



Exploring Metacognitive Reading Strategies for Comprehending English Scientific Texts: A Study of Libyan Medical Students

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استراتيجيات القراءة فوق المعرفية لفهم النصوص العلمية باللغة الانجليزية : دراسة على
طلبة الطب الليبيين

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Abstract

The current study investigates the use of metacognitive reading strategies in understanding scientific publications in English among Libyan medical students at medicine faculty in Misurata city. It aims to examine what strategies are used among Libyan medical students, as well as the impact of these strategies on their comprehension abilities. An additional objective is to assess how aware Libyan students are of metacognitive reading strategies. A mixed method approach is designed through a questionnaire. The questionnaire includes both closed-ended items for statistical analysis and open-ended questions to elicit more detailed insights on students' awareness of using metacognitive strategies. The participants were 92 students enrolled at the faculty of medicine. The questionnaire is designed in two versions, English and Arabic, to avoid any difficulties in interpreting the items. The results reveal that medical students tend to prefer certain strategies over others to understand scientific texts, and these preferences vary among students. The results highlight important implications for EFL teachers and pedagogical education; teachers could train students to use a variety of reading strategies that foster deeply deeper engagement in reading.

Keywords: metacognitive strategies, reading, comprehension, medical students.

المخلص

تتناول هذه الدراسة استخدام استراتيجيات القراءة فوق المعرفية في فهم المنشورات العلمية باللغة الإنجليزية لدى طلبة الطب الليبيين في كليات مختلفة بمدينة مصراتة. وتهدف إلى استقصاء الاستراتيجيات التي يوظفها الطلبة، ومدى تأثير هذه الاستراتيجيات على قدراتهم في الاستيعاب. كما تسعى إلى تقييم وعي الطلبة استراتيجيات القراءة فوق المعرفية. وقد تم اعتماد منهجية مختلطة من خلال استبيان يضم أسئلة مغلقة لتحليل إحصائي، وأخرى مفتوحة لتحصيل رؤى أكثر تفصيلاً حول وعي الطلبة باستخدام هذه الاستراتيجيات. شارك في الدراسة 92 طالباً من كلية الطب. ولتفادي أي صعوبات في تفسير البنود، أعد الاستبيان بنسختين: عربية وإنجليزية. أظهرت النتائج أن طلبة الطب يميلون إلى تفضيل بعض الاستراتيجيات على غيرها عند قراءة النصوص العلمية، وأن هذه التفضيلات تختلف من طالب إلى آخر. وتبرز النتائج

دلالات تربوية مهمة لمعلمي اللغة الإنجليزية بوصفها لغة أجنبية؛ إذ يمكن للمعلمين تدريب الطلبة على استخدام مجموعة متنوعة من استراتيجيات القراءة التي تساعدهم على التعمق في النصوص والانخراط الفعّال في عملية القراءة.

الكلمات المفتاحية: استراتيجيات ما وراء المعرفة، القراءة، الفهم، طلاب الطب.

Introduction:

In Libya, English is taught as a foreign language, and reading English texts is important for academic and scientific purposes. Although English is learned as a subject in Libyan schools, it continues to be important for university education level. Medical Colleges in Libya are required to accomplish a number of English courses as compulsory subjects in order to successfully gain access to new information for academic purposes. Students are also expected to read scientific publications that are in the English language. Improved reading abilities enable them to achieve and develop skills in all other academic subjects.

Medical students at Misrata University study a general English subject through two courses related to medical terminology and basic English grammar. Teachers of English in medical colleges focus more on medical terminology and abbreviations than on grammar rules, reading skill and sentence structure. Adams and Patterson (2008) stated that some medical students encounter many struggles when reading in English because there was not much emphasis placed on the English language during their secondary schooling and early studies in medicine.

Medical curricula are among the most difficult ones, especially for students who do not speak the language (Ahmed et al., 2015). Students must strengthen their skills and focus on reading techniques, such as skimming to obtain the main ideas and general understanding. This includes easy access to words and main headings, determining the general structure and organization of the text, and noting the graphics, pictures, and other visual aids that convey meaning. Meta-cognition, in general, is the ability for students that helps them think about their own thinking processes (Flavell, 1979). This skill involves being conscious of one's own knowledge, experiences, and cognitive strengths and weaknesses, as well as having the ability to plan, monitor, and control thought processes in mind. It means that medical students are aware of what they know and don't know and can successfully organize and direct their own thinking. Meta-cognition is considered an essential skill for effective learning and creative problem solving, as it helps students understand and improve their cognitive processes, leading to enhanced academic and professional performance, (Mokhtar & Reichard, 2002).

Regarding reading and comprehension skills, Wade et al. (1990) stated that metacognitive strategies involve activities designed to control, monitor, and evaluate the reading process. They may contain planning reading tasks, monitoring that information is understood, and analyzing new information with background knowledge.

Previous studies have focused on reading strategies and comprehension among major students of the English department. One of these studies (e.g., Almushwat, 2024) indicated a strong reliance on such strategies to enhance understanding and academic achievement. Moreover, another study was conducted by Ahmed et al. (2015) in the Libyan context that examined medical students' perspectives on comprehending English medical publications. The findings were mixed: some medical students declared that language served as a barrier to understanding, others reported that it did not constitute an obstacle for their academic achievements.

Statement of the Problem

In Libyan medical universities, scientific and academic materials are commonly written in English, making reading skill an extremely crucial requirement for students. Despite years of English instruction in Libyan schools, many students in universities struggle to comprehend English publications due to many reasons such as limited vocabulary, unfamiliar language

structures and the lack of explicit training in reading strategies. The language barrier adds to these difficulties, as most scientific literature is written in English.

The current study addresses the limited research on metacognitive reading strategies among Libyan medical students, whose English comprehension is vital to achieve success. While previous studies have examined general reading difficulties in Libyan context, little attention has been given to how medical students employ metacognitive strategies to overcome barriers in reading scientific texts. By exploring the use and the awareness of these strategies, the study seeks to fill the gap and provide insights for teacher training and medical students support.

Research objectives

The present study investigates which metacognitive reading strategies are used among Libyan medical students at medicine college in Misurata and the impact of these strategies on their comprehension ability. An additional goal is to assess how aware Libyan students are of meta-cognitive reading strategies and to identify which ones they have used.

Research Questions

The current study is an attempt to answer the following questions:

1. What is the most prominent type of meta-cognitive reading strategy employed by Libyan medical students when reading scientific materials?
2. Does the students' understanding of scientific texts in English have a significant connection to their awareness of meta-cognitive reading strategies?

Literature Review

Reading strategies have been classified variously by different scholars. Based on three broad categories, Chamot (1987) introduced twenty-two reading strategies that can be used in reading, categorized into *metacognitive*, *cognitive*, and *social and affective* strategies. According to McNamara (2007), he presented seven reading strategies, Activating, Inferring, Monitoring, Questioning, Summarizing, Visualizing and organizing. Moreover, Adamas and Patterson (2008) summarized other general types of reading strategies and techniques, which are skimming and scanning. He clarified Skimming as a reading technique for quick reading which aims to get an overview of the organization of the text and its main idea from a passage in a book. Scanning on the other hand is a reading technique used to find specific information and grasp the main idea.

Several studies have demonstrated that applying reading strategies is important for boosting students' comprehension, but many students lack the essential skills to effectively learn and utilize these strategies. As Anderson et al. (1985) state, reading is fundamental life ability. It is a cornerstone for a child's success in school and, indeed, throughout life. Without the capability to read well, opportunities for personal development and job achievement will inevitably be lost. In spite of its significance, reading is one of the most challenging realms in the educational system. The constantly increasing demand for high levels of literacy in our technological society makes this issue even more pressing (Snow et al., 1998).

Metacognitive Reading Strategies

Chamot (1987) proposed some reading strategies that can be used in reading, categorized under three categories, namely: metacognitive, cognitive, and social affective strategies. The metacognitive category allows readers to think about the reading process, plan for reading, monitor the reading task, and evaluate how well one has read (Schramm, 2008; Sheorey & Mokhtari, 2001). Another view is that metacognitive reading strategies involve activities designed to control, monitor, and evaluate the reading process (Brown et al. 1995). These may

include planning reading tasks, monitoring that information is understood, and integrating new information with background knowledge.

Several scholars have attempted to classify meta-cognitive reading strategies. Drawing from Brown, Palinscar, and Armbruster's (1984) research, they implemented six meta-cognitive strategies deemed essential to a student's comprehension of text: (1) over-viewing, (2) activating relevant background knowledge, (3) allocating attention to main ideas, (4) critically evaluating, (5) monitoring comprehension, and (6) predicting and drawing inferences.

Also, Pressley et al. (1992) applied a slightly different set of strategies, namely promoting summarization, prediction, visualization, thinking aloud, story grammar analysis, text structure analysis, prior knowledge activation, and self-questioning. The following table shows metacognitive reading strategies proposed by Nguyen (2016), in his article "Reading Strategy Taxonomies" he reviewed a number of studies that were conducted on reading strategies in second/foreign language to improve readers' comprehension. Some of the most common strategies and uses are presented as follow:

Table 1. Metacognitive strategies classifications

STRATEGY	USAGE
1 Over-viewing	used at the first stage of reading process when the reader plan to monitor the texts
2. Problem-Dealing	used when the reader meets difficulties while reading
3 Supporting	used when the reader needs aids to understand the text
4 Guessing and Prediction	used during the reading process when the reader tries to understand the texts without any aids
5.Information-dealing	used when the reader wants to check their understanding for long sentences and paragraphs

Note: adopted from (Nguyen ,2016, p.181)

To sum up, the effective use of metacognitive strategies helps readers become more active, engaged, and strategic in their approach to understanding written material. This can lead to improved reading comprehension, retention, and overall academic performance.

Related Studies

Malcom (2012) conducted a study examining Arab medical students' awareness of changes in reading strategies. The sample included first-year to third-year students from a medical university as a sample. The study employed a mixed-method approach in collecting the data to explore the relationship between level of proficiency and reading strategies awareness. Results showed that metacognitive awareness of using reading strategies increased progressively from the first to the third year, while reliance on translation use declined. Nevertheless, some students still relied on memorization for exam preparation.

Another study conducted by Dardjito (2019) aimed to determine how aware EFL students in an Indonesian context are of reading strategies. The findings revealed no significant correlation between meta-cognitive reading awareness and academic reading comprehension in first-year university students in EFL contexts, suggesting limited application due to English vocabulary mastery and the need for further research.

Another related study was conducted by Alhumsi (2021), it investigated medical students' reading ability to comprehend and process new medical information depending on reading strategies. The study shed light on the importance of metacognitive strategies. The findings revealed that students who employed strategies like monitoring, evaluating sources and predicting were more successful in understanding medical publication.

While previous studies have examined general reading difficulties and strategies, little attention has been given to what metacognitive strategies Libyan medical students employ to overcome barriers in reading scientific texts. By exploring the use and the awareness of these strategies, the study seeks to fill the gap and provide insights for teacher training and medical students.

Methodology

The current study employs a mixed-method approach to investigate medical students' awareness regarding their use of some reading strategies to comprehend texts. According to Terrell (2012), mixed method approach integrates both quantitative and qualitative methods and this allows the researcher to obtain a more comprehensive picture by investigating the issue from various dimensions. For this reason, the researcher has designed a questionnaire that includes both closed-ended items (for quantitative analysis) and open-ended questions (for qualitative analysis).

Participants and Setting

Participants in this study were 92 Libyan medical students studying in the Faculty of Medicine at Misrata University. The sampling frame is the student population of one college without dividing it into clusters or strata, thus the technique of choosing the participants is a simple random sampling.

Research Instruments

The closed-ended questionnaire contains twenty-three items categorized into five groups (see Appendix A). The first group has 5 items (1 to 5) focused on “overviewing strategy.” The second group includes items 6 to 8, which share the same strategy of “guessing strategy.” The third group has items 9 to 14, focusing on “problem-solving strategies.” Furthermore, the fourth group has items 15 to 20 marked on “information-handling strategies.” The fifth group, which is the last, focuses on “supporting strategies.” The questionnaire was provided in two languages, English and Arabic, to avoid any misunderstanding and to ensure authentic data. The open-ended questions contain three questions designed to elicit more information about their experiences in comprehending scientific materials, the reasons behind their choice of certain strategies, and to provide a deeper understanding of the research problems and validate the results of the research questions.

Data Collection.

After gaining consent from the dean of the faculty, data were gathered by means of an online questionnaire via Google form. It was designed and sent to medical students across all five years in a telegram group, and the items were translated into Arabic for better understanding.

Data Analysis

The results of the questionnaire were analyzed with the help of a statistical professional. This analysis included percentages of the agreement and disagreements, and their means presented in tables. The open-ended questionnaire were analyzed qualitatively using thematic analysis to gain more perspectives from the medical students' experiences,

Ethical Considerations

Participants had the opportunity to remain anonymous and withdraw at any time. They were informed that taking part in this study would not affect their grades or performance in any course.

Results

The findings obtained from the questionnaire were analyzed quantitatively using percentages and means. The data were then presented for each group of strategies in the form of tables, followed by a brief description for each table.

The questionnaire used a four-point scale for each statement (agree, strongly agree, disagree, and strongly disagree), giving participants the chance to indicate how much they agreed with the statements. By analyzing each statement individually based on the percentage of students who agreed or disagreed, the researcher decided to combine the scale points “agree” and “strongly agree” into one point, as shown in the tables. Likewise, the points “disagree” and “strongly disagree” were combined.

To explain the infrequent, moderate, and frequent use of metacognitive strategies by students, the scale was divided into three segments based on the means of the students’ choices. A score of 0.66 was accepted to divide the mean scores into three parts. This means that strategies with means between 0 and 0.66 were considered infrequently used, those between 0.67 and 1.33 were considered moderately used, and those between 1.34 and 2.0 were considered frequently used strategies, as reported by the students.

The following tables present the data and results of each strategy. They show the percentages and means of each statement in the questionnaire from 1 to 23, classified into five groups according to the metacognitive reading strategy taxonomy

Table 2. *The Agreement, Disagreement and the Mean of Over-viewing Strategy*

OVER-VIEWING STRATEGY	A/SA (%)	D/S (%)	Mean
1. I glanced at the article headings before beginning reading	95%	5%	1.89
2. I read the paper from start to end	65%	35%	1.31
3. I skip some sections of the article	63%	37%	1.29
4. I read the article jumping from one section to another	49%	51%	0.97
5. I only underline and focus on the main ideas	93.0%	7%	1.86
Overall, of agreement and disagreement	73.1%	26.9%	1.46

Note: A/SA: agree and strongly agree. D/SD: disagree and strongly disagree

Table 2 presents the percentage of medical students’ use of the overviewing strategy . A notably high percentage of agreement (95%), was recorded for statement 1, with a mean indicating frequent use of this strategy. The lowest agreement percentage (49%) was associated with statement 4, which yielded a mean of 0.97. The overall mean for the agreement and disagreement regarding the use of this strategy was 1.46, indicating that the overviewing strategy is frequently used by students.

Table 3. *The Agreement, Disagreement and the Mean of Guessing Strategy*

GUESSING STRATEGY	A/SA (%)	D/SD (%)	Mean
6. Sometimes, I could predict the idea from what followed	82.5%	17.5%	1.65
7. I tried to remember what I knew about the subject	98%	2%	1.93
8. I had to read other pages to understand this one	75.5%	24.1%	1.51
Overall of agreement and disagreement	85.3%	14.7%	1.69

Note: A/SA: agree and strongly agree. D/SD: disagree and strongly disagree

Table 3 demonstrates the percentage of the use of the guessing strategy by medical students. A high percentage of agreement, 98%, is reported for (statement 7) with a mean indicating frequent use. The overall mean for the agreement and disagreement regarding the use of this strategy is 1.69, which means that the guessing strategy is also frequently used by students.

Table 4. *The Agreement, Disagreement and the Mean of problem-dealing Strategy*

PROBLEM-DEALING STRATEGY	A/SA (%)	D/SD (%)	Mean
9. If I encountered difficulty, I take notes	80.8%	19.2%	1.63
10. If I find difficulty in understanding words, I look them up in the dictionary	65%	35%	1.3
11. If I find difficulty in understanding words I look them up on the internet.	92.5%	7.5%	1.85
12. If I find difficulty in understanding words I asked somebody.	51.7%	48.3%	1.03
13. If I find difficulty in understanding words, I underline them.	82.5%	17.5%	1.66
14. If I find difficulty in understanding words I assume their meaning and keep on reading.	85%	15%	1.7
Overall of agreement and disagreement	87.5%	12.5%	1.78

Note: A/SA: agree and strongly agree. D/SD: disagree and strongly disagree

Table 4 presents the percentage of medical students' use of the problem-dealing strategy. A notably high level of agreement (92%) was reported for statement 11, with a mean indicating frequent use of this strategy. The lowest agreement percentage (51.7%) was associated with statement 12, with a mean of 1.03. The combined mean score for the agreement and disagreement was 1.78, indicating that the problem-dealing strategy is frequently used by students.

Table 5 *The Agreement, Disagreement and the Means of Information Dealing Strategy*

INFORMATION DEALING STRATEGY	A/SA (%)	D/SD (%)	Mean
15. If I couldn't understand the topic, I slowed down the speed of my reading.	95%	5%	1.9
16. If I couldn't understand the topic I read the passage again with more attention.	93.5%	6.5%	1.87
17. If I can't understand the topic, i read the passage out loud and draw a map in mind.	61.6%	38.4%	1.23
18. If I couldn't understand the topic I skip the passage and continue reading.	17.5%	82.5%	0.35
19. If I couldn't understand the topic I stopped reading altogether.	18%	82%	0.36
20. If I couldn't understand the topic I asked for help.	49%	51%	0.99
Overall of agreement and disagreement	55.7%	44.3%	1.14

Note: A/SA: agree and strongly agree. D/SD: disagree and strongly disagree

As shown in Table 5, a high percentage of agreement (95%), was reported for statement 15, with a mean indicating moderate use of information dealing strategy. The lowest

agreement corresponds to statement 18: “If I couldn’t understand the topic, I skip the passage and continue reading,” with a mean of 0.35. The overall mean for the agreement and disagreement regarding the use of this strategy is 1.14, which means that the information-dealing strategy is moderately used by students.

Table 6. *The Agreement, Disagreement and the Mean of Supporting Strategy*

SUPPORTING STRATEGIES	A/SA (%)	D/SD (%)	Mean
21. After reading I quickly reviewed the paper again	74.1%	26.9%	1.48
22. To support my understanding I usually write a summary for each topic	59.5%	40.5%	1.19
23. I checked my ideas with a classmate and internet websites	70.9%	29.1%	1.41
Overall of agreement and disagreement	68.1%	31.8%	1.36

Note: A/SA: agree and strongly agree. D/SD: disagree and strongly disagree

Table 6 presents the percentage of the use of the supporting strategy by medical students. A high percentage of agreement (74.1%) was reported for statement 21, with a mean score indicating frequent use. The lowest agreement percentage (59.5%) associated with statement 22 with a mean of 1.19. The overall mean for the agreement and disagreement regarding the use of this strategy is 1.36, which means that the supporting strategy is frequently used by students. The following summary table presents the overall mean, as well as the percentages of agreement and disagreement for all five strategies used in the questionnaire of the current study.

Table 7. *The Overall Agreement, Disagreement and Mean of the Five Strategies*

STRATEGIES	A/SA (%)	D/SD (%)	Mean
Over-viewing strategy	73.1%	26.9%	1.46
Guessing strategy	85.3%	14.7%	1.69
Problem-dealing strategy	87.5%	12.5%	1.78
Information dealing	55.7%	44.3%	1.14
Supporting strategy	68.1%	31.8%	1.36

Note: A/SA: agree and strongly agree. D/SD: disagree and strongly disagree.

Qualitative Results

The open-ended questionnaire contains 3 questions (Appendix B), and it is designed to answer the second research question; “*Does the students' understanding of scientific texts in English have a significant connection to their awareness of metacognitive reading strategies?*” The responses are coded under the following categories: Comprehension challenges (lexical or syntactic), type of strategy (planning, evaluating or monitoring), awareness (explicit or implicit), and impact on comprehension (positive or negative). The obtained qualitative data was categorized into three different themes:

Understanding scientific texts. The students faced some difficulties with the language itself, which seems normal because English is considered a foreign language for Libyan medical students. One student replied, “In terms of language, I think it is difficult to understand but we get used to it and get familiar.” In addition, another student mentioned, “I and many students find our curriculum fully translated, especially in the beginning.”. One difficulty faced by some students is “Spelling”, they found it challenging to recognize some words correctly. As one

student stated, “One of the things that takes the longest time is memorizing the spelling of words, especially medical words.”

Some other students find it difficult to understand and comprehend some technical vocabulary and jargon; “I am searching for foreign and Arab platforms to get a lot of explanations for new terms” They mentioned that they used some strategies to help them comprehend the meaning without translating.

Awareness and use of metacognitive strategies. Students’ responses to the second question showed evidence of planning before reading (such as, previewing, summarizing and interpreting). Majority of the students stated that they preview the headings and figures before reading. Others mentioned that they summarize the texts and translate the unfamiliar words. Few of the students stated that they use self-testing strategy to assess their comprehension. They also stated that they sometimes shift from one strategy to another depending on the text and prior knowledge, one student stated “I always read for general gist at the first time, then start planning what to do to understand, sometimes translation, sometimes analyzing or grouping information.”

Connection between strategy awareness and comprehension. Responses to the third question of the open-ended questionnaire revealed two distinction groups of students. The first group included the majority of the students who actively evaluate and monitor their reading and they intentionally used them, they reported that these strategies helped them in understanding and improve their scores, one quote is “ I always stop and ask myself if I understand this section by this way or shall try another way”. The other group is the students who are unaware of reading strategies and relied more on memorization and translation, this lead them to surface level comprehension. One quote is “ I don’t plan for reading I just divide the texts and translate and memorize”, there are similar responses that indicated unawareness of reading strategies, such as “I always start reading to understand what is written and then memorize the difficult part”.

Discussion

In response to the first research question “What is the most prominent type of meta-cognitive reading strategy employed by Libyan medical students when reading scientific materials?”, the findings from the close ended questionnaire analysis showed that the most frequent metacognitive reading strategy used by medical students was “problem-dealing strategy” since it has the score mean of 1.78, as it was explained at the beginning of this section that the mean range from 1.34 to 2.0 was accepted as being the frequent strategy used by students, the total percentage of agreement for this strategy was 87.5% of students. This suggests that when medical students face some comprehension difficulties, they actively attempt to resolve them rather than abandoning the texts. Such a process reflects a high strategic awareness, as problem-solving is considered a symbol of metacognition.

The second most frequent strategy was “guessing strategy” with a percentage of 85.3% of students and mean of (1.67). This shows that many of the students rely on prior knowledge and contextual clues when faced with unfamiliar words. While guessing strategy is effective but it is not reliable, it may lead to misinterpretation if not followed by confirmation. In addition, students agreed on ‘Over-viewing strategy’ with a percentage of 73.1% and mean of (1.46), which means that they frequently used. This indicates that students often rely on skimming to gain general understanding before engaging in reading. This aligns with metacognitive practices such as planning.

Otherwise, the ‘Information-dealing’ strategy is the least employed, with lowest percentage (55.7%) agreement from the students. This suggests that some students are less likely to

organize and restructure information while reading. In fact this moderate use of such a strategy may reflect limited awareness of high-level strategies such as synthesizing and not taking.

The qualitative results revealed a mix of views among medical students in comprehending English scientific texts. While some faced significant difficulties, others adopted different metacognitive strategies that helped them to understand scientific materials, besides some students relied more on memorization and translation, others demonstrated more flexible use of metacognitive strategies. Based on the students' responses, most of the medical students are considered aware of using these strategies to help them understand scientific texts.

Conclusion and Recommendations

The current study was mainly conducted to investigate the meta-cognitive reading strategies used by Libyan medical students in Misurata to comprehend medical English publications. The quantitative findings showed that Libyan medical students employ a range of metacognitive reading strategies when engaging with scientific texts in English. Among these the problem dealing strategy emerged as the most prominent. Other strategies such as guessing, overviewing and supporting were reported as frequently used, though to varying degrees. The qualitative findings further highlighted that students' reliance on these strategies is shaped by both their academic needs. Overall, the study suggests that medical students actively draw on multiple strategies to enable them to comprehend scientific publications in English. The infrequent use of some strategies highlights the need for instructional support. EFL pedagogy in medical education should emphasize practice in synthesis and evaluation to deepen students' engagement with scientific texts.

It can be concluded that universities and schools need to actively improve metacognitive reading strategies among all students. Research indicates that metacognitive reading strategy awareness promotes both performance and understanding of one's reading comprehension. Further research supports the claim that metacognitive strategies facilitate students' reading comprehension. This study also supports the idea that teaching students metacognitive reading strategies explicitly is a practical way to improve their reading comprehension.

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Appendix (A)

A sample of Questionnaire Items for Reading Comprehension of Scientific Articles Section 1 : closed-ended items

OVER VIEWING STRATEGY				
I glanced at the article headings before beginning reading.	Agree	Disagree	Strongly Agree	Strongly Disagree
I read the paper from start to end.	Agree	Disagree	Strongly Agree	Strongly Disagree
I skip some sections of the article.	Agree	Disagree	Strongly Agree	Strongly Disagree
I read the article jumping from one section to another.	Agree	Disagree	Strongly Agree	Strongly Disagree
I only focus on the main ideas.	Agree	Disagree	Strongly Agree	Strongly Disagree

GUESSING STRATEGY				
Sometimes, I could predict the idea from what followed	Agree	Disagree	Strongly Agree	Strongly Disagree
I tried to remember what I knew about the subject	Agree	Disagree	Strongly Agree	Strongly Disagree
I had to read other pages to understand this one	Agree	Disagree	Strongly Agree	Strongly Disagree

PROBLEM DEALING STRATEGY				
If I encountered difficulty, I take notes	Agree	Disagree	Strongly Agree	Strongly Disagree
If I find difficulty in understanding words, I look them up in the dictionary	Agree	Disagree	Strongly Agree	Strongly Disagree
If I find difficulty in understanding words, I look them up in the internet	Agree	Disagree	Strongly Agree	Strongly Disagree
If I find difficulty in understanding words, I asked somebody	Agree	Disagree	Strongly Agree	Strongly Disagree
If I find difficulty in understanding words, I ignore them	Agree	Disagree	Strongly Agree	Strongly Disagree
If I find difficulty in understanding words, I underline them	Agree	Disagree	Strongly Agree	Strongly Disagree
If I find difficulty in understanding words I assume their meaning and kept on reading	Agree	Disagree	Strongly Agree	Strongly Disagree

INFORMATION DEALING STRATEGY				
If I couldn't understand the topic, I slowed down the speed of my reading	Agree	Disagree	Strongly Agree	Strongly Disagree
If I couldn't understand the topic I read the passage again with more attention	Agree	Disagree	Strongly Agree	Strongly Disagree
If I couldn't understand the topic I read the passage out-loud	Agree	Disagree	Strongly Agree	Strongly Disagree
If I couldn't understand the topic I skipped the passage and continue reading	Agree	Disagree	Strongly Agree	Strongly Disagree
If I couldn't understand the topic I stopped reading altogether	Agree	Disagree	Strongly Agree	Strongly Disagree
If I couldn't understand the topic I asked for help	Agree	Disagree	Strongly Agree	Strongly Disagree

SUPPORTING STRATEGIES				
After reading I quickly reviewed the paper again	Agree	Disagree	Strongly Agree	Strongly Disagree
To support my understanding I usually write a summary	Agree	Disagree	Strongly Agree	Strongly Disagree
I checked my ideas with a classmate and internet websites	Agree	Disagree	Strongly Agree	Strongly Disagree

Appendix B

Open-ended questions:

1. When you read scientific texts in English language, what difficulties you face and how you deal with them?
2. Can you describe the technique or strategy you use to comprehend scientific texts in English language?
3. In what way do you think your awareness of reading strategies influences your understanding of English scientific texts?

Compliance with ethical standards

Disclosure of conflict of interest

The authors declare that they have no conflict of interest.

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