

Cooperative integrated reading and composition and critical thinking skills development in the EFL context

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ABSTRACT

This study examined the effect of cooperative integrated reading and composition (CIRC) on the development of critical thinking skills among English as a foreign language (EFL) learner. A mixed-methods design with a quasi-experimental pre-test–post-test approach, along with qualitative interviews and observations, was employed. There were 60 first-semester non-English major students who participated in this study, with 30 assigned to a CIRC-based experimental group and 30 to a control group receiving conventional instruction. The results revealed that CIRC significantly improved critical thinking skills ($p < .001$, $\eta^2 = 0.195$), with the experimental group outperforming the control group on post-test scores. Meanwhile, the qualitative results revealed that structured group reading, guided discussion, and collaborative composition encouraged students to analyze, evaluate, and synthesize information effectively. Peer interaction promoted reflection, justification of ideas, and comparison of perspectives, while writing tasks reinforced the integration of reading and discussion into coherent arguments. Overall, the findings suggested that CIRC not only enhances language proficiency but also fosters higher-order thinking in EFL contexts. Future research should examine larger and more diverse samples, longitudinal effects, and digital integration to optimize collaborative critical engagement.

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1. INTRODUCTION

Critical thinking is widely regarded as a core competence for academic and professional success in today's globalized context [1], [2]. However, English as a foreign language (EFL) instruction in many classrooms continues to emphasize memorization, translation, and mechanical grammar practice, which limits students' opportunities to engage meaningfully with texts and develop higher-order thinking skills. This gap between instructional practice and educational goals highlights the need for instructional approaches that promote both language learning and cognitive engagement [3].

In light of these challenges, cooperative learning has been shown to enhance participation, comprehension, and interaction in language classrooms, and the cooperative integrated reading and composition (CIRC) model has been particularly effective in improving reading and writing outcomes through structured group activities [4], [5]. At the same time, research in second and foreign language education underscores the importance of critical thinking for learners' ability to analyze, evaluate, and

construct knowledge independently [6], [7]. Despite these parallel lines of research, empirical studies that directly examine how cooperative learning models, such as CIRC, support the development of critical thinking skills in EFL contexts remain limited.

Addressing this gap, the present study investigates the extent to which the implementation of CIRC contributes to the development of EFL learners' critical thinking skills. Specifically, it examines whether CIRC provides opportunities for students to practice analysis, evaluation, and synthesis through reading and writing tasks, and how students perceive its role in fostering these skills. This study hypothesizes that integrating CIRC into EFL instruction positively affects students' critical thinking abilities. It also provides empirical evidence that cooperative learning can support both language development and higher-order thinking.

This study contributes to EFL research in three ways. First, it provides empirical evidence on the effect of CIRC on students' critical thinking skills through a mixed-methods approach. Second, it extends previous CIRC studies by focusing not only on literacy outcomes but also on higher-order cognitive development. Third, it offers pedagogical insights into how cooperative reading, discussion, and composition activities can be structured to foster critical thinking in tertiary EFL contexts.

CIRC has been widely examined within cooperative learning research, with strong evidence supporting its effectiveness in improving literacy outcomes. Studies consistently show that CIRC enhances reading comprehension and writing performance by integrating reading, vocabulary, and composition through structured group work that emphasizes positive interdependence and individual accountability [8], [9]. These findings suggest that CIRC not only supports literacy development but also promotes interaction and shared meaning construction, which are central principles of cooperative learning.

Beyond its contribution to literacy, cooperative learning has been widely recognized for fostering higher-order cognitive skills, with particular emphasis on critical thinking. Critical thinking is commonly defined as the ability to analyze information, evaluate arguments, and draw reasoned conclusions, involving skills such as analysis, synthesis, inference, and evaluation [10], [11]. In EFL contexts, researchers have argued that instruction that encourages discussion, reflection, and problem-solving can help learners move beyond surface-level language use toward more meaningful engagement with texts and ideas [12], [13]. Empirical evidence indicates that such approaches can lead to improvements in both language proficiency and cognitive performance.

In this context, the EFL classroom presents a distinctive setting for integrating cooperative learning and critical thinking. Limited exposure to authentic language input and continued reliance on teacher-centered practices often limit opportunities for extended interaction and critical engagement. Research suggests that cooperative approaches, including CIRC, can address these challenges by encouraging collaboration, sustained communication, and active processing of texts [14], [15]. Indicators of successful integration include increased student participation, improved written expression, and greater ability to evaluate and respond critically to reading materials [16], [17].

Although extensive research on CIRC and its positive effects on literacy skills has been reported, empirical evidence on its role in fostering critical thinking in EFL contexts remains limited. This study addresses this gap by examining how CIRC contributes to the development of EFL learners' critical thinking skills through integrated cooperative reading, discussion, and writing activities, while also exploring learners' perceptions of its instructional value. Accordingly, this study is guided by the following research questions. First, do EFL learners taught using CIRC demonstrate higher critical thinking skills than those taught using conventional instruction? Second, how do EFL learners perceive the effectiveness of the CIRC components in developing their critical thinking?

2. METHOD

This section outlines the methodological procedures employed to investigate the effect of the CIRC model on students' critical thinking skills. It describes the research design, participants, instruments, data collection procedures, and data analysis.

2.1. Research design

This study employed a mixed-methods design, combining a quasi-experimental technique with a qualitative phase [18]. The quantitative component examined the effect of the CIRC model on students' critical thinking skills using a pre-test–post-test design with control and experimental groups. Moreover, the qualitative phase complemented this by exploring students' perceptions and classroom processes through interviews and observations. Both phases were interpreted comprehensively to provide a clearer understanding of the effectiveness of CIRC and the mechanisms through which it supported the development of students' critical thinking skills.

2.2. Research participants

The participants were 60 first-semester EFL students from non-English majors at a university in Indonesia. This sample size was appropriate for a quasi-experimental design and supported balanced comparison between the experimental and control groups within typical class sizes. They were taken from two intact classes of thirty students each. One class was assigned to the experimental group and received instruction using the CIRC model, while the other served as the control group and received conventional instruction. As non-English majors, students often faced challenges in reading comprehension, writing, and critical thinking, which made these subjects relevant for testing the effectiveness of CIRC. Their similar age and academic background provided a relatively homogeneous sample, reducing external variation and allowing for clearer analysis of the intervention's impact. Furthermore, in the qualitative phase, three students were purposively selected from the experimental group, representing elementary, intermediate, and advanced proficiency levels. They were interviewed to provide deeper insights into their experiences with the CIRC model, particularly regarding its role in supporting the development of critical thinking skills. However, as this study involved participants from a single institution, the findings should be interpreted contextually and not generalized to all EFL settings.

2.3. Research instruments

A set of instruments was employed to collect both quantitative and qualitative data. The quantitative instruments included an analytical exposition writing test aligned with higher-order thinking skills such as analysis, evaluation, inference, and synthesis. A writing assessment rubric was applied to students' compositions, evaluating clarity of argument, use of evidence, organization, and depth of reasoning. Additionally, the qualitative instruments comprised semi-structured interview guides for the selected students, which elicited perceptions of CIRC components and their role in developing critical thinking skills. An observation checklist was also used to document classroom processes, including group formation, peer interactions, teacher scaffolding, and evidence of cognitive engagement.

2.4. Data collection procedures

The data collection was carried out in three stages. In the first stage, all participants completed a writing test before the intervention, which functioned as the pre-test of this study to determine their initial level of performance. In the second stage, which lasted four weeks, the experimental group was taught using the CIRC model, including cooperative reading and discussion, guided composition, peer review, and group reflection. In contrast, the control group received conventional instruction. Classroom observations were also conducted in both groups to monitor instructional practices. In the final stage, the participants completed a writing post-test to measure their progress. Additionally, semi-structured interviews were conducted with three selected students from the experimental group to capture their perspectives on the learning process.

2.5. Data analysis

The quantitative data were analyzed to determine the effect of the CIRC model on students' critical thinking skills. Descriptive statistics, including means and standard deviations, were first calculated for both the experimental and control groups. To test the effect of the intervention, analysis of covariance (ANCOVA) was employed, with pre-test scores used as covariates. This approach allowed for adjustment of initial group differences and provided a more accurate estimate of the intervention effect. The main comparisons were made between the adjusted post-test means of the two groups. Statistical significance was set at $p < 0.05$, and effect sizes (partial eta squared, η^2) were reported to indicate the strength of CIRC's effect on critical thinking development. In addition, the qualitative data from interviews and observations were analyzed thematically to identify patterns related to CIRC and students' critical thinking development, particularly in analyzing, evaluating, and synthesizing ideas. Triangulation of multiple data sources was also used to strengthen the credibility of the findings.

3. RESULTS AND DISCUSSION

The findings and discussions are presented in quantitative and qualitative sections. Quantitative results report the effect of CIRC on critical thinking, as measured by pre-test and post-test scores, supported by descriptive and inferential statistics. They are followed by qualitative insights to provide a more comprehensive understanding of how CIRC contributes to students' learning outcomes, specifically in the development of their critical thinking skills.

3.1. The effect of CIRC on students' critical thinking skills

This section presents the findings and discussion of the quantitative analysis, focusing on the effect of CIRC on students' critical thinking skills. The data were collected through pre-test and post-test scores

from both the experimental and control groups. Before presenting the results of the inferential analysis, the descriptive statistics of the students' scores are outlined to provide an overview of their performance.

Table 1 highlights the descriptive statistics of the pre-test and post-test scores. As shown in Table 1, the experimental group ($n=30$) that received instruction through CIRC had a pre-test mean score of 72.1 ($SD=4.8$), which increased to 82.7 ($SD=4.5$) in the post-test. In comparison, the control group ($n=30$) started with a slightly lower pre-test mean of 71.6 ($SD=5.0$) and improved to 76.4 ($SD=4.9$) in the post-test. These results indicated that while both groups demonstrated progress, the experimental group showed a greater improvement in critical thinking skills following the intervention of the CIRC method.

Table 1. Descriptive statistics of experimental and control groups

Group	N	Pre-test mean	Pre-test SD	Post-test mean	Post-test SD
Experimental (CIRC)	30	72.1	4.8	82.7	4.5
Control	30	71.6	5	76.4	4.9

In addition, to examine whether the observed differences between the experimental and control groups were statistically significant, an ANCOVA was conducted with the pre-test scores as covariates. This procedure allowed for controlling the effect of students' initial critical thinking skills and provided a more precise estimate of the impact of the CIRC model. The ANCOVA results for the effect of CIRC on students' post-test scores are presented in Table 2. The analysis revealed that the covariate (pre-test scores) had a significant effect on post-test performance, $F(1, 57)=5.74$, $p=0.02$, with a partial η^2 of 0.091, representing a moderate effect, as approximately 9% of the variance in post-test scores was explained by initial performance. More importantly, the main effect of the group (CIRC vs. control) was statistically significant, $F(1, 57)=13.78$, $p<0.001$, with a partial η^2 of 0.195. This represents a large effect size, indicating that approximately 19.5% of the variance in post-test scores was explained by the instructional model, with the CIRC group outperforming the control group. These findings suggest that the CIRC intervention had a significant positive impact on students' critical thinking skills, even after controlling for pre-test differences.

Table 2. ANCOVA results for the effect of CIRC on students' post-test scores.

Source	Sum of squares	df	Mean square	F	p	Partial η^2
Pre-test (covariate)	124.35	1	124.35	5.74	0.02	0.091
Group (CIRC vs. control)	298.62	1	298.62	13.78	0	0.195
Error	1236.11	57	21.68			
Total	5987.6	60				

The findings demonstrate that students instructed through the CIRC model achieved significantly higher post-test critical thinking scores than those receiving conventional instruction. This advantage can be explained by the theoretical foundations of CIRC, which emphasize structured peer interaction, integrated reading-writing processes, and guided reflection. Through collaborative discussion, role-based tasks, and peer feedback, learners were required to analyze texts, justify interpretations, and evaluate peers' ideas, all of which are core components of critical thinking. Unlike traditional teacher-centered approaches that prioritize surface-level comprehension or memorization, CIRC actively engages learners in higher-order cognitive processes, which enables them to construct meaning collaboratively and refine reasoning through social negotiation [7], [19].

These findings are in line with previous studies reporting the effectiveness of CIRC and cooperative learning in enhancing students' academic and cognitive outcomes. Simarmata [20] and Nasim *et al.* [5] similarly found that structured collaboration within CIRC improved learners' literacy performance by fostering deeper engagement with texts. Moreover, the improvement in critical thinking aligns with the arguments of Liang and Fung [6], Lailiyah and Wediyantoro [21], and Vuqar [22], who emphasized that interactive and reflective engagement with texts promotes independent reasoning and deeper comprehension in EFL contexts. The relatively large effect size observed in this study further suggests that CIRC contributes not merely to gradual improvement gains but meaningful development in learners' critical thinking abilities.

From a pedagogical perspective, these results highlight the value of integrating cooperative, literacy-based instructional models in EFL classrooms, particularly in contexts where critical thinking is underdeveloped due to traditional instructional practices. By embedding analytical and evaluative tasks within cooperative reading and writing activities, CIRC provides teachers with a practical framework for simultaneously developing language proficiency and higher-order thinking skills. Therefore, the findings

support the adoption of CIRC as an effective instructional approach for promoting critical thinking in EFL settings, especially in educational contexts similar to Indonesia, where fostering students' cognitive engagement becomes an essential educational priority [23], [24].

3.2. EFL learners' perceptions of CIRC components in developing critical thinking

The qualitative findings from interviews and classroom observations provide deeper insight into how CIRC supported students' critical thinking development across elementary, intermediate, and advanced proficiency levels. Rather than focusing on learning outcomes, which were addressed in the quantitative phase, the qualitative data highlight students' perceptions of the cognitive processes activated during cooperative reading, discussion, and writing activities. These perceptions reveal how critical thinking emerged through classroom interaction and task engagement, which offer a clearer explanation of the instructional impact of CIRC. In particular, students described engaging in higher-order thinking processes, including analyzing information, evaluating peers' ideas, and synthesizing different perspectives during collaborative learning activities.

Students at different proficiency levels engaged in analytical thinking during cooperative reading and discussion in different ways. Elementary students mainly used group interaction to clarify vocabulary and identify main ideas, whereas intermediate and advanced students focused more on explaining meanings, supporting interpretations, and questioning ideas. One intermediate student noted that group discussion made them "think harder about why" an interpretation was valid, which indicates a shift from basic comprehension to analytical reasoning. Classroom observations also showed that elementary students often asked for clarification, while more proficient learners used textual evidence and responded critically to peers' ideas. This pattern suggests that collaborative discussion can support analytical thinking by encouraging learners to articulate and justify their interpretations. Similar findings are reported by Huang [25] and Jin *et al.* [26], who showed that collaborative reading promotes deeper engagement with texts through shared interpretation and discussion. In addition, peer discussion and feedback can stimulate critical reflection and evaluation of ideas [27], supporting the development of analytical thinking in classroom interaction [28]. Overall, cooperative discussion helps students think more analytically about texts as their proficiency develops.

Additionally, students described group discussion as an important context for developing evaluative thinking, although the engagement differed across proficiency levels. Elementary students noted that listening to peers helped them reconsider their initial answers after hearing alternative responses. In contrast, intermediate and advanced students used discussion to compare viewpoints, judge which ideas were more convincing, and evaluate supporting evidence. One intermediate student explained that realizing "there is more than one way to see a problem" encouraged them to compare perspectives rather than accept a single answer quickly. Classroom observations reflected this pattern, with evaluative engagement more apparent among intermediate and advanced learners who frequently revised their responses after discussion. These findings suggest that discussion encourages learners not only to share ideas but also to assess their validity. This aligns with Tilahun *et al.* [14], who found that integrated reading and writing activities promote reflective judgment by requiring learners to evaluate and justify ideas in EFL contexts. Similarly, collaborative writing research indicates that peer interaction encourages the comparison of arguments and the evaluation of evidence [29]. The results indicate that collaborative discussion can support the development of evaluative thinking by encouraging learners to reconsider and assess ideas during interaction.

Furthermore, the composition component of CIRC appeared to play an important role in supporting synthetic thinking across proficiency levels. Elementary students mainly combined basic ideas from the text and group discussion, whereas intermediate students showed greater attention to linking ideas and clarifying meaning in their writing. Advanced students demonstrated more thoughtful integration of evidence and viewpoints, with one advanced student highlighting the need to "check the evidence carefully" when preparing group reports. Classroom observations also indicated that synthesis developed through group negotiation, as students selected relevant information, addressed different views, and organized ideas collaboratively. These patterns support previous studies showing that CIRC facilitates the integration of ideas through cooperative reading and writing activities. Dewinna [30] reported that CIRC strengthens students' ability to combine ideas and justify their thinking, while research by Susilo *et al.* [7] and Narulita and Armadi [31] highlighted its role in promoting critical writing and idea development. In addition, CIRC-based activities encourage collaborative engagement with texts, which supports deeper comprehension and idea integration [32]. In short, the findings suggest that collaborative composition within CIRC provides a productive context for integrating information and developing students' synthetic thinking.

To sum up, the qualitative findings suggest that CIRC supports the development of critical thinking through collaborative reading, discussion, and writing activities. Students across proficiency levels demonstrated analytical, evaluative, and synthetic thinking, although the complexity of these processes varied. Elementary learners mainly used interaction to clarify meaning and reconsider their answers, while intermediate and advanced students were more engaged in explaining interpretations, comparing viewpoints,

and integrating evidence. These patterns indicate that the cooperative structure of CIRC encourages students to move from basic understanding toward more critical engagement with texts. Through discussion and collaborative composition, students were encouraged to explain ideas, evaluate alternatives, and combine information when producing written responses. In line with previous research on collaborative learning and CIRC-based instruction, these results highlight how interaction and shared task engagement can support deeper engagement with texts and the development of critical thinking skills.

4. CONCLUSION

This study demonstrates that CIRC is not only effective for literacy development but also serves as a practical instructional model for fostering critical thinking in EFL higher education. The quantitative findings indicate that students exposed to CIRC achieved significantly higher critical-thinking outcomes than those in conventional instruction. The qualitative findings further suggest that structured peer interaction and integrated reading-writing tasks promoted analysis, evaluation, and synthesis. Students at different proficiency levels engaged in these processes in ways appropriate to their language ability, with elementary learners benefiting from collaborative support in comprehension and more advanced learners demonstrating stronger evaluative and integrative thinking. Moreover, these results suggest that CIRC supports higher-order cognitive development by embedding critical thinking within collaborative literacy practices, thus enhancing the pedagogical value of cooperative learning in EFL contexts.

Despite these contributions, several limitations should be acknowledged. The relatively short duration of the intervention limits conclusions about the long-term effects of CIRC on the development of critical thinking. In addition, the sample size and single instructional context may restrict the generalizability of the findings. Future research should involve larger and more diverse learner populations and adopt longitudinal designs to examine sustained cognitive outcomes. Further studies may also explore the integration of digital tools within the CIRC framework to determine whether technology-enhanced collaboration improves students' participation, interaction, and critical thinking across different educational contexts.

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C : Conceptualization

M : Methodology

So : Software

Va : Validation

Fo : Formal analysis

I : Investigation

R : Resources

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O : Writing - Original Draft

E : Writing - Review & Editing

Vi : Visualization

Su : Supervision

P : Project administration

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CONFLICT OF INTEREST STATEMENT

The authors affirm that the research was conducted in the absence of any financial or personal affiliations that may have biased the findings of this manuscript.

INFORMED CONSENT

As a crucial step in research ethics, informed consent was obtained from all study participants before the research. During this process, we ensured that the respondents fully understood the study's objectives and their absolute right to voluntarily withdraw their participation at any time without any penalties or consequences.

ETHICAL APPROVAL

The study followed strict ethical standards, fully complying with national regulations, institutional policies, and the principles of the Helsinki Declaration. The research protocol was reviewed and approved by the institutional ethics committee, ensuring the rights and welfare of all participants were protected.

DATA AVAILABILITY

The research data is not publicly available due to privacy and ethical constraints. Access may be granted upon reasonable request submitted directly to the corresponding author, [AQ].

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