



## The Effect of The Cooperative Learning Model Type Student Teams Achievement Division (STAD) In the IPAS Subject on the Critical Thinking Skills of Fourth Grade Elementary School Students

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ABSTRACT	ARTICLE INFO
<p><i>The problem addressed in this study is the low level of critical thinking skills at East Metro 4 Public Elementary School, where only 24%–39% of students achieved the minimum learning target (KKTP). This study aims to analyze the effect of implementing the Cooperative Learning model of the Student Teams Achievement Division (STAD) type on students' critical thinking skills in the IPAS subject for fourth-grade elementary school students. A quasi-experimental method with a Non equivalent Control Group Design was used with 57 students as samples: 28 in the experimental class (STAD) and 29 in the control class (CTL). Data were analyzed using Mann–Whitney and Wilcoxon Signed Rank tests. The Mann–Whitney post-test showed a significance value of 0.009 (<math>p &lt; 0.05</math>), indicating a significant difference between classes. N-Gain analysis showed low category in the experimental class and medium category in the control class, confirming that the STAD model significantly influences students' critical thinking skills.</i></p> <p>© 2026 Kantor Jurnal dan Publikasi UPI</p>	<p><b>Article History:</b> Submitted/Received 15 Apr 2026 First Revised 10 May 2026 Accepted 25 May 2026 First Available online 01 Jun 2026 Publication Date 01 Jun 2026</p> <hr/> <p><b>Keyword:</b> Critical Thinking; IPAS; Cooperative Learning (STAD)</p>

## 1. INTRODUCTION

Education is an important aspect in developing high-quality human resources. It is designed to create a learning environment that enables students to develop their potential, intelligence, skills, and character needed in social and national life (Azhar et al., 2025). The goal of education is not only focused on knowledge but also on the formation of students' values and character, as emphasized in Article 31 of the 1945 Constitution regarding the state's responsibility to educate the nation (Fitria, 2022). Therefore, improving the quality of learning is essential to achieve educational goals.

Along with the development of globalization, education is required to foster 21st-century skills, one of which is critical thinking. This ability is necessary for students to analyze information, evaluate evidence, and solve problems logically (Sihotang et al., 2025). The development of critical thinking skills needs to be supported by selecting appropriate learning models, as learning models serve as guidelines in designing effective learning processes (Chintia, 2025). One model that can be applied is the Cooperative Learning model of the Student Teams Achievement Division (STAD) type, which emphasizes group collaboration, discussion, and active student involvement in understanding the material (Simamora et al., 2024).

Science and Social Studies (IPAS) learning in elementary schools plays an important role in training students' critical thinking skills. However, preliminary observations in Grade IV at East Metro 4 Public Elementary School show that students still experience difficulties in asking questions, analyzing information, and connecting concepts with real-life situations. Group work activities have also not run optimally, as many students remain passive and participate less in discussions.

Data on critical thinking skills show that most students have not reached the Minimum Learning Achievement Criteria (KKTP) of 75. In Class IV A, only 24% of students achieved mastery, Class IV B reached 39%, and Class IV C reached 18%. Overall, these results indicate that students' critical thinking skills are still relatively low, so more effective learning innovations are needed.

The urgency of this research is underscored by the persistent challenge of developing 21st-century critical thinking skills among elementary school students in Indonesia. Despite the growing emphasis on higher-order thinking in national curriculum frameworks, many classrooms continue to rely on teacher-centered approaches that offer limited opportunities for student inquiry, discussion, and collaborative problem-solving (Fitria, 2022; Dewi et al., 2025). This gap is particularly evident in IPAS (Science and Social Studies) instruction, where conceptual depth and analytical reasoning are essential yet underexplored in practice.

A review of previous studies reveals several gaps that this research seeks to address. While prior research has documented the effectiveness of cooperative learning models in improving critical thinking at the secondary and higher education levels (Kurniasih et al., 2024; Mukminah & Hirlan, 2025), studies focusing specifically on STAD implementation in elementary IPAS classrooms remain limited. Furthermore, most existing studies compare STAD only against conventional lecture-based instruction, leaving unexplored its comparative effectiveness against active, student-centered approaches such as Contextual Teaching and Learning (CTL) (Ziliwu & Mahmudi, 2025; Azzahra et al., 2025). The absence of such comparison limits educators' ability to make informed, context-sensitive instructional decisions.

Based on these problems and research gaps, this study was conducted to answer the following research question: Does the implementation of the Cooperative Learning model of the Student Teams Achievement Division (STAD) type have a significant effect on the critical thinking skills of fourth-grade elementary school students in the IPAS subject compared to the Contextual Teaching and Learning (CTL) model? This research is expected to provide empirical evidence that can serve as an alternative learning strategy to improve students' critical thinking skills in elementary IPAS education.

## 2. RESEARCH METHODOLOGY

This study is a quantitative research using a quasi-experimental method. Both groups were given a pretest, after which the experimental group received treatment through the implementation of the Cooperative Learning model of the Student Teams Achievement Division (STAD) type in the IPAS subject, while the control group used the Contextual Teaching and Learning (CTL) approach. Subsequently, both groups were given a posttest to measure the critical thinking skills of fourth-grade elementary school students. The research was conducted at East Metro 4 Public Elementary School in the odd semester of the 2025/2026 academic year, with samples determined through purposive sampling: Class IVC as the experimental group consisting of 29 students and Class IVA as the control group consisting of 28 students. The research procedures included preparation, implementation, and completion stages, covering instrument development, pretest–treatment–posttest implementation, and data processing and reporting.

The research instrument was a multiple-choice test that had undergone validity, reliability, difficulty level, and discrimination index testing. The validity test results showed that 26 items were valid, while the reliability test obtained a Cronbach's Alpha value of 0.939, indicating very high reliability (Sugiyono, 2023). Data were collected through tests, observations, questionnaires, and documentation. Data analysis included calculating critical thinking scores, mean scores, and improvement using the N-Gain. The prerequisite tests for analysis included the Kolmogorov–Smirnov normality test and Levene's homogeneity test using SPSS version 27 (Ghozali, 2018). Because the data were not normally distributed, hypothesis testing was conducted using nonparametric statistics, namely the Mann–Whitney test to compare two independent groups and the Wilcoxon Signed Rank test to analyze differences in scores before and after treatment (Yensy et al., 2019). The decision-making criteria were based on a significance value ( $p$ -value)  $< 0.05$ , indicating that the alternative hypothesis could be accepted.

## 3. RESULT AND DISCUSSION

### 3.1. Classification N-Gain

The description of the pretest and posttest data results in the control class and experimental class is presented in Table 1.

**Table 1. Description of Pretest and Posttest Results Data**

Experimental Class		
N	Pretest	Posttest
28	82,54	90,36
Control Class		

N	Pretest	Posttest
29	92,14	95,93

Based on the results of the descriptive analysis, the initial critical thinking skills of students in both classes showed differences before being given the learning treatment. The experimental class had an average pretest score of 82.54, while the control class had an average of 92.14. After being given the learning treatment, both classes experienced an increase in critical thinking skills. The average posttest score of the experimental class increased to 90.36 or an increase of 7.82 points. Meanwhile, the control class experienced an increase from 92.14 to 95.93 or an increase of 3.79 points. The increase in the average scores in both classes indicates that the learning process implemented was able to improve students' critical thinking skills. Although the final average score of the control class was still higher, the increase that occurred in the experimental class shows that the application of the modified STAD type Cooperative Learning model without individual quizzes contributed to improving students' critical thinking skills.

### 3.2. Normality test

Before testing the hypothesis, prerequisite analysis tests were first conducted, including normality and homogeneity tests. The results of student activities are presented in Table 2.

**Table 2. Normality Test Results**

Significance value	Class	Pretest	Criteria	Posttest	Criteria
Sig > 0,05	Control	<0,001	Abnormal	<0,001	Abnormal
	Experimental	<0,001	Abnormal	<0,001	Abnormal

Based on Table 2, the results of the normality test using the Kolmogorov–Smirnov test indicate that all pretest and posttest data have a significance value of less than 0.05, indicating that the data are not normally distributed. Therefore, further hypothesis testing uses nonparametric tests.

### 3.3. Homogeneity Test

The homogeneity test in this study was conducted to determine whether the variance of the research data in the control class and the experimental class was the same (homogeneous). In this study, the homogeneity test used the Levene Test, with the decision criterion that the data were considered homogeneous if the significance value was  $> 0.05$ . Based on the homogeneity test, the output showed a significance value (Sig.) of  $0.090 > 0.05$  for both the control class and the experimental class. Therefore, it was concluded that the data variance was homogeneous.

### 3.4. Mann-Whitney Test (Pretest)

Because the normality test results showed that the data were not normally distributed (Sig.  $< 0.001$  for all groups), the hypothesis testing was carried out using the non-parametric Mann-Whitney U test. The Mann-Whitney pretest was used to determine whether there was an initial difference in critical thinking skills between the experimental class and the control class before the learning treatment was given. Based on the analysis, the Mann-Whitney pretest showed a Sig. (2-tailed) value of  $0.012 < 0.05$ . Therefore, it was concluded that there was a statistically significant difference in the initial critical thinking

ability between the experimental class and the control class prior to the intervention. This indicates that the two groups were not initially equivalent, which is consistent with the Nonequivalent Control Group Design applied in this study.

### 3.5. Mann-Whitney Test (Posttest)

The Mann-Whitney posttest was conducted to determine whether there was a significant difference in students' critical thinking skills between the experimental class and the control class after the learning treatment was administered. Based on the analysis, the Mann-Whitney posttest showed a Sig. (2-tailed) value of  $0.009 < 0.05$ . Therefore, it was concluded that there was a statistically significant difference in the final critical thinking skills between the experimental class, which used the Cooperative Learning STAD model, and the control class, which used the Contextual Teaching and Learning (CTL) model. The mean posttest score of the experimental class was 90.36, while the control class obtained a mean of 95.93. Although the control class showed a higher average posttest score, the significant result of the Mann-Whitney posttest confirms that a meaningful distributional difference existed between the two groups' final critical thinking outcomes.

### 3.6. Wilcoxon Signed Rank Test

The Wilcoxon Signed Rank Test was used to determine whether there was a significant improvement in students' critical thinking skills from pretest to posttest within each group. In the experimental class, the results showed a Z value of  $-2.357$  and an Asymp. Sig. (2-tailed) of  $0.018$ . Because the significance value was  $< 0.05$ ,  $H_0$  was rejected, which means there was a statistically significant improvement in critical thinking skills in the experimental class after the implementation of the STAD Cooperative Learning model. In the control class, the test produced a Z value of  $-2.218$  with an Asymp. Sig. (2-tailed) of  $0.027$ . Since  $0.027 < 0.05$ ,  $H_0$  was also rejected for the control group, indicating that the CTL model also significantly improved students' critical thinking skills. These findings reveal that both the STAD and CTL learning models were independently effective in improving students' critical thinking skills.

### 3.7. N-Gain Test

The N-Gain test was used to determine whether the application of the STAD Cooperative Learning model was effective in improving students' critical thinking skills. After applying the treatment to the experimental class and the control class, data in the form of pretest and posttest results were obtained. The results of these calculations were used to determine the extent of the effectiveness of the applied treatment.

Based on the N-Gain analysis, the experimental class obtained a mean N-Gain score of  $0.1782$  or  $17.82\%$ , which fell into the low category ( $g < 0.3$ ), while the control class obtained a mean N-Gain score of  $0.3008$  or  $30.08\%$ , which was categorized as moderate ( $0.3 < g < 0.7$ ). These results showed that the control class applying the CTL model experienced a greater improvement in critical thinking skills compared to the experimental class applying the STAD model.

However, considering that the pretest Mann-Whitney test confirmed a significant initial difference between the two groups (Sig. =  $0.012$ ), the higher N-Gain in the control class may also reflect a more favorable initial ability level rather than solely the effect of the learning model. Nonetheless, the STAD model still demonstrated its potential in fostering

collaborative learning, active discussion, and equal participation among students with diverse academic abilities, which are essential foundations for developing critical thinking skills.

### 3.8. Discussion

This study aims to analyze the effect of implementing the Student Teams Achievement Division (STAD) cooperative learning model on fourth-grade elementary students' critical thinking skills in the IPAS subject. The results showed that the average post-test score of the experimental class was 90.36, while the control class using the Contextual Teaching and Learning (CTL) model achieved an average score of 95.93. Quantitatively, the learning outcomes of the control class were higher; however, the findings cannot be interpreted solely based on final scores. Process analysis revealed that the STAD model made a significant contribution to the development of students' critical thinking indicators during the learning process.

Critical thinking skills in this study were measured through indicators including providing simple explanations, building basic skills, drawing conclusions, giving further explanations, and developing problem-solving strategies. Observations showed that the implementation of STAD increased students' active engagement through group discussions, idea exchange, and argumentation. These findings are consistent with [Mukminah and Hirlan \(2025\)](#), who emphasized that collaborative learning enhances critical thinking skills by encouraging social interaction and joint knowledge construction.

Group discussion activities in the experimental class showed increased student participation in expressing opinions and responding to peers' ideas. This process contributed to the development of the ability to provide simple explanations and build fundamental critical thinking skills. These results are aligned with [Alya et al. \(2024\)](#), who stated that cooperative learning improves student engagement and collaboration, thereby positively impacting the development of critical thinking skills. Research by [Putri et al. \(2025\)](#) also indicates that structured group-work-based cooperative learning effectively enhances elementary students' critical thinking skills through interaction and group discussions.

Presentation activities of group discussion results became an important component in training students to provide further explanations and defend arguments logically. [Kurniasih et al. \(2024\)](#) stated that cooperative learning requires students to construct arguments, evaluate information, and draw rational conclusions. In addition, [Khanifahi et al. \(2025\)](#) emphasized that problem-oriented learning improves analytical skills and the ability to plan problem-solving strategies.

On the other hand, the implementation of the CTL model in the control class also proved to support the development of critical thinking skills by linking learning material to real-life contexts. [Ziliwu and Mahmudi \(2025\)](#) explained that contextual learning enhances problem-solving abilities because students are trained to connect concepts with real-life situations. This factor partly explains why the control class achieved a higher average score.

However, observations showed that student participation in discussions in the CTL class was not evenly distributed. [Fahrizal and Sari \(2025\)](#) noted that learning approaches that do not strongly emphasize collaboration may lead to uneven student engagement. In contrast, the STAD model emphasizes individual accountability within groups, making learning interactions more equitable and inclusive.

The development of critical thinking skills requires innovative learning approaches that demand active student involvement. [Dewi et al. \(2025\)](#) emphasized the importance of innovative learning strategies to develop critical thinking, while [Sari et al. \(2025\)](#) showed that

project-based learning and interactive media enhance meaningful learning experiences. Furthermore, [Azzahra et al. \(2025\)](#) demonstrated that cooperative learning in the IPAS subject improves critical thinking skills through teamwork activities.

Besides comparing learning outcomes between STAD and CTL models, this study also highlights that the learning process is as important as the final outcomes. The improvement of critical thinking skills in the experimental class did not occur instantly but developed through structured stages of social interaction. At each stage of STAD, students not only received information but also engaged in negotiating meaning through discussion, clarification, and argumentation. This indicates that cooperative learning provides opportunities for students to actively construct knowledge rather than passively receive explanations from the teacher. Thus, the improvement of critical thinking skills in the STAD class can be understood as a consequence of a student-centered learning process.

Further observations indicated that individual accountability within groups was a key factor in the successful implementation of STAD. Each group member was required to understand the material because individual performance contributed to the group score. This condition encouraged intrinsic motivation and a sense of collective responsibility. Students learned not only for personal achievement but also for group success. This was reflected in increased academic interactions such as peer explanation, feedback, and helping classmates who experienced difficulties. These activities became important indicators in the development of critical thinking skills, particularly in building basic skills and developing problem-solving strategies.

From a social learning theory perspective, peer interaction in the STAD model enables peer scaffolding. Students with better understanding help those who experience difficulties, leading to more equal understanding within groups. This phenomenon explains why participation in the experimental class tended to be more evenly distributed than in the control class. Equal engagement provides opportunities for all students to repeatedly practice critical thinking skills, leading to more consistent development.

Although the CTL model produced a higher average score, the findings indicate that linking learning material to real-life contexts is highly effective in strengthening students' conceptual understanding. Contextual learning helps students see the relevance of material to everyday experiences, making learning more meaningful. However, limitations in collaboration reduced opportunities for students to practice argumentation and idea evaluation. Therefore, CTL is stronger in strengthening conceptual understanding, while STAD is more effective in developing critical thinking skills through social interaction.

These findings suggest that the development of critical thinking skills is influenced by the balance between conceptual understanding and collaborative interaction. Therefore, integrating contextual and cooperative approaches has the potential to become a more optimal learning strategy. Teachers can begin learning with a contextual approach to build initial understanding and then continue with cooperative learning to deepen analysis, discussion, and problem-solving.

The practical implications of this study emphasize the importance of teachers designing learning that provides broad opportunities for students to discuss, argue, and collaborate. Learning that focuses solely on content delivery is insufficient to optimally develop critical thinking skills. Teachers need to act as facilitators who create collaborative learning environments, pose stimulating questions, and encourage students to evaluate and reflect on their thinking processes.

Overall, this study confirms that the development of critical thinking skills requires

varied, collaborative, and contextual learning approaches. Both the STAD and CTL models have complementary strengths in creating meaningful learning oriented toward 21st-century skills. The integration of these two models is expected to produce learning processes that not only improve learning outcomes but also shape students who are active, critical, and capable of solving problems independently and collaboratively.

#### 4. CONCLUSION

This study aims to analyze the effect of implementing the Student Teams Achievement Division (STAD) cooperative learning model on fourth-grade elementary students' critical thinking skills in the IPAS subject. The results showed that quantitatively, the average post-test score of the control class using the Contextual Teaching and Learning (CTL) model was higher than that of the experimental class using the STAD model. However, these results do not fully reflect the process of developing students' critical thinking skills during the learning process.

The findings indicate that the implementation of the STAD model was able to increase students' active engagement through group discussions, teamwork, idea exchange, and presentation activities. These activities contributed to the development of critical thinking indicators, such as the ability to provide explanations, construct arguments, draw conclusions, and design problem-solving strategies. The STAD model also encouraged more equitable student participation due to individual accountability within groups.

On the other hand, the CTL model proved effective in improving learning outcomes by linking learning materials to real-life contexts, helping students understand concepts more meaningfully. Thus, both learning models have different yet complementary contributions to the development of students' critical thinking skills.

Based on these findings, it can be concluded that the STAD model has strong potential for developing critical thinking skills collaboratively, while the CTL model is more effective in supporting conceptual understanding through real-life contexts. Therefore, educators are recommended to combine or adapt the use of both learning models according to learning objectives so that the development of students' critical thinking skills can be optimized.

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