The Impact of Cognitive and Metacognitive Reading Strategies on EFL Students' Reading Comprehension

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Abstract

Academic success among EFL learners is closely linked to their foundational skills in reading comprehension. However, many students continue to struggle with understanding English texts within a limited timeframe. This difficulty stems from the fundamental purpose of reading: to comprehend written content in order to follow specific instructions. Since cognitive and metacognitive strategies are interrelated where metacognitive strategies oversee and regulate cognitive processes, their combined use is considered effective in enhancing reading comprehension skills. This study aims to investigate the extent to which cognitive and metacognitive reading strategies simultaneously impact EFL students' reading comprehension using mixed methods (quantitative-qualitative) of one-group pre-experimental design. Data were obtained through pre-test and post-tests, questionnaires, and classroom observation. The treatments were cognitive and metacognitive reading strategies taught by two expert teachers to 60 EFL students. Quantitative data were analyzed using descriptive statistics to investigate EFL students' reading comprehension and their reading strategy awareness before and after treatment. Inferential statistics using paired sample t-tests revealed a significant difference between EFL students' reading comprehension before and after treatment (p-value<0.05). Analysis of multiple linear regression also revealed a significant impact of cognitive and metacognitive reading strategies on EFL students' reading comprehension simultanously (p-value<0.05 and $F_{Computed} > F_{Table}$) with an impact of 43.8% (moderate). Qualitative data analyzed descriptively revealed that almost all EFL students showed positive attitudes during the treatment given. This study is expected to present significant contributions for teachers to implement various cognitive and metacognitive reading strategies in reading classes to enhance EFL students' reading comprehension and assist them in overcoming the difficulties they face during the reading process.

Keywords: Cognitive Reading Strategies; Metacognitive Reading Strategies; Reading Comprehension; Student Attitudes

INTRODUCTION

Reading is a reciprocal activity carried out by readers to generate interpretations and find ideas from a text to comprehend the message conveyed by the writer. Reading is essential for everyone, especially students (Haryati, 2021). Many researchers have stated that reading comprehension is a primary skill students need for academic achievement (Fang & Rahman, 2024; Fitriana, 2018). Thus, reading comprehension becomes a crucial skill that students must master because it will help them understand material or articles in the English learning process, especially for EFL students (Budiman, 2020; Meniado, 2016). Reading also helps students obtain information (Al-Jarrah & Ismail, 2018). Through reading, students can acquire various vocabulary and enhance other skills (Akyol & Sural, 2021). Reading is also crucial for further education and lifelong learning (Hilmi, 2024; Susanti, 2019).

Because of its significance, reading comprehension is included in the skills emphasized in the Merdeka Curriculum program in Indonesia as a focus for developing human resources that are changing at all educational levels (Herlina et al., 2024). One of the directions of the transformation policy in the field of higher education is implemented in the selection mechanism for new student admissions at state universities nationally and independently to encourage improvements in the quality of education at previous levels. With this transformation, Government Regulation Number 48 of 2022 Article 6 (2) concerning the selection of new student admissions at state universities makes English literacy one of the subtests used to test students' ability to process and understand information in English texts (Ministry of Education, Culture, Research and Technology of the Republic of Indonesia, 2022). This is because reading skills in understanding the meaning contained in a text have a significant part in the process of students learning (Ashadi et al., 2020; Hakim et al., 2022). Although most students are accustomed to reading English texts, they still often experience many obstacles to understanding the texts they read. Many students cannot understand English texts even though they can interpret or find the meaning of words fluently. Students' reading literacy skills are still very low (Nasution, 2022). This is a problem for EFL students because the primary goal of reading is to extract ideas and information from the text to accomplish particular instructions, as requested in a text and question.

The researcher found a problem in the average high school student who took the state university entrance exam in the English literacy subtest. The exam requires good reading comprehension skills because students must use limited time to read several texts and answer various questions correctly. Considering the findings of the researcher's pre-observations through try-out scores and interviews with several students at one of the state university entrance preparation institutions in Pati, most of the students' English text reading comprehension skills are still lacking. Their average English literacy scores are still far from the maximum score. From the interview results, many students still struggle to comprehend the text, summarize the text, determine the main sentence and main idea of each paragraph, manage their time, identify complex vocabulary, and even answer questions about what is discussed in the text correctly. Therefore, students need good reading strategies and techniques not to waste time reading the text repeatedly without finding the answer requested by the question.

To overcome these difficulties, students need to implement various reading strategies to assist them in acquiring, storing, and retrieving information from the text. Reading strategies are believed not only for successful text comprehension but also to overcome reading problems (Febriani et al., 2019). To minimize students' difficulties in reading comprehension, teachers need to find solutions to overcome them (Akbar & Adi, 2020). Based on pre-

interviews conducted by the researcher, some students also said that their teachers rarely teach reading strategies during lessons at their school. Therefore, teachers must explore their reading strategies knowledge and teach them to students to help them understand reading. Teachers must do this to equip their students to use strategies appropriately so that their students can have effective reading skills.

Mikulecky and Jeffries (2004) recommend several cognitive strategies teachers can use to teach students to improve reading comprehension and overcome reading difficulties within a limited time (Fisher, 2016). Among them are speed reading techniques, namely skimming and scanning, used in this study. Skimming is a technical fast-reading method that captures each paragraph's main idea to outline the text's contents or conclusion (Akyol & Sural, 2021). Scanning is a technical fast-reading method that aims to obtain certain information (Rashid et al., 2021). Usually, scanning is done to discover answers to specific questions or meet certain information needs quickly. Using skimming and scanning reading techniques together will prevent readers from wasting time while reading.

Other cognitive strategies used in this study are previewing and predicting, questioning, analyzing vocabulary, making inferences, and summarizing. Previewing and predicting are two related reading techniques where readers make predictions and formulate ideas when they preview a text using information from the text, such as the title (Rashid et al., 2021). In this case, readers imagine what will occur in the text afterward. Questioning is a reading strategy in which readers ask themselves questions to build meaning in a text by developing their understanding to discover information that can be utilized to solve problems and find answers (Banditvilai, 2020). Here, students will refer back to the text while reading to discover an answer to their question. Analyzing vocabulary is a reading strategy the readers implement to comprehend the text's content using the vocabulary definition in the passage they read (Setiawati & Budiasih, 2022). Making inferences is a strategy readers use to conclude that is not explicitly stated in a text (Fisher, 2016). Summarizing is a rearrangement completed by readers after reading a text by focusing on important points related to the text (Akyol & Sural, 2021). This will improve their memory of what they read. Applying this cognitive reading strategy will equip students to handle their reading effectively.

Additionally, the reading strategy promoted to enhance students' reading comprehension is a metacognitive strategy (Ashadi et al., 2020; Haryati, 2021). Metacognitive reading strategy refers to the reader's metacognitive awareness of their knowledge and cognitive processes during the reading process (Hilmi, 2024). Therefore, reading with this strategy encourages readers to be more conscious of what they are reading and thinking while reading. Metacognition is closely related to reading activities because it is used to see how cognitive activities such as understanding, remembering, learning, and solving problems are carried out effectively (Azevedo, 2020). Readers can apply metacognitive reading strategies by "planning before reading, monitoring and solving problems while reading, and evaluating after reading" to achieve high-level reading comprehension (Annury et al., 2019; Berenji, 2021; Djudin, 2017; Huynh, 2024). Students' reading comprehension and performance will be enhanced when they know how to implement the reading strategies (Wu et al., 2019). By implementing those strategies, students will be more aware of how they learn and use this process to acquire new information efficiently (Peng et al., 2024). As a result, students will become more independent thinkers.

In various pieces of literature, cognitive and metacognitive skills are considered to be interrelated. The researcher suspects that

metacognitive abilities directly affect cognitive abilities in learning. Furthermore, both reading strategies enhance EFL students' reading comprehension (Dai, 2024). An enhancement in students' reading comprehension can be seen through increased awareness and self-control at the metacognitive level regarding cognitive processes that will be seen through changes in achievement that are better than previous achievements (Kuhn, 2021). In other words, students' reading comprehension improvements can be seen by comparing their reading test results before and after being taught reading strategies. Implementing cognitive and meta-cognitive reading strategies can be investigated using the Survey of Reading Strategy Awareness (SORS) questionnaire, which has been categorized according to its relationship (Msaddek, 2023; Xie et al., 2023). Purpura (1999) said that cognitive reading strategies are multidimensional constructs categorized into comprehension, memory, and retrieval strategies (Mosalli et al., 2022). Metacognitive reading strategies are unidimensional constructs categorized into planning, monitoring, and evaluation strategies (Phakiti, 2006). The implementation of reading strategy questionnaires can help students better understand the reading strategies they implement, enhance awareness concerning the implementation of reading strategies, and identify reading strategies they have never implemented before that can help enhance the efficiency of their reading skills (Akbar & Adi, 2020; Aziz et al., 2019; Hatami & Asl, 2017). In addition, students can also use reading strategy questionnaires as self-reflection on their metacognitive awareness. This will be very useful because metacognitive awareness is directly related to cognitive processing, which is expected to enhance comprehension of EFL students' reading (Ashadi et al., 2020; Babashamasi et al., 2022).

Considering all the problems found by the researcher in the average EFL students above, the researcher provides treatment in the form of intensive learning of both cognitive and metacognitive reading strategies by presenting teachers who are experts in their fields. This study is based on the current phenomenon and the gaps in previous studies. On average, previous researchers only used one of those reading strategies in their studies. This study generally aims to investigate the extent to which cognitive and metacognitive reading strategies simultaneously impact EFL students' reading comprehension accomplished in one of Pati's state high schools. The data were gathered through several instruments, such as the pre-posttests of English literacy and questionnaires, which were used to identify their reading strategy awareness before and after being taught cognitive and metacognitive reading strategies. The classroom observation sheet instrument was also utilized to determine EFL students' attitudes during the learning process of cognitive and meta-cognitive reading strategy in detail. This study offers a broad, complete, and deep reference regarding the implementation of cognitive and meta-cognitive reading strategies. EFL students are expected to be competent in enhancing their reading comprehension and overcoming problems faced during the reading process using appropriate cognitive and metacognitive reading strategies. Other related parties, such as English teachers or lecturers, can use this helpful information to teach and train the implementation of cognitive and metacognitive reading strategies according to their students' needs in enhancing comprehension and overcoming difficulties faced during the reading process.

METHODOLOGY

In investigating the impact of cognitive and meta-cognitive reading strategies on EFL students' reading comprehension, the researcher utilized mixed methods (quantitative and qualitative) with a one-group pre-posttest pre-experimental design. This design includes giving a pre-test, treatment, and post-test in one

experimental group (Babashamasi et al., 2022; Creswell & Cresswell, 2018). There are five research problems underlying this study: (1) to what extent are EFL students' reading comprehension and their reading strategy awareness before being taught cognitive and meta-cognitive reading strategies?; (2) how are EFL students' attitudes during the process of teaching cognitive and metacognitive reading strategies in enhancing their reading comprehension?; (3) to what extent are EFL students' reading comprehension and their reading strategy awareness after being taught cognitive and metacognitive reading strategies? (4) Is there a significant difference between the pre and post-test scores of EFL students' reading comprehension before and after being taught cognitive and metacognitive reading strategies? (5) Do cognitive and metacognitive reading strategies significantly impact EFL students' reading comprehension? To address those research problems, the data were collected through several instruments given to 60 EFL students from grade 12 who wanted to enhance their reading comprehension to take the English literacy test on the 2025 state university entrance exam. The researcher used purposive sampling to choose the sample since it accurately represents a specific population (L. R. Gay et al., 2012), where the researcher used his own experience and knowledge about the sample group with criteria based on targets to meet the research objectives.

Quantitative data was obtained using both test and non-test instruments. The instrument test included a pre-posttest of reading comprehension called the "*English literacy test,*" containing 20 multiple-choice questions adopted from the previous year's selection test questions and had been tested for validity. Those tests were given to EFL students before and after they were given treatment via Google Forms for 30 minutes, which was equipped with security to avoid cheating. The results of those tests were used to identify the reading comprehension of EFL students before and

after treatment. Furthermore, the results were also used to answer 1st hypothesis (H_0 "*There is no significant difference between EFL students' reading comprehension before and after treatment*" and H_1 "*There is a significant difference between EFL students' reading comprehension before and after treatment*"). The non-test instrument is a questionnaire called the "*Survey of Reading Strategies Awareness*" (SORS), which contains 30 statement items regarding the cognitive and metacognitive reading strategies implementation during the process of reading, which was adopted by the researcher from Aek Phakiti and has been tested for validity (Moradi et al., 2022). This questionnaire was given to EFL students after completing the English literacy pre-posttests. It was assessed using a 1-4 Likert scale (never-rarely-usually-always) whose results were categorized based on the values obtained (low: 0-2.4, medium: 2.5-3.4, high: 3.5-5) (Phakiti, 2006). The results of this questionnaire were utilized to determine EFL students' reading strategies awareness before and after being given treatment. Furthermore, both instruments from these quantitative data were used to answer the 2nd hypothesis (H_0 "*There is no significant impact of cognitive and metacognitive reading strategies on EFL students' reading comprehension*" and H_1 "*There is no significant impact of cognitive and metacognitive reading strategies on EFL students' reading comprehension*").

Qualitative data were obtained through non-test instruments by conducting observations using class observation sheets adjusted to the researcher's needs with the help of a recording device to observe EFL students' attitudes during the treatment. The attitudes referred to by the researcher are three interrelated components from Gardner (1985): cognitive, affective, and behavioral (Fitria et al., 2022). These aspects are further divided into several criteria assessed using a Likert scale of 1-5 (never-seldom-sometimes-often-always), and observers describe each criterion.

The observer in this observation was the researcher with the help of one of the teachers at the school. The results are categorized based on the values obtained (1.00-2.00: very low frequency, 3.00-4.00: low frequency, 5.00-6.00: moderate frequency, 7.00-8.00: high frequency, 9.00-10.00: very high frequency).

Expert teachers conducted the treatment by teaching cognitive and metacognitive reading strategies and implementing questions according to the learning plan the researcher had made for EFL students. The treatment was carried out for eight meetings: four meetings to teach cognitive reading strategies (skimming-scanning-previewing-predicting-questioning-analyzing vocabulary-making inferences-summarizing) and four meetings to teach metacognitive reading strategies (planning-monitoring-evaluating). The meetings were conducted hybrid, where meetings 1, 2, 6, and 8 were offline, and 3, 4, 5, and 7 were online. The researcher designed this so that the treatment could be carried out intensively. In addition, the researcher also provided mini books and PowerPoints containing materials, question grids, and practice questions to expert teachers and EFL students as references during the treatment.

After collecting data using several instruments above, the researcher analyzed the quantitative data through descriptive and inferential statistics. *First,* descriptive statistical analysis was utilized to determine EFL students' reading comprehension and their reading strategy awareness before and after treatment. *Second,* inferential statistical analysis was employed to answer the 1st hypothesis using a paired sample t-test and the 2nd hypothesis using multiple linear regression. Meanwhile, qualitative data were analyzed descriptively by reducing, describing, presenting, and concluding observation data from class observation sheets and video recordings to investigate EFL students' attitudes when given treatment in online and offline classes.

RESULT AND DISCUSSION

EFL students' reading comprehension and reading strategies awareness before being taught cognitive and metacognitive reading strategies.

This study's findings use the analysis result of the English literacy pre-test and the SORS 1 questionnaire through descriptive statistics using SPSS, which are presented in the tables and diagrams below.

Table 1. English Literacy Pre-Test

	N	Min	Max	Sum	Mean	Std. Error	Std. Deviation	Variance
English Literacy PRE-TEST	60	10	70	2275	37,92	1,884	14,593	212,959

As presented in Table 1 above, the sample of 60 EFL students obtained the smallest score of 10 and the largest score of 70. From the minimum criteria determined at 55, 10 shows that students passed the English literacy pre-test, and 50 did not. The total score is 2275, and the average is 37.92. This reveals that the EFL students' English literacy pre-test average score is still far below the average. Therefore, EFL students' reading comprehension before being taught both cognitive and metacognitive reading strategies is still in the low category because many of their scores are still far below the minimum criteria that have been set.

Chart 1. SORS 1 (EFL Students' Reading Strategy Awareness)
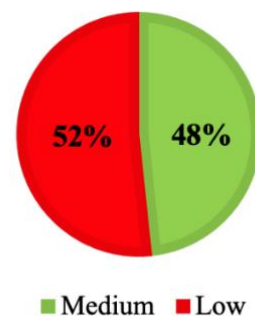
As presented in Chart 1 above, it can be seen that out of 3 categories (low, medium, and high), there are only two categories obtained by 60 EFL students from filling out the questionnaire (SORS 1) after completing the English Literacy Pre-Test. The two categories obtained by the EFL students are the low reading strategy awareness category of 52% (31 students) and the medium category of 48% (29 students). Meanwhile, none of the EFL students obtained a high awareness category of reading strategy implementation. This causes the low average score of the EFL students' English literacy pre-test.

Before being taught cognitive and metacognitive reading strategies, EFL students' average reading comprehension and reading strategy awareness were still in the low category. This is known from the average EFL student's English literacy pre-test score, which is still far below the minimum criteria that have been set. In addition, the questionnaire stated that almost all EFL students obtained a low to moderate reading strategy awareness category, and none of them obtained a high category. This is because EFL students have not been taught cognitive and metacognitive reading strategies when doing the English literacy pre-test. Most students have difficulty understanding reading if they do not use reading strategies, which will lead to low reading skills and even affect their academic achievement (Al-Jarrah & Ismail, 2018). This happens because readers who do not know reading strategies and their implementation will have difficulty deciding what strategy to apply when, why, and so on (Par, 2020). Thus, it can be assumed that low reading comprehension is caused by low awareness of implementing cognitive and metacognitive reading strategies, which affects EFL students' academic achievement and success.

EFL students' attitudes during the learning process of cognitive and metacognitive reading strategies in enhancing their reading comprehension.

This study's findings use the qualitative descriptive analysis results obtained from class observation sheets by collecting, reducing, drawing conclusions, and presenting data. The overall average score of the three aspects (cognitive, affective, and behavioral) obtained by the researcher regarding EFL students' attitudes during the cognitive and metacognitive reading strategies learning carried out offline and online is 82. This score falls into the "high frequency" category, indicating that EFL students have a positive attitude while learning metacognitive reading strategies offline and online to improve their reading comprehension. Although both fall into the "high frequency" category, the positive attitude of EFL students in learning cognitive reading strategies (82) is higher than in learning metacognitive (81). In addition, the positive attitude of EFL students in learning online reading strategies (86) is higher than in learning offline reading strategies (78).

In cognitive and metacognitive reading strategy learning, EFL students showed positive attitudes in all aspects observed (cognitive, affective, and behavioral). In general, in the cognitive aspect, *EFL students often share ideas or opinions during discussions, have a high curiosity by constantly asking questions, and provide suggestions or comments on other friends' projects*. In the affective aspect, *EFL students always show enthusiasm and are excited about working on projects, enjoy the learning process well, and answer questions confidently in front of other students and teachers*. In the behavioral aspect, *EFL students always heed the teacher's teaching regarding implementing the reading strategy, often practice applying it when working on questions, and always take the projects the teacher gives seriously by putting in their best efforts*. From those descriptions, EFL students have a positive attitude during the

learning process of cognitive and meta-cognitive reading strategies.

Almost all EFL students showed positive attitudes (cognitive, affective, and behavioral) during the learning process of cognitive and metacognitive reading strategies by expert teachers in enhancing their reading comprehension and strategies awareness conducted online and offline. Although both online and offline learning showed positive attitudes, these classroom observations revealed that EFL students showed higher activeness when learning was conducted online than offline. From the comparison of student activity in online and offline classes, the results of other studies revealed that most EFL students feel more comfortable and confident in asking and answering questions when classes are conducted online (Hollister et al., 2022). The role of teachers is also vital in helping students implement the right reading strategies to enhance their comprehension skills (Takaloo & Ahmadi, 2017). Students' attitudes toward the learning process are essential elements that determine the failure or success of their learning objectives (Pratiwi et al., 2021; Sukarni, 2019). This study's finding conforms to earlier research, which reveals that almost all EFL students with a positive attitude during cognitive and metacognitive strategy learning in class have a better awareness level of reading strategies and reading comprehension than before (Pahrizal et al., 2024). This is evidenced by the differences in reading comprehension results and reading strategy awareness conducted before and after cognitive and metacognitive reading strategy learning. Therefore, it can be concluded that the positive role of expert teachers in the classroom is vital in shaping positive attitudes of EFL students in classroom learning so that they can comprehend and implement suitable reading strategies to increase their reading comprehension competence (Babashamasi et al., 2022; Hilmi, 2024).

EFL students' reading comprehension and reading strategies awareness after being taught cognitive and metacognitive reading strategies.

This study's findings use the analysis result of the English literacy post-test and the SORS 2 questionnaire through descriptive statistics using SPSS, which are presented in the tables and diagrams below.

Table 2. English Literacy Post-Test

	N	Min	Max	Sum	Mean	Std. Error	Std. Deviation	Variance
English Literacy POST-TEST	60	25	95	3605	60,08	2,087	16,169	261,434

As presented in Table 2 above, the sample consisting of 60 EFL students obtained the smallest score of 25 and the largest score of 95. From the minimum criteria determined at 55, 41 students passed the English literacy post-test, and 19 did not. The total score is 3605, and the average is 60.08. This reveals that the average score of EFL students' English literacy post-test is above average. Therefore, the average reading comprehension of EFL students before being taught cognitive and metacognitive reading strategies is better because many of their post-test scores are already above the minimum criteria set.

Chart 2. SORS 2 (EFL Students' Reading Strategy Awareness)

■ High ■ Medium
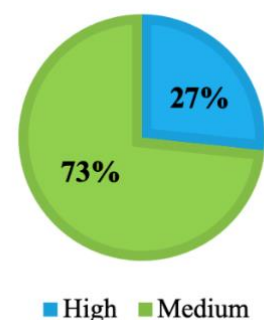
As presented in Chart 2 above, it can be seen that out of 3 categories (low, medium, and high), there are only two categories obtained by 60 EFL students from filling out the questionnaire (SORS) given after completing the English Literacy Post-Test. The two categories obtained by the EFL students are the high reading strategy awareness category of 27% (16 students) and the medium category of 73% (44 students). Meanwhile, none of the EFL students obtained the low reading strategy awareness category. This caused an increase in the scoring average of the EFL students' English literacy post-test.

After being taught cognitive and metacognitive reading strategies, EFL students' average reading comprehension and reading strategies awareness increased significantly. This is known from the many post-test scores of EFL students that were above the minimum criteria that had been set. In addition, the questionnaire stated that almost all EFL students obtained a medium to high reading strategy awareness category, and none of them obtained a low category. This is because EFL students have been demonstrated and taught both cognitive and metacognitive reading strategies when doing the English literacy post-test. Students who have been guided with reading strategies, their reading comprehension develops to an excellent level (Amin, 2019; Huang, 2024). In addition, EFL students' reading comprehension improved after they realized the importance of applying appropriate reading strategies according to their needs (Usman et al., 2017). Therefore, EFL students' academic performance and success can be affected by improved reading comprehension caused by greater awareness of implementing cognitive and metacognitive reading strategies as they are reading. This is proven by the increasing awareness of EFL students towards reading strategies, which also increases their reading comprehension.

A significant difference between EFL students' reading comprehension before and after being taught cognitive and metacognitive reading strategies.

This study's findings were used to answer the 1st hypothesis through inferential statistical analysis using paired sample t-tests that had previously met all prerequisite tests using SPSS. The findings are presented in the table below.

Table 3. Paired Sample T-Test

				Paired Differences						
						95% Confidence Interval of the Difference				Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean		Lower	Upper	t	df	
Pair 1	English Literacy Pre-Test - English Literacy Post-Test	22,167	8,654	1,117		24,402	19,931	19,841	59	0,000

As presented in Table 3 above, EFL students' English literacy pre-test and post-test mean score difference is 22.167, standard deviation 8.654, $T_{Computed}$ 19.841, and significance value or p-value (2-tailed) 0.000. To test the hypothesis, the researcher looked at the p-value by comparing it. The data results show that the p-value is 0.00<0.05, which indicates that H_0 is rejected while H_1 is accepted in 1st hypothesis. This revealed a significant difference between EFL students' reading comprehension before and after being taught by cognitive and metacognitive reading strategies.

This significant difference is the reading comprehension of EFL students' enhancement after being taught cognitive and metacognitive reading strategies. Furthermore, they are aware of implementing both reading strategies while reading. Another study showed significant differences where students' post-test scores were more outstanding than final scores after

they received metacognitive reading strategy learning (Khellab et al., 2022; Thongwichit & Buripakdi, 2021). The group that implemented metacognitive reading strategies obtained better scores than those who did not implement them (Pasaribu et al., 2021). In addition, the cognitive reading strategies implemented by students made their post-test reading scores better than their pre-test (Fauzi, 2018). Therefore, it is assumed that cognitive and metacognitive reading strategies are equally significant to be implemented in enhancing the reading comprehension of EFL students.

Cognitive and metacognitive reading strategies significantly impact EFL students' reading comprehension.

This study's findings were used to answer the 2nd hypothesis through inferential statistical analysis using multiple linear regression that had previously met all prerequisite tests using SPSS. The findings are presented in the table below.

Table 4. Simultaneous Test

	ANOVAᵃ					
	Model	Sum of Squares	df	Mean Square	F	Sig.
1	Regression	7054,539	2	3527,269	24,021	.001ᵇ
	Residual	8370,045	57	146,843		
	Total	15424,583	59			

a. Dependent Variable: EFL Students' Reading Comprehension (Y)

As presented in Table 4 above, it can be seen that $F_{Computed}$ is 24.021, and the significance value or p-value is 0.001. The F_{Table} obtained by the researcher from df1(2) and df2 (57) is 3.16. To test the 2nd hypothesis, the p-value was compared with the sig. value and $F_{Computed}$ with F_{Table}. The data results show that the p-value obtained is lower than the sig. level (0.001 < 0.05), and $F_{Computed}$ is larger than F_{Table} (24.021 > 3.16). Both comparisons indicate that H_0 is rejected while H_1 is accepted in the 2nd hypothesis. This revealed a significant impact of cognitive and metacognitive reading strategies simultaneously on EFL students' reading comprehension.

The researcher then used the coefficient of determination to determine the adjusted r-square in investigating the proportion's impact of cognitive and metacognitive reading strategies on EFL students' reading comprehension. The findings are presented in the table below.

Table 5. Coefficient of Determination

					Model Summaryᵇ				
				Std. Error of the Estimate	Change Statistics				
Model	R	R Square	Adjusted R Square		R Square Change	F Change	df 1	df 2	Sig. F Change
1	,676ᵃ	0,457	0,438	12,11787	0,457	24,021	2	57	0,000

As presented in Table 5 above, the R-square obtained is 0.438 or 43.8% (moderate). This indicates that cognitive and meta-cognitive reading strategies simultaneously moderately impact EFL students' reading comprehension. The rest (56.2%) is impacted by other elements not explored in this study.

The researcher then used a partial test (t-test) to investigate whether each cognitive and metacognitive reading strategy impacted EFL students' reading comprehension partially. The findings are presented in the table below.

Table 6. Partial Test

	Coefficientsᵃ		
	Model	t	Sig.
1	(Constant)	-2,353	0,022
	Cognitive Reading Strategies (X1)	2,453	0,017
	Metacognitive Reading Strategies (X2)	2,593	0,012

a. Dependent Variable: EFL Students' Reading Comprehension (Y)

As presented in Table 6 above, the cognitive reading strategy has a $T_{Computed}$ of 2.453 and a p-value of 0.017, while the metacognitive reading strategy has a $T_{Computed}$ of 2.593 and a p-value of 0.012. The T_{Table} obtained by the researcher from df (57) is 2.00247.

First, the data showed that 0.017<0.05 (the p-value obtained was lower than the sig. level) and 2.453>2.00247 ($T_{Computed}$ was higher than T_{Table}). Both comparisons revealed a significant impact of cognitive reading strategies on EFL students' reading comprehension partially. Second, the data showed that 0.012<0.05 (the p-value obtained was lower than the sig. level), 2.593>2.00247 ($T_{Computed}$ was higher than T_{Table}). Both

comparisons revealed a significant impact of metacognitive reading strategies on EFL students' reading comprehension partially.

A significant impact between both cognitive and metacognitive reading strategies on EFL students' reading comprehension simultaneously and partially was revealed in this study. Previous studies support this study. Among them, it is stated that cognitive reading strategies have a positive effect because their use is considered very effective when reading (Marliasari, 2017). In addition, metacognitive reading strategies have a good impact because they can help students improve their reading achievement (Gilakjani & Sabouri, 2016). Using metacognitive strategies regularly can improve reading effectiveness (Pahrizal et al., 2024). Cognitive and even metacognitive strategy instruction contributes to reading behavior (Aghaie & Zhang, 2012). A systematic descriptive study shows that cognitive and metacognitive strategies affect students' academic achievement (Fooladvand, 2017). These reading strategy instructions contribute to autonomous reading behavior (Aghaie & Zhang, 2012). These findings conformed with the results of this study because both strategies are interrelated in enhancing the comprehension of EFL students' reading. This is underpinned by the statement that metacognitive reading strategies help integrate and organize cognitive reading strategies (Thienngam et al., 2020). Thus, EFL students can succeed in enhancing their reading comprehension and academic performance by simultaneously implementing cognitive and metacognitive strategies as they are reading.

CONCLUSION

This study revealed a significant impact of both cognitive and metacognitive reading strategies on EFL students' reading comprehension simultaneously and partially. The researcher combined the implementation of cognitive and metacognitive reading strategies because both are interrelated in enhancing reading comprehension and overcoming difficulties EFL students face during reading. The role of metacognitive reading strategies is to help integrate and regulate the cognitive reading strategies implementation. The significant impact is due to the significant difference between the English literacy pre-test and post-test findings completed by EFL students before and after being taught cognitive and metacognitive reading strategies. The significant difference indicates an increase in EFL students' awareness of implementing cognitive and metacognitive reading strategies so that their reading comprehension also increases. EFL students consistently showed positive attitudes in all aspects observed during the cognitive and metacognitive reading strategy teaching conducted by expert teachers online and offline for eight meetings. This positive attitude makes them aware of these reading strategies' implementation. Among the positive attitudes of EFL students are showing high enthusiasm, such as often asking questions, answering questions, sharing ideas, giving comments, paying attention to the teacher, practicing, and giving their best efforts while learning cognitive and metacognitive reading strategies. Therefore, it is clear that EFL students' positive attitudes toward the learning process are also essential elements that determine the failure or success of their learning goals. The implications of this study are discussed as follows. This study focused on the impact of cognitive and metacognitive reading strategies on EFL students' reading comprehension. Future researchers can explore the correlation between various cognitive and also metacognitive strategies for reading comprehension in English or other languages or even other skills by focusing on differences in students' proficiency levels, age, gender, discipline, and others. This study used 60 EFL students from grade 12 as participants who wanted to enhance their reading comprehension to take the English literacy test in the state

university entrance examination, while future research can select participants according to their research needs.

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