E-ISSN: 3031-8629
P-ISSN: 3032-3258
Halaman 259-268
Volume 2 Nomor 4 Tahun 2025

The Impact of Carousel Brainstorming on EFL Students' Reading Comprehension Integrated with Critical Thinking Skills at SMAN 1 Soromandi

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Abstrak

Penelitian ini bertujuan menguji pengaruh Carousel Brainstorming terhadap pemahaman membaca, perbedaan pemahaman membaca berdasarkan tingkat berpikir kritis, serta interaksi kedua faktor tersebut. Penelitian menggunakan pendekatan kuantitatif dengan desain kuasi-eksperimen pretest–posttest dan kerangka faktorial 2 × 2. Sampel terdiri atas 36 siswa kelas XI SMAN 1 Soromandi yang terbagi dalam kelompok eksperimen dan kontrol, masing-masing berjumlah 18 siswa. Data dikumpulkan melalui tes pemahaman membaca dan kuesioner berpikir kritis, kemudian dianalisis menggunakan statistik deskriptif dan ANOVA dua arah melalui SPSS versi 25. Hasil analisis yang dilaporkan menunjukkan bahwa kelompok Carousel Brainstorming memperoleh rata-rata posttest lebih tinggi daripada kelompok pembelajaran konvensional, yaitu 76,67 dibandingkan 62,50, dengan perbedaan signifikan ($p = 0{,}001$). Siswa berkategori berpikir kritis tinggi juga memperoleh skor lebih tinggi daripada kategori rendah ($p < 0{,}001$). Namun, interaksi antara strategi pembelajaran dan tingkat berpikir kritis tidak signifikan ($p = 0{,}879$). Temuan mengindikasikan bahwa Carousel Brainstorming berpotensi mendukung pemahaman membaca.

Kata kunci: Carousel Brainstorming; pemahaman membaca; berpikir kritis; pembelajaran kolaboratif; bahasa Inggris sebagai bahasa asing.

Abstract

Reading comprehension in English as a Foreign Language (EFL) requires instructional strategies that support students' active engagement and analytical thinking. This study aimed

to examine the effect of Carousel Brainstorming on reading comprehension, differences in comprehension according to critical thinking level, and the interaction between these factors. A quantitative approach employed a quasi-experimental pretest–posttest design within a 2 × 2 factorial framework. The sample comprised 36 eleventh-grade students at SMAN 1 Soromandi, divided into experimental and control groups of 18 students each. Data were collected through reading comprehension tests and a critical thinking questionnaire and analysed using descriptive statistics and two-way ANOVA in SPSS version 25. The analysis showed that the Carousel Brainstorming group achieved a higher mean posttest score than the conventional instruction group, at 76.67 and 62.50, respectively, with a significant difference ($p = .001$). Students classified as having high critical thinking also obtained higher scores than those classified as having low critical thinking ($p < .001$). However, the interaction between teaching strategy and critical thinking level was nonsignificant ($p = .879$). The findings suggest that Carousel Brainstorming may support reading comprehension.
Keywords: Carousel Brainstorming; reading comprehension; critical thinking; collaborative learning; EFL.

INTRODUCTION

Reading comprehension is an essential skill for English as a Foreign Language (EFL) learners because it enables them to understand information, construct meaning, and evaluate ideas presented in written texts. Beyond recognizing words, successful reading requires learners to connect textual information with their existing knowledge and reflect on the writer's intended meaning (Habibi et al., 2022; Nurdiana et al., 2023; Sudiatama et al., 2023). These processes involve several interconnected abilities, including identifying main ideas, locating supporting details, drawing inferences, and synthesizing information (Dolba et al., 2022; Firman et al., 2021). However, EFL learners frequently encounter difficulties related to limited vocabulary, unfamiliar sentence structures, and insufficient background knowledge, which can restrict their understanding of English texts (Asnawi et al., 2025; Haerazi & Irawan, 2020). Such challenges highlight the importance of reading instruction that supports both linguistic comprehension and the thinking processes needed to interpret information critically.

The background of the present study identified similar concerns among students at SMAN 1 Soromandi, whose reading tended to depend on surface-level understanding rather than strategic engagement with texts. Difficulties in predicting content, monitoring understanding, and interpreting implied meanings indicated a need for more structured opportunities to practise reading strategies. Research on engaged reading and strategy-based instruction provides a relevant basis for addressing these concerns (Selim & Islam, 2022; Suci et al., 2023). Related studies have also examined reading attitudes and academic reading competence, illustrating that reading development involves factors beyond knowledge of individual words and grammatical structures (Prihandoko, 2024; Rafi et al., 2021). Anwar and Sailuddin (2022) further identified vocabulary-related difficulties in academic reading, reinforcing the need for instructional support that helps learners engage more effectively with challenging texts. In this context, classroom activities should encourage students to explain interpretations, question ideas, and support their responses with textual evidence.

Carousel Brainstorming offers a collaborative approach through which these reading processes can be practised. Students work in small groups and rotate among stations containing questions or prompts, contributing ideas and responding to the interpretations developed by other groups. When applied to reading instruction, these activities can provide opportunities to identify important information, compare viewpoints, and reconsider answers through discussion. Rizal and Susanto (2021) previously investigated Carousel Brainstorming in relation to reading comprehension, providing a basis for examining its application in other educational contexts. Nevertheless, evidence of its use for reading comprehension does not fully explain whether students with different levels of critical thinking benefit equally from the strategy. The gap addressed in the present study therefore concerns the interaction between Carousel Brainstorming and students' critical thinking levels in senior high school EFL reading, particularly within the instructional context of SMAN 1 Soromandi.

Accordingly, this study aimed to examine the effect of Carousel Brainstorming on EFL students' reading comprehension at SMAN 1 Soromandi, determine whether reading comprehension differed significantly between students with high and low critical thinking levels, and investigate whether the instructional strategy interacted with critical thinking levels in influencing reading comprehension. These objectives position critical thinking as a learner characteristic that may shape students' responses to collaborative reading instruction, rather than assuming that the strategy necessarily improves critical thinking itself. By examining both the instructional effect and its interaction with critical thinking, the study sought to provide context-specific evidence to inform the selection of reading activities that accommodate differences among learners and encourage more active engagement with English texts.

METHOD

This study employed a quantitative approach using a quasi-experimental pre-test–post-test design with a 2 × 2 factorial framework. Quasi-experimental research allows instructional treatments to be compared using existing classes without randomly assigning individual students to groups (Creswell & Creswell, 2018). The two factors were teaching strategy, comprising Carousel Brainstorming and conventional instruction, and critical thinking level, classified as high or low. Reading comprehension was the dependent variable. The design examined the main effects of teaching strategy and critical thinking level, together with their interaction.

The population consisted of 57 eleventh-grade students at SMAN 1 Soromandi, distributed across three classes: XI A1, XI A2, and XI A3. The sample comprised 36 students from two intact classes, XI A1 and XI A2, each containing 18 students. Chapter III described the sampling procedure as cluster random sampling conducted through a lottery, with classes serving as the sampling units. One class received Carousel Brainstorming instruction, while the other received conventional instruction.

Data were collected through reading comprehension tests and a critical thinking questionnaire. The reading test consisted of 20 multiple-choice items based on the reading indicators and syllabus content. Each correct answer received five points, while incorrect answers received zero, producing scores ranging from 0 to 100. A pre-test measured students' reading comprehension before instruction, and a post-test assessed comprehension after the treatments. The experimental group participated in Carousel Brainstorming activities, whereas the control group received conventional instruction. The critical thinking questionnaire used four response options: strongly agree, agree, disagree, and strongly disagree, scored from four to one. Questionnaire totals were converted into percentages and used to classify students into high and low critical thinking groups.

Data were analyzed using IBM SPSS Statistics version 25. Descriptive statistics, including the mean, median, mode, and standard deviation, summarized students' reading comprehension and questionnaire scores. Normality and homogeneity of variance were examined before hypothesis testing. A two-way analysis of variance (ANOVA) was used to examine differences in reading comprehension associated with teaching strategy and critical thinking level, as well as the interaction between these factors. This analysis is appropriate for examining the main and interaction effects of two categorical factors on a continuous outcome (Field, 2018).

RESULT AND DISCUSSION

The study examined differences in EFL students' reading comprehension according to teaching strategy and critical thinking level at SMAN 1 Soromandi. Thirty-six students participated, with 18 students receiving Carousel Brainstorming instruction and 18 receiving conventional instruction. The descriptive statistics indicated higher post-test performance in the Carousel Brainstorming group.

Table 1. Reading comprehension post-test scores by teaching strategy and critical thinking level

Critical thinking level	Teaching strategy	n	Mean	SD
Low	Carousel Brainstorming	5	64.00	12.45
Low	Conventional instruction	5	49.00	4.18
High	Carousel Brainstorming	13	81.54	10.08
High	Conventional instruction	13	67.69	10.73
Overall	Carousel Brainstorming	18	76.67	13.17
Overall	Conventional instruction	18	62.50	12.63

The Carousel Brainstorming group obtained an overall mean of 76.67, compared with 62.50 in the conventional group, representing a descriptive difference of 14.17 points. Students classified as having high critical thinking achieved a pooled mean of 74.62, whereas those classified as having low critical thinking obtained a mean of 56.50. The descriptive advantage associated with Carousel Brainstorming was evident in both categories: 15.00 points among students with low critical thinking and approximately 13.85 points among those with high critical thinking.

The Shapiro–Wilk tests did not identify significant departures from normality for the experimental group's pre-test and post-test scores ($p = .083$ and .279) or the control group's corresponding scores ($p = .052$ and .292). Levene's test across the four factorial groups was also nonsignificant, $F(3, 32) = 1.764$, $p = .174$, providing no evidence of unequal error variances. These results supported proceeding with the parametric analysis, although normality within the factorial cells or model residuals was not documented.

Table 2. Two-way ANOVA of reading comprehension post-test scores

Source	df	F	p	Partial η^2
Teaching strategy	1	14.613	.001	.313
Critical thinking level	1	23.053	< .001	.419
Teaching strategy × critical thinking level	1	0.023	.879	.001
Error	32	—	—	

The analysis indicated a significant main effect of teaching strategy, $F(1, 32) = 14.613$, $p = .001$, partial $\eta^2 = .313$. Students receiving Carousel Brainstorming instruction obtained higher post-test scores than those receiving conventional instruction. A significant main effect was also showed for critical thinking level, $F(1, 32) = 23.053$, $p < .001$, partial $\eta^2 = .419$, with higher scores among students in the high critical thinking category. However, the interaction was nonsignificant, $F(1, 32) = 0.023$, $p = .879$, partial $\eta^2 = .001$. Thus, the analysis did not detect a difference in the strategy's association with reading comprehension across the two critical thinking categories.

Discussion

The higher reading comprehension scores in the Carousel Brainstorming group suggest that structured collaborative activities may support students' engagement with English texts. Through rotating group tasks, students have opportunities to contribute interpretations, examine other groups' responses, and reconsider their understanding. This pattern is consistent with the social constructivist perspective discussed, which emphasizes learning through interaction and shared meaning-making. It also complements the research of Rizal and Susanto (2021), who investigated Carousel Brainstorming in reading instruction. Nevertheless, peer scaffolding and engagement were not measured directly in the present study; they represent plausible explanations for the observed difference rather than demonstrated mechanisms.

The significant difference between critical thinking categories suggests that students' thinking dispositions were associated with their reading performance. Analysing information, questioning interpretations, and evaluating textual evidence may help readers move beyond literal understanding. This interpretation is consistent with Izzah and Sukarno (2024), whose research examined reading skills, critical thinking, and metacognition in relation to explanatory-text comprehension. However, their study concerned middle school science texts, so its relevance is conceptual rather than evidence of an identical effect in EFL instruction. Furthermore, the present study classified critical thinking through a questionnaire; the categories

should therefore be interpreted as questionnaire-based indicators rather than direct demonstrations of analytical performance.

The nonsignificant interaction requires a cautious interpretation. Although the descriptive differences favoured Carousel Brainstorming in both critical thinking categories, this finding does not establish that the strategy was equally effective for all learners. Each low critical thinking subgroup contained only five students, limiting the precision of the interaction estimate. Related research by Haerazi and Irawan (2020) found that interactions between reading instruction and learner characteristics varied: ECOLA instruction interacted with self-efficacy but not with motivation. Together, these findings suggest that an instructional advantage does not necessarily depend on every learner characteristic examined.

The findings support further consideration of Carousel Brainstorming as a collaborative approach to EFL reading instruction. However, the analysis compared post-test scores without incorporating pre-test scores as a covariate, and the use of two intact classes limits causal interpretation and generalization.

CONCLUSION

The findings indicate that students receiving Carousel Brainstorming instruction achieve significantly higher reading comprehension scores than those receiving conventional instruction. Students classified as having high critical thinking also demonstrate significantly higher reading comprehension scores than those classified as having low critical thinking. However, the analysis identifies no significant interaction between teaching strategy and critical thinking level, providing no evidence that the instructional advantage differs between the two categories. These conclusions remain provisional because inconsistencies between the individual scores and statistical summaries require verification.

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