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The Effect of the Reciprocal Teaching Model on Students' Critical Thinking Skills in Grade IV Natural and Social Sciences (IPAS) Learning at SD Negeri 4 Padoang-Doangan

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Abstract

Students' critical thinking skills in Natural and Social Sciences (IPAS) remain underdeveloped because teacher-centered instruction provides limited opportunities to analyze information, articulate arguments, and formulate conclusions. This study aimed to compare the critical thinking skills of fourth-grade students taught through the Reciprocal Teaching model with those taught through conventional instruction and to determine the effect of the model on students' critical thinking performance at SD Negeri 4 Padoang-Doangan. A quantitative quasi-experimental approach with a pretest–posttest control group design was employed. The sample comprised 46 students, including 22 students in the experimental group and 24 students in the control group. Data were collected using a critical thinking skills test and analyzed through descriptive and inferential statistics using SPSS Statistics version 26. The findings showed that the experimental group achieved a higher mean posttest score than the control group (86.14 vs. 77.29). The N-Gain analysis classified 14 experimental-group students in the high category and 8 in the moderate category, whereas the control group comprised 2 students in the high category, 21 in the moderate category,

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and 1 in the low category. The independent-samples *t* test yielded $p < .001$, indicating a statistically significant difference between the two groups. These findings demonstrate that Reciprocal Teaching significantly enhances students' critical thinking skills in fourth-grade IPAS learning. The study contributes practical evidence that structured activities involving questioning, clarifying, summarizing, and predicting can provide a more participatory instructional alternative for developing elementary students' analytical reasoning and conclusion-formulation skills.

Keywords: Critical Thinking Skills; Elementary Education; IPAS Learning; Quasi-Experimental Study; Reciprocal Teaching

INTRODUCTION

Education is a principal foundation for developing human resources who can think critically and adapt to contemporary change. Elementary education is particularly important because it establishes students' basic patterns of reasoning, learning, and character. The current curriculum therefore encourages flexible, student-centered, and competency-oriented learning that connects subject matter with meaningful activities and real contexts (Kurniawan et al., 2024; Rosiyani et al., 2024).

The learning process at the elementary-school level plays an important role in shaping students' patterns of thought and learning dispositions. Elementary education aims not only to establish foundational knowledge but also to develop critical thinking as a resource for understanding and solving simple problems encountered in everyday life. Critical thinking reflects students' ability to analyze information, formulate questions, and draw logical conclusions based on available facts.

In response to the demands of twenty-first-century education, the learning paradigm has shifted from teacher-centered to student-centered instruction. Student-centered learning emphasizes students' active participation through discussion, collaboration, and reflection on learning material. The Merdeka Curriculum provides teachers with flexibility to select and implement learning models suited to students' characteristics and oriented toward competency development, including critical reasoning as an element of the Pancasila Student Profile.

Natural and Social Sciences (IPAS) is an elementary-school subject that helps students understand the natural and social environments around them. Its content requires students to observe phenomena, compare information, identify relationships, and formulate evidence-based conclusions. Recent studies indicate that elementary students' critical thinking in science and social-science contexts remains uneven and therefore requires learning experiences that explicitly develop analysis and reasoning (Dewi et al., 2023; Lailiyah et al., 2025). The Grade IV topic of local wisdom also requires students to examine cultural diversity, customs, and social values rather than merely recall factual information.

Critical thinking is an important capability because it enables students to interpret information, evaluate alternative explanations, connect prior knowledge with new situations, and make reasoned decisions. For elementary learners, these skills must be translated into developmentally appropriate tasks and indicators. Instrument-development and diagnostic studies have therefore emphasized analysis, inference, explanation, and evidence-based judgment as core aspects of elementary students' critical thinking (Gumala et al., 2024; Kumala et al., 2025; Susanti et al., 2025).

Students' critical thinking may remain underdeveloped when classroom learning is dominated by explanation, memorization, and routine exercises. Limited motivation, confidence, active participation, and independent learning can interact with instructional constraints such as unsuitable learning models, weak use of media, and evaluation techniques that do not elicit higher-order reasoning. Current elementary-school IPAS research shows that problem-based, technology-supported, and deliberately structured learning models can address these constraints by increasing students' opportunities to analyze and solve problems (Anjelina & Mustika, 2025; Himmah et al., 2024; Siregar et al., 2025).

The suboptimal development of students' critical thinking indicates a need for learning models that promote active engagement in understanding, processing, and reflecting on information obtained during learning. Learning that gives students opportunities to ask questions, express opinions, and review material independently and collaboratively is expected to improve the quality of their thinking. A learning model is therefore required that emphasizes not only the delivery of content but also the sustained development of critical thinking.

One learning model relevant to this objective is *Reciprocal Teaching*. This model emphasizes interaction through the sharing of roles between students and teachers and

among students in understanding learning material. In its implementation, students actively summarize information, formulate questions, clarify their understanding, and predict subsequent material. These processes encourage analytical thinking, evaluation of information, and conclusion drawing based on discussion. Accordingly, *Reciprocal Teaching* is expected to contribute positively to the development of Grade IV elementary-school students' critical thinking skills in IPAS learning.

Reciprocal Teaching is an interactive learning model organized around four mutually reinforcing strategies: predicting, questioning, clarifying, and summarizing. Predicting activates prior knowledge, questioning directs attention to key information and problems, clarifying resolves incomplete understanding, and summarizing requires students to identify and communicate the essential meaning of the material. Systematic and classroom-based evidence describes these strategies as a scaffold for comprehension, metacognition, discussion, and independent learning (Mafarja et al., 2023; Satriani et al., 2022a, 2022b).

The Reciprocal Teaching model is designed to promote active student participation through dialogue and the gradual transfer of responsibility from the teacher to students. During implementation, students discuss information, explain their reasoning, assess the adequacy of answers, and formulate conclusions. These characteristics have supported learning and higher-order skills across science, mathematics, and elementary-school subject contexts (Adityawan et al., 2024; Dalimunthe et al., 2025; Yunita et al., 2023).

Previous studies have shown that Reciprocal Teaching can positively affect students' critical thinking skills. Adilah and Sutarna (2025) reported stronger critical-thinking outcomes for elementary students learning IPAS through Reciprocal Teaching, while Nurropidah and Puad (2025) found that the model, supported by digital flipbook media, significantly improved critical thinking. These findings suggest that the model is particularly relevant when students are expected to construct meaning collaboratively and explain the basis of their conclusions.

Recent evidence also extends beyond a single subject area. Putri et al. (2024) found strong critical-thinking outcomes when Reciprocal Teaching was compared with another active-learning model, while systematic reviews by Nurropidah and Kosmajadi (2024) and Rahayu and Dwi Kurino (2025) concluded that its four-stage structure consistently supports analysis, interpretation, inference, and evaluation. Decristan et al. (2024) and Fitriani (2026) further demonstrated the model's value for comprehension and critical reading in primary

education. Taken together, these studies support the model's theoretical suitability; however, direct evidence in Grade IV IPAS and the local-wisdom topic remains limited.

On the basis of previous findings, *Reciprocal Teaching* can be regarded as an effective model for improving students' critical thinking skills. Research has demonstrated significant improvement after its implementation at both elementary and secondary levels. However, the specific application of *Reciprocal Teaching* in Grade IV elementary-school IPAS learning remains underexplored.

More broadly, current IPAS studies indicate that critical thinking improves when students engage with problem-based, scientific, project-based, and technology-supported learning experiences (Anjelina & Mustika, 2025; Dewi et al., 2023; Himmah et al., 2024; Lailiyah et al., 2025; Lestari et al., 2024; Siregar et al., 2025). Research on measurement also shows the importance of age-appropriate critical-thinking indicators for elementary learners (Gumala et al., 2024; Kumala et al., 2025; Susanti et al., 2025). These findings strengthen the rationale for examining whether Reciprocal Teaching can improve critical thinking in elementary-school IPAS.

METHODS

This study employed a quantitative *quasi-experimental* approach using a *Pretest-Posttest Control Group Design*. Two groups participated: an experimental class taught through *Reciprocal Teaching* and a control class taught through conventional instruction. Both groups completed a *pretest* before the treatment and a *posttest* afterward to measure students' critical thinking skills.

The study was conducted at SD Negeri 4 Padoang-Doangan during the second semester of the 2025/2026 academic year. The population consisted of all 46 Grade IV students. Non-probability purposive sampling was used, with Class IVA (24 students) designated as the control class and Class IVB (22 students) as the experimental class. The independent variable was the *Reciprocal Teaching* model, while the dependent variable was students' critical thinking skills in IPAS learning.

Data were collected through *pretest* and *posttest* measures of critical thinking and were supported by a Student Worksheet (LKPD). The test instrument consisted of 20 multiple-choice items developed from critical thinking indicators in the topic of local wisdom. Data were analyzed using descriptive and inferential statistics with SPSS Statistics version 26. The

analysis included normality and homogeneity tests, *N-Gain* calculation, and an *Independent Samples t-test* at a significance level of 0.05 to examine the effect of *Reciprocal Teaching* on students' critical thinking skills.

RESULTS

This study examined the effect of *Reciprocal Teaching* on the critical thinking skills of Grade IV students in IPAS learning at SD Negeri 4 Padoang-Doangan. Data were obtained through a *pretest* administered before the treatment and a *posttest* administered afterward in both the experimental and control classes. Descriptive statistics were used to describe students' critical thinking skills, and inferential statistics were used to test the research hypothesis.

Table 1. Descriptive Statistics of Students' Critical Thinking Skills

Class	N	Mean Pretest	Mean Posttest
Control	24	53.33	77.29
Experimental	22	47.95	86.14

Source: Research Data (2026)

The descriptive statistical analysis showed that the control class's mean score increased from 53.33 on the *pretest* to 77.29 on the *posttest*. In the experimental class, the mean score increased from 47.95 on the *pretest* to 86.14 on the *posttest*. Both classes therefore improved after instruction, although the increase was greater in the experimental class.

In addition to the mean-score comparison, the *posttest* results showed that students in the experimental class achieved better learning outcomes than those in the control class. This indicates that *Reciprocal Teaching* provided students with greater opportunities to develop critical thinking during learning than conventional instruction.

To determine the magnitude of improvement in students' critical thinking after the treatment, a Normalized Gain (*N-Gain*) analysis was conducted. The results are presented in the following table.

Table 2. N-Gain Results for Students' Critical Thinking Skills

Category	Control Class	Experimental Class
High	2	14
Moderate	21	8
Low	1	0
Total	24	22

Source: Research Data (2026)

The *N-Gain* analysis showed that the experimental class included 14 students in the high category and 8 in the moderate category; no students were in the low category. In the control class, 2 students were in the high category, 21 in the moderate category, and 1 in the low category. These results indicate that the improvement in the experimental class tended to be greater than that in the control class.

The difference in improvement between the two classes can also be seen in the comparison of mean *posttest* scores presented in the following histogram.

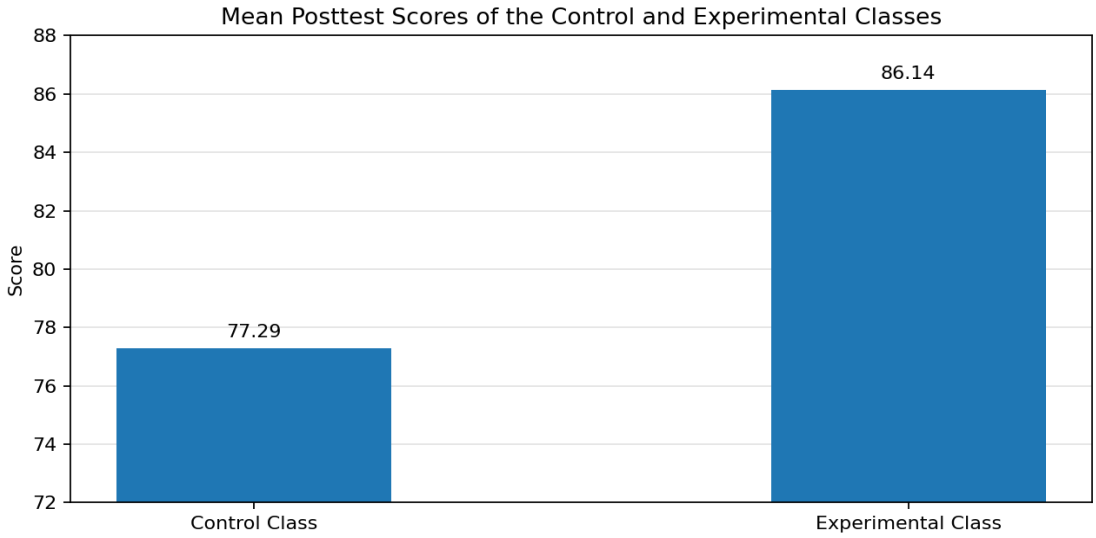


Figure 1. Histogram Comparing the Mean Posttest Scores of the Control and Experimental Classes

The histogram shows that the experimental class achieved a mean *posttest* score of 86.14, whereas the control class achieved 77.29. This difference indicates that students taught using *Reciprocal Teaching* obtained better outcomes than those taught conventionally. Descriptively, the finding suggests that *Reciprocal Teaching* has the potential to improve students' critical thinking skills in IPAS learning.

To determine whether the difference in critical thinking between the two classes was statistically significant, the hypothesis was tested using an *Independent Samples t-test*. The results are presented in the following table.

Table 3. Independent Samples t-test Results

T-Test	
t	Sig (2-tailed)
-6.074	<0.001

Source: Research Data (2026)

The *Independent Samples t-test* produced a significance value (Sig. 2-tailed) of < 0.001, which was below the 0.05 significance level. The calculated t value was -6.074, with an absolute value greater than the critical t value (6.074 > 2.015). Therefore, H_0 was rejected and H_1 was accepted, indicating a significant difference in critical thinking skills between students taught through *Reciprocal Teaching* and those taught through conventional instruction.

These results demonstrate that *Reciprocal Teaching* had a significant effect on the critical thinking skills of Grade IV students in IPAS learning at SD Negeri 4 Padoang-Doangan. In practical terms, the model can serve as an alternative for elementary-school IPAS learning because it promotes students' active engagement in *predicting*, *questioning*, *clarifying*, and *summarizing* learning material. These activities provide opportunities for students to construct knowledge independently, enabling their critical thinking skills to develop more optimally than under conventional instruction.

DISCUSSION

The findings showed that *Reciprocal Teaching* significantly affected the critical thinking skills of Grade IV students in IPAS learning at SD Negeri 4 Padoang-Doangan. The experimental class's mean *posttest* score was 86.14, exceeding the control class's mean of 77.29. In addition, the *Independent Samples t-test* produced a significance value of < 0.001; therefore, H_0 was rejected and H_1 was accepted. These findings indicate that *Reciprocal Teaching* was more effective than conventional instruction in improving students' critical thinking skills.

The improvement in the experimental class was also supported by the *N-Gain* results. Most students in the experimental class were in the high category, while most students in the control class were in the moderate category. Students taught through *Reciprocal Teaching* therefore demonstrated greater improvement in critical thinking than those taught conventionally. This finding indicates that learning models that actively involve students in knowledge construction can have a stronger effect on critical thinking development.

The effectiveness of *Reciprocal Teaching* is related to its placement of students as the principal agents in the learning process. Rather than merely receiving information from the teacher, students actively participate in four main stages: *predicting*, *questioning*, *clarifying*, and *summarizing*. During *predicting*, students connect prior knowledge with upcoming material and

formulate initial expectations about its content. Questioning encourages them to formulate questions from the information obtained, developing their abilities to identify problems and analyze information. During *clarifying*, students discuss and explain concepts they have not understood, exchanging information and strengthening comprehension. During *summarizing*, they formulate summaries based on discussion and draw logical conclusions. These four stages provide opportunities to interpret, identify, analyze, and synthesize information as indicators of critical thinking.

The findings are consistent with Isminari and Suryantari (2024), who emphasized that Reciprocal Teaching supports independent learning through active engagement. They also align with Mafarja et al. (2023), Nurropidah and Kosmajadi (2024), and Rahayu and Dwi Kurino (2025), whose reviews identified positive effects across learning outcomes and critical-thinking measures. Evidence from primary literacy and classroom interventions further indicates that reciprocal dialogue, questioning, clarification, and summarization can improve comprehension and higher-order processing (Decristan et al., 2024; Fitriani, 2026; Nurropidah & Puad, 2025).

In the control class, by contrast, instruction remained dominated by the teacher through lectures, question-and-answer sessions, and exercises. Students consequently received more information than they constructed themselves. Their opportunities to analyze information, express opinions, and formulate conclusions were therefore more limited. These differences in the learning process explain why the experimental class's improvement was greater than that of the control class.

Overall, *Reciprocal Teaching* was effective in improving students' critical thinking skills in IPAS learning. Its effectiveness was supported by characteristics that enabled students to construct knowledge actively through *predicting*, formulating questions, *clarifying*, and *summarizing* learning material. *Reciprocal Teaching* can therefore serve as an alternative model for elementary-school teachers seeking to improve students' critical thinking skills in IPAS.

CONCLUSION

The findings indicate that *Reciprocal Teaching* significantly affected the critical thinking skills of Grade IV students in IPAS learning at SD Negeri 4 Padoang-Doangan. The experimental class achieved a higher mean *posttest* score than the control class, with scores of

86.14 and 77.29, respectively. The *Independent Samples t-test* also yielded a significance value of < 0.001, indicating a significant difference between students taught through *Reciprocal Teaching* and those taught conventionally. The experimental class's improvement was supported by the stages of *predicting*, *questioning*, *clarifying*, and *summarizing*, which encouraged students to analyze information actively, express opinions, clarify concepts, and draw conclusions. *Reciprocal Teaching* can therefore serve as an effective alternative for improving elementary-school students' critical thinking skills in IPAS learning.

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