

The impact of photomindset media on students' metacognitive awareness and reading comprehension

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ABSTRACT

This study investigates the effects of photomindset media on students' metacognitive awareness and reading comprehension. Employing a sequential explanatory mixed-methods design, the research involved 33 seventh-grade students at a junior high school in Batam. Quantitative data were collected using reading comprehension tests and the Metacognitive Awareness Inventory (MAI) developed by Schraw and Dennison, administered before and after the intervention. The photomindset media required students to observe images and respond to guided questions during reading activities. A paired-sample t-test was used to examine changes in students' scores. To complement the quantitative findings, qualitative data were gathered through semi-structured interviews exploring students' perceptions of the intervention. The results indicated significant improvements in both metacognitive awareness and reading comprehension. Students demonstrated enhanced planning, self-monitoring, and engagement while reading. Interview data further revealed that photomindset media supported visualization and deeper understanding of key textual details. Overall, the findings suggest that photomindset media serve as an effective and practical instructional approach for improving reading comprehension in EFL classrooms.

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INTRODUCTION

In a global context, English has become the language of introduction that gives students access to various sources of information and increases the scope and depth of their knowledge (Wang & Halim, 2025). In the present interconnected world, proficiency in foreign languages is increasingly recognized as an essential component of comprehensive education (Cerezo Herrero & Pérez-Sabater, 2024).

However, in the local situation, the EFL classroom shows a notable contrast to these global opportunities. Most teaching remains conventional, dominated by teacher-centered approaches where students passively listen and take notes, learning materials are often unengaging and the strategies used fail to maximize student participation, which leads to boredom and lack of interest in learning English (Altun, 2023; Athiyyaturrahmah et al., 2023). This issue is worsened by teachers' limited knowledge of innovative models and digital media for teaching (Rahma et al., 2024). In this situation, there is an urgent need for solutions that can integrate technology into teaching in a way that actively involves students. The use of digital learning materials, if implemented effectively, can help students complete tasks more efficiently and meaningfully (Reflianto et al., 2021). So that an innovative approach can bridge the gap between global expectations and local realities.

Reading comprehension remains one of the most persistent issues in EFL classrooms, which affects students' ability to process and understand written material effectively. In many cases, students need more time than expected to complete reading tests and often request additional time or explanations; this indicates that the comprehension process is not as efficient as it should be (Hezam et al., 2022). This inefficiency reflects a broader problem in the current process of teaching and learning English, where teaching practices often fail to facilitate students' comprehension of reading materials (Zare et al., 2021). Early readers, especially those still developing reading comprehension, often face multiple challenges that limit their ability to engage meaningfully with text (Li et al., 2022). The most common barriers include limitations in word recognition during early schooling and inadequate oral language skills, both of which contribute to a weak vocabulary foundation and declining comprehension performance (Syafrizal et al., 2019).

To address these issues, a strategic approach is needed that empowers students to actively interact with text, as awareness of effective reading can help less proficient readers identify their weaknesses and take corrective measure before, during, and after reading (Kung & Aziz, 2020). Therefore, reading comprehension in the context of EFL is not only related to language proficiency but also to the quality of teaching and students' awareness of their abilities.

In addition to problems in reading comprehension, the main focus is on students' metacognitive awareness, which plays an important role in the way students can

approach and manage their learning processes. The success of classroom learning is also influenced by various factors that include the selection of appropriate instructional models, the integration of learning media, and the development of students' metacognitive awareness (Hamsyah et al., 2021). Metacognitive awareness enables students to consciously understand, regulate, and reflect on their learning activities, thereby promoting independence and self-confidence in an academic context (Nurajizah et al., 2018). However, preliminary findings from the Metacognitive Awareness Inventory pretest in this study indicate that participants' awareness levels are still low. This result is in line with a wider pattern in which many students find it difficult to reflect on their learning (Tuononen et al., 2023). These limitations hold students' ability to become greater learners. Therefore, it is also important to enhance students' metacognitive awareness by exploring instructional innovations that can strengthen metacognitive skills.

Moreover, metacognitive awareness is a critical component of student-centered learning, as it involves students' ability to regulate their learning processes and maintain motivation in the learning environment (Abdelrahman, 2020). Essentially, metacognition refers to awareness of one's own self-thinking processes and the strategies used to manage them (Jaleel & P, 2016). This awareness enables students to identify what they already know, recognize what they do not yet know, and determine the steps needed to fill the gaps in their knowledge (Karaoglan-Yilmaz et al., 2023). Furthermore, metacognitive awareness divided into two main components: knowledge about cognition and regulation of cognition. Knowledge about cognition involves knowing about cognitive processes that include three sub-processes, such as declarative knowledge (knowledge about self and strategies), procedural knowledge (knowledge about how to use strategies), and conditional knowledge (knowledge about when and why to use strategies) (Schraw & Dennison, 1994). Whereas, regulation of cognition focuses on managing and controlling these processes through five skills such as planning, information management, monitoring, debugging strategies, and evaluation. Together, these components give students the tools to consciously direct their learning, which makes metacognitive awareness a crucial foundation for academic success.

On the other hand, reading comprehension is a complex cognitive process that involves decoding written symbols to extract meaning from a text (Monica & Soplantila, 2024). This process requires readers to actively interpret and integrate new information with prior knowledge stored in memory (Pardede, 2019). Common measures of reading comprehension in language assessment include the ability to skim to find main ideas, locate details, infer meaning from context, interpret discourse markers, and make inferences, among other skills (Brown, 2004; Manurung et al., 2024). In developing reading comprehension, metacognitive processes are also

needed because metacognition is relevant to various cognitive tasks, including reading comprehension, writing, and problem-solving (Flavell, 1979). In the context of EFL education, effective reading comprehension is not only a linguistic challenge but also a cognitive one that requires language skills and the ability to strategically manage the reading process.

Early research on metacognition and reading consistently shows that metacognitive strategies significantly improve reading comprehension outcomes. For example, studies show that students use global strategies, problem-solving strategies, and support strategies during reading tasks, with strong links between these approaches (Amierul et al., 2023). These findings suggest that planning before reading, monitoring progress, addressing difficulties, and asking for help are essential parts of a successful reading experience. In addition, various studies confirm that metacognitive strategies are effective in improving the comprehension skills of EFL students (Bouknify, 2023; Chen, 2024), and the relationship between strategy use and comprehension levels has been strongly proven (Altamura, 2025).

In recent years, research has shifted toward exploring the role of learning media in developing metacognitive awareness. Digital tools and applications have appeared as worthwhile options for supporting student learning, with evidence showing their potential for improving self-regulation. For example, one study found that the use of one game-based learning application to learn English significantly improved students' metacognitive awareness during an eight-week intervention period (Achmad Suherman et al., 2025). These findings highlight that exploring innovative media designed to target both metacognitive awareness and reading comprehension is crucial and necessitates further research, particularly in the context of EFL learning.

Moreover, several previous research studies provide context for this research while highlighting existing gaps. (Akbar et al., 2025) examined Higher Order Thinking Skills (HOTS) in EFL students' reading practices, with a similar focus to this research on reading activities and the EFL context. However, their research approach differs from the methodology of this study, and the study focuses on Higher Order Thinking Skills (HOTS) rather than the impact of learning media on metacognitive awareness and reading comprehension. Another study had investigated the use of Learning Management Systems (LMS) in EFL reading classes, focusing on technology integration and promoting self-directed learning, but relied solely on survey-based self-reports without directly measuring understanding or metacognitive outcomes (Umarlinda et al., 2025). Whereas, the study by Rosnaeni et al. (2020) that explored students' metacognitive awareness and their ability in reading comprehension of narrative texts was in line with the variables in this research but without the innovative learning media component and focused on a different text type.

To address these gaps, this research introduces photomindset as an innovative learning medium that serves as the main intervention. Photomindset is a visual-based learning medium consisting of photos followed by guiding questions or prompts that stimulate students' critical thinking and support their ability to compose descriptive texts (Yuri et al., 2025). By engaging students through visual prompts, photomindset encourages them to actively observe, analyze, and construct meaning, which can improve metacognitive awareness and reading comprehension.

Although interest in metacognitive awareness and reading comprehension in EFL education continues to grow, most previous studies have commonly explored reading strategies or metacognitive strategy instruction (Han, 2024; Pahrizal et al., 2025). The gap suggests that there are still little research that explicitly examines the influence of learning media on both issues together. Innovations in photomindset media are also still less known and under-explored, leaving a gap in understanding the potential of this media to impact metacognitive awareness and reading skills (Yuri et al., 2025). Therefore, the novelty of this research lies in the introduction of photomindset media as a targeted intervention designed to improve students' metacognitive awareness and reading comprehension in EFL classrooms. Photomindset is a learning medium that contains photographs and prompting questions, which aim to stimulate students' critical thinking skills and assist them in constructing descriptive texts (Yuri et al., 2025). Furthermore, this research differs from previous research by employing a mixed-data design that combines questionnaire data, reading tests, and interview results to obtain comprehensive insights into students' performance and perceptions (Ariyandi et al., 2025; Darajat et al., 2025; Liu et al., 2024). This research contributes to enriching insights into the influence of learning media on metacognitive awareness and reading comprehension skills, especially among EFL students. To fill the gaps, this research aims to address the following research questions:

1. Is there any significant impact of the use of photomindset on students' metacognitive awareness and reading comprehension?
2. How do the students perceive the use of photomindset in relation to their metacognitive awareness and reading comprehension development?

RESEARCH METHODOLOGY

Research Design

An explanatory sequential mixed-method design was chosen to obtain a wide and deep understanding of the research problem. This design involves two phases, such as quantitative data collection in the first phase, followed by qualitative data collection to further explore the quantitative results (Creswell & Creswell, 2018). The research

for using this design was its ability to combine the generalizations of quantitative results with the rich context of qualitative results.

The first phase of this research focused on collecting numerical data through reading tests and questionnaires from the metacognitive awareness inventory. The aim of this research was to examine the impact of photomindset and its influence on students' metacognitive awareness in reading comprehension. While the second phase involved the collection of qualitative data through interviews, which aim to explore how students perceive of the use photomindset in relation to their metacognitive awareness and reading comprehension development. The sequential design allowed researchers to clarify ambiguities, enrich statistical results, and reveal possible factors that might not be apparent through numerical analysis alone (Creswell & Creswell, 2018).

Participants

This research involved 33 seventh-grade students from a junior high school in Batam. Participants were selected through purposive sampling. This class was chosen because the students had participated in a series of English learning activities using photomindset media based on the discovery learning method. Before data collection, students were given an explanation of the purpose and procedures of the research, and their participation was entirely voluntary. They gave their consent to participate in the research and were assured that their responses would remain confidential and would only be used for academic purposes. In addition, the students had been introduced to the concept of metacognitive awareness, so they understood the key terms used in this research. All participants had similar educational backgrounds, so consistency in the learning environment was maintained.

Instruments

This research used three research instruments, which are a reading comprehension test, the Metacognitive Awareness Inventory (MAI), and a series of interview questions. Each instrument was designed to collect specific data related to students' reading comprehension and metacognitive awareness after using photomindset media.

Reading comprehension tests were developed by researchers to measure students' comprehension of English texts after using photomindset. The test consists of several short texts followed by multiple-choice questions that measure students' reading comprehension to understand the main idea, identify specific details, and understand vocabulary in context. In order to ensure content validity, the test was reviewed by two EFL lecturers and one English teacher, who ensured that the questions adequately represented key aspects of reading comprehension. After validation by experts, the test was trialed on a separate group of 31 students who were not included in the main

population. The validity of each item was evaluated using Pearson's Product-Moment Correlation, comparing the correlation coefficient (r-count) with the r-table value of 0.355. A total of 35 items were found to be valid. The reliability of the test was measured using Cronbach's Alpha, resulting in a coefficient of 0.916, which indicates a high level of internal consistency. For the main research, 30 valid questions were selected and administered as pre-tests and post-tests to measure improvements in students' reading comprehension.

The Metacognitive Awareness Inventory (MAI) developed by Schraw and Dennison (1994) was used in its entirety without modification. This instrument was chosen because it has been widely recognized and used in many previous studies to measure students' metacognitive awareness. This instrument consists of 52 dichotomous items (yes/no) and measures two main components: knowledge about cognition (declarative, procedural, and conditional knowledge) and regulation of cognition (planning, information management, monitoring, problem solving, and evaluation). This instrument shows strong construct validity and high reliability with a Cronbach's Alpha value of 0.90 and an inter-factor correlation coefficient of $r = 0.54$. Due to its proven validity and reliability, the MAI was adopted directly to ensure accuracy and consistency with previous research (Schraw & Dennison, 1994).

Interview questions were used to collect qualitative data and explore how students viewed the use of photomindset in relation to their metacognitive awareness and reading comprehension. The questions were developed based on two components of MAI, knowledge of cognition and cognitive regulation, so that qualitative findings could complement quantitative results (Dorri & Kenevisi, 2025; Teng et al., 2024). As well as guided by the original MAI framework (Schraw & Dennison, 1994). Each component is represented through guiding questions, such as how students know and regulate their cognition after using photomindset media in understanding reading. The validity of the interview guide was validated through expert assessment by English as a foreign language lecturers who evaluated the clarity, relevance, and suitability of the questions to the research objectives.

Data for this research were collected in two sequential phases according to the explanatory sequential mixed-method design. The data collection procedures are summarized in the table below.

Table 1. Data collections

Phase	Procedure	Description
Preparation	Participant selection	Thirty-three seventh-grade students were selected through purposive sampling. They were informed about the objectives and procedures of the research, and their participation was voluntary. Written consent was obtained, and students were assured

Phase	Procedure	Description
		that their responses would remain confidential and used only for academic purposes.
Pretest	Reading comprehension test and MAI	Both instruments were administered online through Google Forms. The pre-test aimed to identify students' initial levels of metacognitive awareness and reading comprehension before the use of photomindset media.
Treatment 1	Introducing Photomindset through Discovery Learning	Students explored photos and mnemonic questions on Typeform to stimulate critical thinking during data collection and processing stages.
Treatment 2	Applying Photomindset for Reading Descriptive Text	Students used photomindset on Typeform to enhance reading skills through descriptive texts about extracurricular activities.
Treatment 3	Guided Writing of Descriptive Text Using Photomindset	Students developed ideas and wrote descriptive texts after answering mnemonic questions on photomindset.
Treatment 4	Reinforcement through Independent Use of Photomindset	Students independently applied discovery learning and photomindset to strengthen their descriptive writing skills.
Post-test	Reading comprehension test and MAI	After the treatment, both instruments were re-administered to the same participants to measure possible changes in students' metacognitive awareness and reading comprehension performance.
Interview	Semi-structured interviews	Five students who showed the highest improvement in both reading and MAI scores were purposively selected to participate in semi-structured interviews. The interviews were conducted individually in a quiet classroom setting, lasted about 15–20 minutes, and were recorded with participants' consent. The interview guide was flexible to allow follow-up questions when necessary. All responses were transcribed and prepared for thematic analysis.

Previously developed in Yuri et al. (2025), photomindset is a visual learning medium designed to stimulate students' critical thinking through the implementation of visual prompts. After the treatment was completed, both instruments, the Metacognitive Awareness Inventory and the reading comprehension test, were administered again

to the same participants as a post-test. This procedure aimed to identify potential changes in students' metacognitive awareness and reading comprehension performance after the use of photomindset media. Although, this research did not involve a control group.

Four treatments were designed to gradually improve students' reading comprehension through the integration of photomindset media into the discovery learning framework. In the first treatment, photomindset served as a tool to train students' observation and critical thinking skills through photo-based mnemonic questions, which are important cognitive processes for understanding written text. The second treatment directly engaged students with descriptive reading materials, allowing them to analyze text structure, identify main ideas, and understand supporting details, thereby enhancing their reading comprehension skills. The third treatment further connected reading with writing, where students reconstructed meaning and developed descriptive texts based on their comprehension, enhancing their understanding through productive skills. Finally, the fourth treatment allows students to apply Photomindset and discovery learning independently, demonstrating their improved ability to interpret, analyze, and comprehend written information. Overall, these stages support the gradual development of students' reading comprehension skills by encouraging active engagement, critical analysis, and reflective understanding throughout the learning process.

Data Analysis

Data analysis in this research was conducted in accordance with a mixed design of sequential explanatory methods. Quantitative data was analyzed first, followed by qualitative data analysis to provide a more insightful interpretation and explanation.

In the quantitative phase, data from reading comprehension tests and MAI were analyzed statistically. The first step was to test the normality of the data using the Shapiro-Wilk method to determine whether the scores were normally distributed. Since the data fulfills the assumption of normality, a paired sample t-test was applied to compare students' pre-test and post-test scores. This analysis aimed to examine whether there were significant differences in students' metacognitive awareness and reading comprehension after the implementation of photomindset media.

In the qualitative phase, interview data were analyzed using thematic analysis based on the six-step procedure (Braun & Clarke, 2012). These steps included (1) understanding the data by reading and rereading the interview transcripts, (2) generating initial codes by identifying meaningful statements related to metacognitive awareness and the use of photomindset, (3) searching for themes by grouping similar codes, (4) reviewing themes to ensure their consistency and relevance, (5) clearly defining and naming themes, and (6) producing a final report

presenting interpretations supported by direct quotes from participants. Qualitative findings were then integrated with quantitative results to provide a more comprehensive understanding of how photomindset influences students' metacognitive awareness and reading comprehension.

RESULTS

This section presents the results of the research based on two research questions. The first research question focuses on calculating the impact of photomindset media on students' metacognitive awareness and reading comprehension. Meanwhile, the second research question focuses on exploring how students view the use of photomindset in relation to the development of metacognitive awareness and reading comprehension. The research data was collected from 33 students in a class at a junior high school in Batam who had undergone treatment using photomindset media.

Is there any significant impact of the use of photomindset on students' metacognitive awareness and reading comprehension? (Research Question #1)

To analyze quantitative data, parametric statistics were used to answer the first research question. The selection of parametric data analysis was supported by the results of the Shapiro-Wilk normality test in Table 2 below.

Table 2. Result of normality test Shapiro-Wilk

	Kolmogorov-Smirnov			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
MCPre	.141	33	.093	.923	33	.022
MCPo st	.208	33	<,001	.901	33	.006
RCPre	.216	33	<,001	.919	33	.018
RCPo s t	.200	33	.002	.902	33	.006

The table above shows the results of the Shapiro-Wilk normality test, which indicates that the significance values (Sig.) for the pretest data of the two variables, metacognitive awareness and reading comprehension, are 0.022 and 0.18, respectively, which are greater than 0.05. This indicates that the pretest data for both variables are normally distributed. Similarly, the post-test data for both variables, where the significance values are 0.06 and 0.06, respectively, which are greater than 0.05, also indicate that the post-test data for both variables are normally distributed. Therefore, the research data for these two variables are qualified to conduct parametric statistical tests to examine the impact.

Furthermore, because the data is normally distributed, the test to get the answer to the first research question is to analyze the data with a paired sample test. Paired sample statistical data in the pretest and post-test results of students' metacognitive awareness and reading comprehension, which shows the mean, standard deviation, and standard error, can be seen in Table 3, as follows.

Table 3. Result of paired sample statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	MCPre	75.16	33	2.74	.48
	MCPo st	85.66	33	5.81	1.01
Pair 2	RCPre	77.47	33	8.08	1.04
	RCPo st	94.14	33	3.82	.67

From the table 3, it can be seen that there were 33 participants involved in the pretest and post-test of metacognitive awareness and reading comprehension. In pair 1, the data of the metacognitive awareness variable can be seen, which shows that there is an increase in the mean from before treatment (pretest), which is 75.16, to 85.66 after treatment (post-test). Then, the pretest standard deviation, which is 2.74, is relatively less tight, which indicates a smaller variation than the post-test standard deviation, which is 5.811, which indicates that the data is more variational. Meanwhile, the low standard error for both measurements (pretest: 0.48 and post-test 1.011) indicates the sample mean acquired is most likely a fairly accurate estimate of the true population mean. On the other hand, in pair 2, it can be seen that the reading comprehension variable data shows that there is an increase in the mean from before treatment to after treatment (pretest: 77.47 and post-test: 94.14). Then, the standard deviation before treatment varied more than after treatment (pretest: 8.08 and post-test: 3.82). Meanwhile, the low standard error for both measurements (pretest: 1.41 and post-test: 0.66) also indicates that the sample mean obtained is most likely a fairly accurate estimate of the true population mean. The significant increase in the mean on both variables indicates that the intervention was effective. Furthermore, the relationship between pretest and post-test data on both variables is presented in Table 4 below.

Table 4. Result of paired samples correlations

		N	Correlation	Sig.
Pair 1	MCPre & MCPPost	33	.548	<.001
Pair 2	RCPre & RCPPost	33	.327	.064

Table 4 explains the correlation between pretest and post-test data on each variable. It can be seen that the decision-making for the correlation test results is that if the significance value is less than 0.05, then there is a significant correlation, and when the significance value is more than 0.05, then there is no significant correlation. For the metacognitive awareness variable, the significance value is <0.001, which indicates that there is a significant relationship between the metacognitive awareness pretest and post-test data, while for the reading comprehension variable, the significance value is 0.64, which indicates that there is no significant relationship between the reading comprehension pretest and post-test data. Furthermore, the paired sample test results for the pretest and post-test of both variables are shown in Table 5.

Table 5. Result of paired samples test

		Paired Differences							
		Mean	Std. Deviation	Std. Error	95% Confidence Interval of the Difference		t	df	Sig. (2-tailed)
					Lower	Upper			
Pair 1	MCPre - MCPPost	10.49	4.88	.85	-12.22	-8.76	-	32	<.001
Pair 2	RCPre - RCPPost	16.67	4.73	1.35	-19.41	13.93	-	32	<.001

Table 5 shows that there is a significant change between the pretest and post-test. The basis for decision-making of the difference test is the Sig value. (2-tailed) < 0.05, then there is a significant difference in the pretest and post-test, while if the Sig. (2-tailed) is greater than 0.05, then there is no significant difference in the pretest and post-test. The table above shows that the Sig. (2-tailed) for pair 1 and pair 2 is <0.001, which is smaller than 0.05, so it can be interpreted and answer the first research question that there is a significant difference in students' metacognitive awareness

before and after the intervention, and there is also a significant difference in students' reading comprehension before and after the intervention.

How do the students perceive the use of photomindset in relation to their metacognitive awareness and reading comprehension development? (Research Question #2)

Once the qualitative data was complete, semi-structured interviews were also conducted to supplement the quantitative data. The qualitative data was analyzed using thematic analysis of 16 interview questions. Once the qualitative data had been collected, semi-structured interviews were also conducted to facilitate a deeper understanding of the quantitative data results. The qualitative data was analyzed using thematic analysis of 16 interview questions. The thematic analysis procedure consisted of six phases (Braun & Clarke, 2012). The first phase is familiarizing the data, where interview transcripts are read repeatedly with the aim of intimately finding things that are relevant to the research questions. The second phase is generating initial codes that are potentially relevant to the research questions, where the codes generated are codes that describe the data. The third phase is searching for themes, where potential themes are formed from the codes in the previous phase. The fourth phase is reviewing potential themes by checking whether the themes to be formulated and determined can represent the data or not. The fifth phase is determining and naming the themes with the criteria of having a singular focus, not being repetitive, and directly answering the research questions. The final phase is reporting the themes by providing a compelling story about the data based on the researchers' analysis. Once the researchers have found the following themes to answer the research questions.

Photomindset as a media that enhance students' metacognitive awareness

Previously, most students reported reading without a plan, simply repeating the text until they felt they understood it. As one student explained, *"Back then, it wasn't planned out; I just read until I understood."* However, once they got to know photomindset media, their approach to learning became more systematic. Students began to outline specific steps, such as looking at the images first, guessing the content of the text, and then reading the text with greater focus. Another student shared, *"Maybe now I have steps before starting to read. First, I look at the images, then the text... so I can save time."*

As well as being helpful in planning, photomindset media also influences students' awareness in monitoring their understanding. The prompting questions in it make it easier for them to check whether they have understood the text or not. One student said, *"With photomindset media, it prompts me to answer questions with SHOWeD... it really helps me to understand the text."* In fact, some students feel they become

more aware faster when the strategy being used is ineffective and immediately switch to another approach. *"photomindset media really helps me decide when to switch strategies... I can feel which ones make me understand better and which ones don't."* Another student also said, *"Yes, because the question made me realize that the method I was using wasn't working."*

This supports the point that the photomindset media has an impact on students' metacognitive awareness. From this, it can be seen that the photomindset media not only guides students to have more planned reading skills but also develops their metacognitive awareness in monitoring, evaluating, and reflecting on the reading comprehension process.

Photomindset as a support for reading comprehension development

Other than increased metacognitive awareness, students also felt that photomindset media helped them to support their reading comprehension. Many of them mentioned that the images in this medium made it easier to visualize the content of the text. *"I realized that looking at the pictures first helps me to visualize the content of the text, so when I read it, it makes more sense to me."* A similar statement was made by another student: *"If I look at the images first, I can visualize the content of the text, so when I read it, it makes more sense... questions like 'What is happening?' help me focus on the details."*

In addition, with visual support, students feel faster at capturing the main ideas, understanding details, and remembering important information from the text more quickly. One student said, *"With photomindset media... it's easier for me to understand texts or readings."* Moreover, reading activities become more focused and enjoyable because students do not just read repeatedly but follow the flow of the images and questions. One student described their experience: *"Now that I use photomindset media, I often use the strategy of looking at the images first... so when I read, I don't just jot down notes randomly, but more neatly."* From the experiences of these students, it is clear that photomindset media not only makes reading easier to understand but also increases their engagement in reading. As a result, photomindset media contributes to the development of more thorough reading comprehension.

DISCUSSION

The results of this research indicate that photomindset media significantly improves students' metacognitive awareness and reading comprehension. Quantitative results show a significant increase in the mean scores for both variables from pre-test to post-test, with statistically significant differences (Creswell & Creswell, 2018). Further qualitative results show that students became more systematic in their reading

approach, more reflective in monitoring their comprehension, and more engaged in the reading process when using photomindset media.

Students reported that being more aware of their reading process, like being able to switch approaches if the first one was not effective (Wallot et al., 2019). Thus, suggesting that photomindset not only improves comprehension outcomes but also promotes adaptive learning behaviors. The weak correlation in reading comprehension scores contrasts with qualitative findings indicating positive student perceptions (Husain et al., 2024). This contrast confirms that students' learning experiences may have captured benefits that are not fully reflected in statistical tests.

Previous research has found that the application of metacognitive strategies significantly improves the reading comprehension of Indonesian high school students, with a strong effect size and clear improvements in pre-test and post-test scores (Muhid et al., 2020). This is in line with the current research, in which photomindset media also produced significant improvements. However, while previous research emphasized explicit training in metacognitive strategies, the current study shows that metacognitive awareness can be developed implicitly through visual cues and guided questions in photomindset media (Muhid et al., 2020).

Similarly, previous research by Parmis et al. (2020) reported that students in the digital age have a high level of metacognitive awareness of reading strategies, often supported by online reading habits and visual content. This is also in line with current studies showing that visual and digital tools, such as photomindset, can increase metacognitive awareness and reading comprehension. The difference lies in the methodological approach; previous research focused on descriptive survey data on reading habits and awareness, while this research applied interventions and measured improvements in metacognitive awareness and reading comprehension variables (Parmis et al., 2020).

On the other hand, another previous research found that the use of internet-based learning combined with metacognitive instruction increased students' motivation but did not significantly improve their reading comprehension or metacognitive awareness compared to traditional classrooms (Mirzapour & Mohammed, 2023). This contrasts with the present results, where photomindset media produced measurable improvements in both reading comprehension and metacognitive awareness.

Moreover, the significance of this research in practical terms is that the photomindset can be used by teachers or tutors as an innovative medium to increase students' metacognitive awareness and reading comprehension (Yuri et al., 2025). Theoretically, these results expand the literature on the integration of visual media in English language learning, especially in the context of EFL junior high school students. For education policy, these results provide a simple and applicable alternative method for

schools. However, this research also has limitations, as it was limited to a small sample size of 33 students from one school, so the generalization of the results is still quite limited.

In addition, further research could be conducted by involving larger samples and diverse school contexts. Furthermore, it is necessary to explore variations in photomindset design or its integration with other digital media to see its wider effectiveness. Overall, this research confirms that photomindset media contributes positively to improving students' metacognitive awareness and reading comprehension. These results demonstrate the potential of visual media to support a more reflective and meaningful learning process (Aldi et al., 2025).

CONCLUSION

This research shows that photomindset media significantly improves metacognitive awareness and reading comprehension in the context of learning English as a foreign language (EFL). The results of this research expand the theoretical understanding of how visual-based interventions can encourage reflective learning processes by encouraging students to be aware of their knowledge and regulation of cognition. These results also contribute to the literature by showing that students' metacognitive awareness can be developed not only through explicit strategy training but also implicitly through visual cues and guided questions. In practice, photomindset media provides teachers with a simple yet innovative tool to improve student engagement and understanding in reading activities. By combining visuals with guided prompts, this approach helps students process texts more efficiently and meaningfully, making reading more accessible and enjoyable. Although limited to a small sample, this research offers valuable implications for classroom practice and suggests further research with larger and more diverse populations to maximize the potential of photomindset in language education.

CONFLICT OF INTEREST

The authors declare that they have no known financial or personal relationships that could have appeared to influence the work reported in this paper. All authors confirm that there are no competing interests, either financial or non-financial, related to the content or materials presented in this manuscript.

AUTHOR (S) CONTRIBUTION

Yudani, N.P.: Yudani, N. P.: Conceptualization (lead), methodology (lead), writing – original draft (lead), review (supporting), editing (supporting). Manurung, S.: Conceptualization (supporting), methodology (supporting), review (lead), editing (lead), supervision (lead). Siahaan, S.: Conceptualization (supporting), review (lead), editing (lead), supervision (supporting).

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