant difference between the two groups at the post-test stage ($t(98) = 10.19$, $p < .001$, Cohen's $d = 2.02$), highlighting the strength of meta-cognitive strategy training on reading outcomes. Meta-cognitive strategy training aids EFL learners, as shown by prior research [10], [23].

Qualitative questionnaire and semi-structured interview results, which reveal students' perspectives, enhance these advances. Key tactics including planning (18% to 72%), monitoring (22% to 76%), and evaluating (14% to 68%) increased significantly after the questionnaire. Students noted that these tactics helped them actively connect with texts, minimize translation-focused reading (81% to 32%), and gain reading confidence. Strategy use helped participants identify core ideas, manage reading time, and self-correct when comprehension breakdowns occurred, according to interview data.

The intervention also seemed to motivate. In the experimental group, 84% felt more competent reading English texts and 79% were more motivated to read them. Many said the tactics gave them a “clear plan” for tackling texts, minimizing fear and increasing learning autonomy. According to [24] and [26], explicit meta-cognitive education enhances cognitive development and learner independence.

However, the post-questionnaire and interviews showed that students struggled with vocabulary (63%), inferences (48%), and focus during lengthier reading assignments (41%). Some also said utilizing methods during timed reading took time and effort to become instinctive. These challenges suggest that MCS were beneficial, but ongoing support and practice are needed to maximize their long-term efficacy [25].

The integration of quantitative and qualitative findings shows that meta-cognitive strategy instruction improved students' measurable reading performance, strategic awareness and reading behaviors, confidence, motivation, and learner autonomy. However, the problems noted suggest that instructional refinement and scaffolding are needed to guarantee consistent and sustainable adoption of these tactics.

4.4.2. Comparison with previous studies on meta-cognitive strategies

The findings of this study are consistent with and further extend the growing body of research on the role of MCS in improving reading comprehension among EFL learners.

First, the experimental group's large reading performance improvement supports [10], who noted that specific training in planning, monitoring, and assessing helps learners regulate their cognitive processes and improve comprehension. Similar to Anderson, students in this study found that previewing materials, creating reading goals, and self-questioning helped them focus and feel confident when reading.

Students' motivational gains match [23], who found that strategy-based training improves comprehension, reduces anxiety, and improves reading attitudes. This study found that 84% of students were more secure reading English texts and 79% were more motivated to read following the intervention. These psychological and motivational benefits demonstrate meta-cognitive instruction's impact beyond cognitive skill development.

This intervention had a considerable effect size (Cohen's $d = 1.84$ for the experimental group), similar to earlier meta-cognitive strategy studies. When EFL students were explicitly taught prediction, self-monitoring, and summary, [27] found similar improvements in reading comprehension. This analogy shows that explicit inclusion of such tactics into classroom instruction consistently improves EFL learning across situations.

Similarly, students in this study struggled with vocabulary and strategy application under time restrictions, as in earlier research. Without proper linguistic proficiency and ongoing practice, learners may struggle to internalize and employ MCS [25]. This highlights the necessity of scaffolding and strategy reinforcement beyond initial training sessions.

This study significantly supports the literature that meta-cognitive strategy education improves reading comprehension and learner autonomy in EFL situations. It adds to the area by showing how these tactics improve cognitive performance and learner attitudes in Vietnamese universities.

4.4.3. Pedagogical implications for teaching reading to Non-English major students

This study has numerous important implications for enhancing English reading instruction for non-English majors in Vietnamese universities.

First, reading courses should emphasize explicit meta-cognitive technique instruction. Teaching pupils to plan, monitor, and assess their reading processes improved the experimental group's reading performance significantly. Teachers should openly model these tactics, provide guided practice, and gradually encourage students to use them independently rather than depending

exclusively on teacher-centered instruction or text-focused exercises. This approach can assist children move from passive, word-by-word reading to active, purposeful text engagement, following [10]'s strategy-based instruction suggestions. This study significantly supports the literature that meta-cognitive strategy education improves reading comprehension and learner autonomy in EFL situations. It adds to the area by showing how these tactics improve cognitive performance and learner attitudes in Vietnamese universities.

Second, reading teaching should promote self-directed learning and reflection. In this study, students who set objectives, self-monitor, and evaluated their comprehension reported enhanced confidence, motivation, and learning control. Reflective practices like post-reading notebooks, self-assessment checklists, and peer conversations can improve these skills and encourage autonomous reading [26]. The goal of lifelong learning is supported by this student-centered approach.

Third, individual issues require scaffolding and differentiated help. Customized education is needed since students struggle with vocabulary, inference, and strategy application under time pressure. Instructors should combine vocabulary-building and strategy training with scaffolded exercises that rise in complexity. Strategies, annotated readings, and online practice platforms can assist students consolidate their information outside of class.

Fourth, collaborative learning improves MCS application. Group conversations, peer teaching, and collaborative problem-solving projects allow students to express their ideas, share strategies, and learn from each other. Such activities can increase meta-cognitive awareness and make strategy application easier.

Last, curriculum designers and institutional policymakers should encourage comprehensive meta-cognitive strategy education in English programs. This study emphasizes the necessity for non-English major-specific training and teaching materials to embed strategy-based methods throughout several courses rather than treating them as standalone interventions. Instructors also need professional growth to implement meta-cognitive strategy training [24].

This study shows that meta-cognitive strategy education improves reading comprehension, learner autonomy, and motivation. These tactics can improve reading education for Vietnamese non-English majors by integrating them into classroom practises and providing ongoing support.

5. CONCLUSION

The findings emphasize the need to teach meta-cognitive strategies in everyday reading courses. Meta-cognitive training helps students regulate their cognitive processes, enabling more strategic and successful reading [24]. Student strategy application should be scaffolded from teacher modeling to guided practice to student independence.

Reflective activities like post-reading notebooks, self-assessment checklists, and peer discussions can help students understand and regulate [24]. Collective learning methods like group discussions and peer teaching allow students to share strategies, voice their thoughts, and learn from one other, improving comprehension and meta-cognition [23].

Teachers should include vocabulary-building assignments and pre-reading help like glossaries and leading questions to address chronic issues like inadequate vocabulary and inferences. To promote higher-order reading skills alongside comprehension, [28] suggest vocabulary enrichment and inferencing.

Curriculum designers and institutional policymakers should incorporate meta-cognitive strategy education across English courses. Strategy education must be consistent and structured

for long-term internalization [26]. This could involve creating reading course modules that focus on planning, monitoring, and assessing techniques with clear objectives, instructional materials, and proficiency-based assessment tools.

Furthermore, curriculum design should prioritize learner autonomy. Students should set reading goals, track their progress, and reflect on their learning to develop lifetime learning skills [24]. Instructor professional growth is crucial. Teachers need pedagogical expertise and practical instruments to implement strategy-based education. Institutional workshops, collaborative training, and resource-sharing platforms can help teachers teach meta-cognitive strategies. Finally, educators and researchers must collaborate to evaluate and improve courses to meet students' changing needs and current higher education demands.

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