JCP (Jurnal Cahaya Pendidikan)
Vol. 11 No. 1: 1-10
June 2025
E-ISSN: 2655-9412

THE EFFECTIVENESS OF PHOTOMINDSET LEARNING MEDIA BASED ON DISCOVERY LEARNING TO ENHANCE EFL STUDENTS' CRITICAL THINKING

EFEKTIFITAS MEDIA PEMBELAJARAN PHOTOMINDSET BERBASIS DISCOVERY LEARNING UNTUK MENINGKATKAN KEMAMPUAN BERPIKIR KRITIS SISWA

Received: 02/08/2024; Revised: 24/03/2025; Accepted:25/06/2025; Published: 30/06/2025

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ABSTRACT

Students' low English proficiency and critical thinking often stem from traditional language learning methods that do not encourage performance, creativity, or analytical abilities. Teachers play a vital role in cultivating these skills through meaningful and interactive learning experiences. This study investigated the effectiveness of using photomindset learning media based on a discovery learning method to enhance English as a Foreign Language (EFL) students' critical thinking skills. Employing a quantitative approach with a one-group pre-test post-test design, this study involved 33 first-grade students from a Junior High School in Batam, Indonesia, through purposive sampling. The research instrument was a test consisted 30 multiple-choice questions and one essay covering reading and writing section, validated by expert judgment, Pearson Product-moment and tested for reliability using Cronbach's Alpha. A Paired-sample T-test revealed a significant difference between pre-test and post-test scores (a sig. (2-tailed) = 0.000 < 0.05). The finding demonstrates that using photomindset learning media based on discovery learning effectively enhances students' critical thinking skills. This study contributes valuable insights into EFL teaching by demonstrating how integrating discovery learning with visual media can foster students' analytical and problem-solving abilities. Future research should explore its impact on other English skills and involve a larger sample with a control group for broader comparisons.

Keywords: *critical thinking, discovery learning, photomindset, reading comprehension, writing skills.*

ABSTRAK

Rendahnya kemampuan Bahasa Inggris dan kemampuan berpikir kritis siswa sering kali berawal dari metode pembelajaran tradisional yang tidak mendorong penampilan, kreativitas atau kemampuan analitis. Guru memegang peran penting dalam mengembangkan keterampilan ini melalui pengalaman belajar yang bermakna dan interaktif. Penelitian ini mengkaji efektivitas penggunaan media pembelajaran photomindset berbasis metode discovery learning untuk meningkatkan kemampuan berpikir kritis siswa dalam pembelajaran Bahasa Inggris sebagai bahasa asing (EFL). Menggunakan pendekatan kuantitatif dengan desain one-group pre-test post-test, penelitian ini melibatkan 33 siswa kelas satu Sekolah Menengah Pertama di Batam, Indonesia, melalui purposive sampling. Instrumen penelitian berupa tes yang terdiri dari 30 soal pilihan ganda mencakup aspek membaca dan menulis, divalidasi dengan penilaian ahli, Pearson Product-moment, dan uji reliabilitas menggunakan Cronbach Alpha.

Uji T-sampel berpasangan menunjukkan perbedaaan signifikan antara skor pre-test and post-test (sig (2-tailed) = 0.000 < 0.05). Hasil penelitian menunjukkan bahwa penggunaan media photomindset berbasis discovery learning efektif meningkatkan kemampuan berpikir kritis siswa. Penelitian ini memberikan kontribusi wawasan dalam pengajaran dan pembelajaran Bahasa Inggris sebagai bahasa asing dengan menunjukkan bagaimana integrasi discovery learning dengan media visual dapat menumbukan kemampuan analitis dan pemecahan masalah siswa. Penelitian selanjutnya dapat mengeksplorasi dampaknya terhadap keterampilan Bahasa Inggris sebagai bahasa asing lainnya dengan melibatkan sampel yang lebih besar dan kelompok kontrol untuk perbadingan yang lebih luas.

Kata kunci: *berpikir kritis, discovery learning, photomindset, pemahaman membaca, kemampuan menulis.*

How to cite: Yuri, M.P, Manurung,S., Yudani, N.P., Sembiring, E., Pratiwi, I.S. & Ghaisani, F. (2025). The Effectiveness of Photomindset Learning Media Based on Discovery Learning to Enhance EFL Students' Critical Thinking. *Jurnal Cahaya Pendidikan*, 11(1), 1-10. https://doi.org.10.33373/chypen.v11i1.6751

INTRODUCTION

Critical thinking skills are crucial for education in Indonesia today, as they enable students to make informed decisions using the information they have (O'Reilly et al., 2022). Recognized as a 21st century skill, critical thinking enhances students' ability to analyze, engage in discussions, express their thoughts, and make conclusions (Rahayu & Kuswanto, 2021). Research indicates that students with strong critical thinking skills are more likely to make the right decisions and avoid mistakes in making decisions (Chusni et al., 2021). Since critical thinking skills are not innate and do not develop independently, they must be systematically integrated into every subject (Dewanthikumala et al., 2021).

Critical thinking skills are an active process when someone examines things, asks questions, and seeks information on their own, rather than passively receiving ideas and knowledge (Zare et al., 2021). As a higher-order thinking skill, it plays a crucial role in cognitive development (Azizah et al., 2020). In recent years, developing higher-order thinking skills has become a major goal in education (Mislia et al., 2019). Recognizing its importance, the Indonesian government has incorporated critical thinking as a key aspect of the Pancasila Learner Profile within the Merdeka Curriculum. This highlights the necessity of integrating critical thinking skills across all subjects, including English as a Foreign Language (EFL) learning. Consequently, schools and universities should adopt curricula that promote higher-order thinking skills (Riswanto et al., 2022). The role of critical thinking in EFL learning has been widely studied and revealed that critical thinking facilitates students' learning and thought processes (Widyapuraya et al., 2023). Research suggests that students with well-developed critical thinking skills demonstrate improved writing skills and reading comprehension (Ferdiansyah et al., 2020; Vana & Nurhaeni, 2024). The ability to analyze, interpret and construct logical argument is fundamental for language learners as it enables them to comprehend texts effectively and articulate ideas coherently (Jayanti, 2021).

However, a pilot study conducted in one of Junior High Schools in Batam, Indonesia, revealed that students' critical thinking remain low. This could be seen by the low pre-test scores in reading comprehension and writing, with an average score of only 45%. Students exhibit limited proficiency in articulating their views, comprehending contextual information, and constructing logical reasoning in writing tasks (Pohan, 2020). The primary causes of these challenges include lack of engaging learning media and the utilization of conventional teaching method. Traditional methods, such as lectures, often lead to passive learning, where students mainly listen rather than actively engaging in the learning process (Dogani, 2023; Mislia et al., 2019).

To address this issue, there is a need for new innovative learning media that can enhance students' critical thinking skills, especially in EFL learning. Innovative learning media in the classroom is essential to keep students interested and actively engaged in learning activities (Harahap et al., 2023; Yanti et al., 2023). One effective strategy is using photomindset learning media based on discovery

learning, which encourages the students to analyze visuals, construct knowledge, and enhance both critical thinking and English proficiency. Photomindset is a digital learning media comprising instructions, vocabulary lists, photos, and prompt questions. Photomindset combines several strategies to enhance reading and writing skills. This learning media applies three essential components from Brown (2004) for assessing reading and writing including picture-cued tasks, guided questions and answers, and ordering tasks.

The picture-cued task involves using photos as stimuli to prompt responses from students. In photomindset, students observe a photo and interpret its meaning, which helps develop their visual analysis, critical thinking and comprehension skills. This media encourages students to make connections between visual elements and textual descriptions, reinforcing their ability to analyze and describe what they see. Next, guided questions and answers provide structured prompts to help students in generating responses. Through photomindset, students engage with some questions related to the photo, helping them articulate their thoughts clearly. Guided questioning process also help students in organizing ideas logically and encourages deeper engagement with the content. Lastly, ordering tasks help students sequence their ideas in a structured manner. Employing photomindset, students initially address specific questions and subsequently arrange their answer into cohesive paragraph. This systematic step enhances both reading comprehension and writing skills, as students learn to structure their thoughts in a logically and cohesively. By integrating these strategies, photomindset provides and engaging significant medium for language acquisition. It does not only enhances students' analytical skills regarding visual content but also augment their ability to construct well-formed written responses, making the learning process more engaging and efficacious.

Photomindset learning media is fundamentally influenced by photovoice, a process that enables individuals to recognize, describe and strengthen their communities through the use of specific photographic techniques (C. Wang & Burris, 1997). Photovoice was found as an effective learning tool to develop students' ability to understand the significance behind the photos they take and enhance their critical reflection on an issue such as the positive and negative impacts of globalization (Haffejee, 2021). Additionally, educators can modify photovoice-based approaches to learning by using the desired method (T. Wang, 2020). By incorporating photovoice, photomindset fosters students' ability to interpret images, reflect on their meaning, and articulate their insights in written form.

Photomindset learning media is also integrated with the discovery learning method in its application. Discovery learning plays a crucial role in language learning by encouraging students to actively explore, analyze, and construct their own understanding, and foster deeper critical thinking skills. According to Hammer (1997), discovery learning is a learning method in which students explore and investigate the material under the teacher's guidance. This learning method enables students to collect information, identify issues, and solve problems on their own (Yulianta, 2021). This learning method provides opportunities for learners to explore and utilize all their competencies to find solutions to problems. Discovery learning also arouses learners' curiosity by increasing their motivation and enthusiasm to find answers to questions asked during learning (Yazdani & Sadeghi, 2022). Studies revealed that the discovery learning method encourages active learning and critical thinking through self-exploration and investigation and helps students understand the content of texts more quickly (Vana & Nurhaeni, 2024). Consequently, when integrated with photomindset learning media, this approach enhances students' ability to interpret visual information, make connections, and develop a more analytical mindset in the learning process.

Although discovery learning methods has been widely implemented with audio, video and text-based media (Akihary et al., 2023; Chusni et al., 2021), few studies have explored the use of photographs as primary medium, particularly in EFL learning. Therefore, this research fills the gap in applying photomindset learning media based on the discovery learning method to developing students' critical thinking skills through photo and mnemonic questions in EFL learning. Based on the research objectives, the research question of this research was formulated as "Is there a significant difference in students' critical thinking skills after using photomindset learning media?". Thus, this study seeks to examine the effectiveness of photomindset learning media in enhancing EFL students' critical thinking skills through a discovery learning approach.

MATERIAL AND METHODS

This research was an experimental study using one group pre-test post-test design method. This research involved only one group and does not include a comparison or control group. The research process for the experimental group consisted of only three steps. The first step, giving a test to the group known as the pre-test. Second, conducting experiments or treatment on the experimental group. Third, give a test to the group known as the final test or post-test (Sugiyono, 2022). The independent variable of this research is photomindset learning media with discovery learning, while the dependent variable is students' critical thinking. The population of this research consisted of 249 first-year students at one of Junior High Schools in Batam, Indonesia, in academic year 2023/2024. Purposive sampling was used to select one class out of nine (33 students from 249) to ensure a manageable and focused implementation of photomindset learning media based on discovery learning. This selection allowed for an in-depth exploration of its effectiveness while maintaining consistency in students' learning backgrounds and classroom conditions.

Researchers designed research instruments to measure students' critical thinking in the initial stage. The questions contained a reading comprehension test and a writing test. These questions were structured based on critical thinking indicators according to Anderson and Krathwohl's Taxonomy, which include C1 (Remembering), C3 (Applying), C4 (Analyzing), C5 (Evaluating), and C6 (Creating). A content validity test was conducted to ensure the research instrument accurately measured students' critical thinking skills. This process involved expert judgment from EFL teachers and lecturers, who evaluated whether the instrument covered all essential aspects of critical thinking skills. Their assessment confirmed that the instrument appropriately addressed the targeted constructs. Following experts' validation, the instrument was piloted with a non-sample group of 31 students to assess the test validity further. Pearson's Product moment correlation was employed to assess the correlation between each item and the total score. The analysis compared r-count and r-table values, and the results indicated that 35 items were valid as the r-count values were >0.355. This is done to ensure that the test instrument measures what should be measured (validity) and provides consistent results if used repeatedly (reliability).

The reliability test in this study was conducted using Cronbach's Alpha to measure the internal consistency of the instrument. The analysis results showed a reliability coefficient of 0.916, which indicates a high level of reliability and suggests that the instrument consistently measures students' critical thinking skills, as shown in Table 1.

Table 1. Reliability Statistics

Cronbach's Alpha	N of Items
0.916	35

After the instrument was valid and reliable, the instrument was distributed to students with a total of 30 multiple choice questions and 1 essay. In the experimental stage, researchers carried out English language learning using photomindset media based on discovery learning with the main topic of extracurricular activities. By the end of the course, students were expected to comprehend a descriptive text and be able to compose a basic one. The implementation of photomindset learning media based on the discovery learning method involved using photos and mnemonic questions embedded in a Typeform website. The process consisted of several stages: stimulation and problem statement. During these stages, students were presented with photos and texts related to extracurricular activities and descriptive texts, along with mnemonic questions that are an evolution of the SHOWeD questions: "What do you **see**?", "What is **happening**?", "How is it related to **our life**?", "What can **we do**?". These developed mnemonic questions are used to enhance students' thinking processes, enabling them to easily articulate their thoughts, which can range from opinions and comments to questions. The next stage was data collection and data processing. This stage is the core stage in the discovery learning method. Students were given the opportunity to use photomindset learning media on the Typeform website. In this stage, before students were instructed to create

descriptive text based on the available photos, students were allowed to explore the photos and the questions contained in the learning media first. The process of students answering each mnemonic question aimed to train and improve students' critical thinking process. Thus, when students were instructed to make descriptive text based on the photos listed, students no longer had difficulty to express their thoughts. In the final stage, namely verification and generalization, students were able to understand descriptive text and extracurricular activity. Finally, students presented the results of the photo description of extracurricular activities that they had compiled after going through the whole process. The photomindset learning media that supports this stage can be seen in Figure 1, 2 and 3.

Figure 1. Start Menu Display of Photomindset Learning Media

Figure 2. One of the Mnemonic Questions in the Photomindset Learning Media

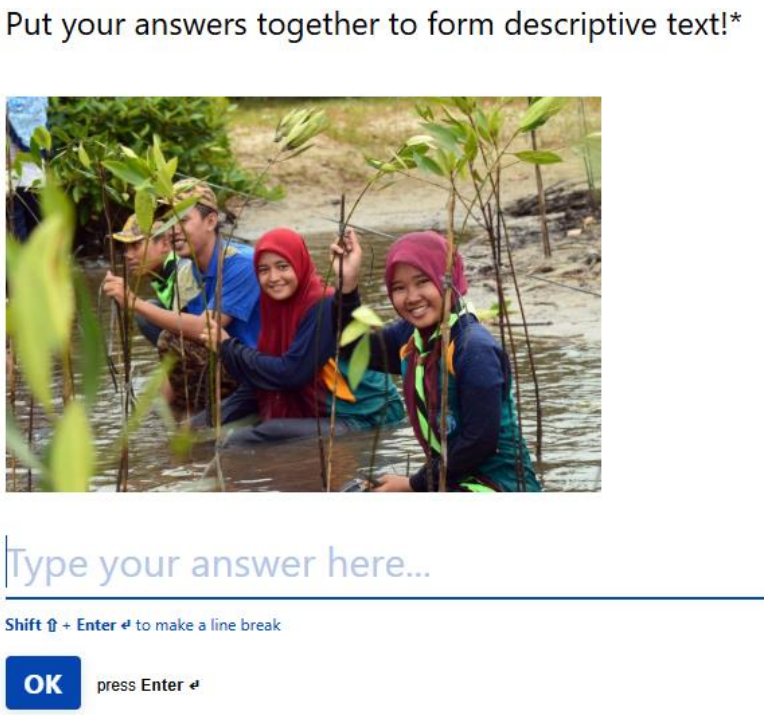

Figure 3. Final Stage of the Photomindset Learning Media

Following the data collection, an analysis of the students' pre-test and post-test results was performed. Normality test was conducted as prerequisite using the Shapiro Wilk test, as the sample was less than 50 (Habibzadeh, 2024). The Premise of the normality posits that the data distribution is normal if the sig. > 0.05. A statistical Paired Sample T-test was used to compare two mean score from the same group at two different time or conditions using SPSS version 26. The Hypothesis Alternative (Ha) states that there is an increase in students' critical thinking skills in English learning after the treatment, indicated by a 2-tailed significance result of less than 0.05. The Null Hypothesis (H0) suggests that there is no significant increase in students' critical thinking skills in English learning after the treatment, with the 2-tailed significance result being greater than or equal to 0.05.

RESULT AND DISCUSSION

To analyze the collected data, parametric statistics were used to test the hypothesis of this study. This is supported by the Shapiro-Wilk normality test results shown in the Table 2 below.

Table 2. Result of Shapiro Wilk Normality Test

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	**df**	**Sig.**	**Statistic**	**df**	**Sig.**
Pre-Test_CT	.073	33	.200*	.985	33	0.921
Post-test_CT	.086	33	.200*	.942	33	0.077

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

Based on the table above, the Shapiro-Wilk normality test results for the pre-test show a significance value (sig) of 0.921 which is greater than 0.05. This indicates that the pre-test data is normally distributed. Similarly, the post-test data has a significance (sig) value of 0.077 which is also greater than 0.05 indicating that the post-test data is also normally distributed. Therefore, both the pre-

test and post-test data follow a normal distribution, allowing the use of parametric statistical tests in further data analysis.

Furthermore, because the data were normally distributed, hypothesis testing was carried out using parametric statistics, namely the Paired Sample T-test. The level of students' critical thinking in English learning is presented through descriptive statistics of the pre-test and post-test results, which consist of mean scores, standard deviation, and standard error of the mean. Descriptive statistics for pre-test and post-test scores are presented in the Table 3 below.

Table 3. Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Pre-test	45.75	33	13.193	2.297
	Post-test	82.12	33	9.502	1.654

Based on the table above, it can be seen that the number of students who took the pre-test and post-test was 33 students. The analysis results show a significant increase in the mean score from the pre-test to the post-test. The pre-test mean was 45.75, while the post-test mean increased to 82.12. The standard deviation on both measurements (pre-test: 13.193 and post-test: 9.502) showed that the variation or spread of scores around the mean was relatively consistent between the two tests. The low standard error of the mean on both measures (pre-test: 2.297 and post-test: 1.654) indicates that the sample mean obtained is most likely a fairly accurate estimate of the true population means. A significant increase in mean scores from pre-test to the post-test indicates the effectiveness of the intervention applied between the two tests. The relationship between pre-test and post-test data is shown in the Table 4 below.

Table 4. Paired Samples Correlation

		N	Correlation	Sig.
Pair 1	Pre-test & Post-test	33	-.014	0.939

The table above explains the relationship between pre-test and post-test data. The significance result is 0.939, which is greater than 0.05. As the basis for making correlation test decisions, if the significance value is greater than 0.05, there is no relationship between the pre-test and post-test. Therefore, based on the table above, the significance result is 0.939>0.05, meaning the pre-test and post-test data have no relationship. Next, descriptive statistics and the result of the Paired Sample T-test formula for the pre-test and post-test are presented in Table 5 below.

Table 5. Paired Samples Test

				95% Confidence Interval of the Difference					
		Mean	Std.Deviation	Std. Error Mean	Lower	Upper	t	df	Sig. (2-tailed)
Pair 1	Pre-test & Post-test	-36.370	16.366	2.849	-42.173	-30.567	-12.766	32	0.000

In Table 5, the results of descriptive analysis of pre-test and post-test explain that there is a significant change between pre-test and post-test using the Paired Sample T-test formula. The basis for decision-making is if the Sig. (2-Tailed) value < 0.05, the Hypothesis Alternative (Ha) is accepted, means there is a significant difference between learning outcomes in pre-test and post-test data. Then,

if the Sig.(2-Tailed) value > 0.05, the Null Hypothesis is accepted, indicating there is no significant difference between the learning outcomes in the pre-test and post-test data. Table 5 shows the Paired Sample T-test analysis results obtained a Sig. (2-tailed) value of 0.000, which is smaller than the significance of 0.005; thus, the Hypothesis Alternative (Ha) is accepted. This suggests that the intervention contributed to the improvement of students' critical thinking skills.

The results of this study revealed an increase in students' grades after the application of photomindset media. This teaching and learning media can help students in answering questions with various cognitive levels in taxonomy blooms such as C1 (Remembering), C3 (Application), C4 (Analysis), C5 (Evaluation), and C6 (Creating). This has many benefits for mastering 21st century educational competencies, such as creativity, critical thinking, collaboration, and communication skills (Setiawati, 2023). Students' critical thinking improvement after using photomindset media was observed when students doing the essay test. Before the treatment, students had difficulty in writing descriptive text about an object. However, after using photomindset, students could write descriptive texts about the given photos effectively. Photomindset with discovery learning method is very helpful in developing students' critical thinking skills, with several stages implemented, students can be active and express their thoughts about what they see based on facts and their knowledge.

The research results are relevant to Akihary et al (2023), who highlighted that integrating media with a discovery learning approach can improve students' cognitive test scores and critical thinking skills. This research finding is also supported by previous research by Ferdiansyah et al (2020), which demonstrated that using the photovoice technique in English as an Additional Language (EAL) classes can engage students in the writing process and help them develop their writing skills because photovoice encourages students to think creatively and critically. The results of this study are consistent with the findings that using photovoice enables students to create structured analytical exposition texts, adhere to language rules, and thoroughly explain main ideas related to the photos (Ferdiansyah et al., 2020; Rosmawanty & Abdulrahman, 2021). Recent research shows that the discovery learning method can help students' reading comprehension especially in identifying main ideas and specific information (Vana & Nurhaeni, 2024). This study's findings align with previous research by Jayanti (2021), which emphasizes that discovery learning is an effective method to improve students' critical thinking skills. This method encourages active learning and leads students to engage in independent exploration and investigation, ultimately improving their ability to analyze and solve problems critically.

CONCLUSION

The study provides empirical evidence supporting the effectiveness of photomindset learning media based on the discovery learning in enhancing EFL students' critical thinking. The application of photomindset media also showed significant improvement in students' ability to write descriptive texts that included important elements such as strong content, clear organization of ideas, grammar, appropriate vocabulary, and effective mechanics. The significant improvement in students' performance after intervention highlights the potential of this instructional approach in fostering analytical and evaluative abilities. Teachers are encouraged to integrate similar learning media or strategies into their teaching practices to promote critical thinking.

However, the sample size in this study relatively small and limited to a single group without control group, reducing the generalizability of the findings to the other contexts. The study only focused on reading and writing skills, excluding other language skills such as listening and speaking. Future research should address these limitations by incorporating a control group to enable a more comprehensive comparison between students who receive the intervention and those who do not, expanding a larger sample size, and investigating the impact of the photomindset learning media on other language skills. This research provides valuable insights for educators, suggesting that incorporating photomindset with discovery learning can effectively enhance students' critical thinking and English language competence, which are reading comprehension and writing skills.

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