

The Effect of the Student Teams Achievement Division Learning Model on Elementary School Students' Critical Thinking Skills in Social Studies

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Abstract

Critical thinking is one of the key competencies required in 21st-century education, particularly in Social Studies learning, which aims to develop students' analytical, evaluative, and problem-solving abilities. However, many elementary school students still demonstrate low levels of critical thinking due to the predominance of conventional teacher-centered learning approaches. This study aimed to examine the effect of the Student Teams-Achievement Divisions (STAD) learning model on the critical thinking skills of fifth-grade students in Social Studies learning at SDN 1 Amahusu. The study employed a quantitative approach using a quasi-experimental design involving 46 students, consisting of 23 students in the experimental group and 23 students in the control group. Data were collected through observation and essay-based test instruments that had undergone validity and reliability testing. Data analysis was conducted using SPSS version 25 and included descriptive statistics, validity testing, reliability testing, normality testing, homogeneity testing, paired-samples t-test analysis, and N-Gain analysis. The findings revealed that the STAD learning model significantly improved students' critical thinking skills. The experimental group achieved a mean post-test score of 91.5, compared with 48.2 in the control group. The paired-samples t-test yielded a significance value of 0.000 ($p < 0.05$), indicating a statistically significant effect of the intervention. Furthermore, the average N-Gain score of 0.8440 was categorized as high. These findings indicate that the STAD learning model is an effective instructional strategy for enhancing elementary school students' critical thinking skills in Social Studies learning through collaborative and student-centered learning activities.

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Introduction

The demands of 21st-century education require students to possess higher-order thinking skills that enable them to adapt to rapid social, technological, and global changes. Educational systems are expected not only to transfer knowledge but also to develop students' ability to analyze information, solve problems, and make informed decisions. Among the various competencies required in the modern era, critical thinking has emerged as one of the most essential skills because it enables learners to evaluate information objectively and respond effectively to complex situations. Students who possess strong critical thinking skills are better prepared to face academic challenges and real-world problems through logical and evidence-based reasoning. Therefore, developing critical thinking skills has become a major objective of contemporary education systems, including in Indonesia (Roudlo, 2020; Rahmaini & Ogylva Chandra, 2024).

Critical thinking refers to a reflective and rational process that involves interpretation, analysis, evaluation, inference, and explanation when assessing information and making judgments. According to Facione, critical thinking encompasses a set of cognitive skills that enable individuals to examine issues carefully, evaluate evidence systematically, and formulate well-reasoned conclusions. These abilities help learners distinguish valid information from unsupported claims and encourage them to construct knowledge through logical reasoning. The indicators of critical thinking include interpretation, analysis, inference, evaluation, and explanation, all of which contribute to students' capacity to communicate ideas effectively and solve problems independently. Consequently, critical thinking is considered a fundamental component of meaningful learning and lifelong learning competencies (Rositawati, 2018; Mulyawan, 2021; Rahmaini & Ogylva Chandra, 2024).

The importance of critical thinking development is closely related to the objectives of Social Studies learning at the elementary school level. Social Studies is not merely intended to help students memorize historical events, geographical concepts, or social facts; rather, it functions as a medium for developing citizenship values, social awareness, and civic reasoning. Through Social Studies, students are encouraged to understand social phenomena, evaluate societal issues, and make responsible decisions based on ethical considerations. Such learning experiences are expected to foster critical, responsible, and participatory citizens who can contribute positively to society. Therefore, Social Studies learning plays a strategic role in cultivating students' social analysis skills and civic competence from an early age (Balqis et al., 2024; Stitzlein, 2020; Setiawan et al., 2021).

Despite its importance, the critical thinking skills of Indonesian students remain relatively low. Evidence from the Programme for International Student Assessment (PISA) 2022 indicates that Indonesian students continue to experience difficulties in tasks requiring analytical reasoning, evaluation, and problem-solving abilities. These findings suggest that students are still insufficiently exposed to learning experiences that encourage active inquiry and higher-order thinking. One contributing factor is the continued dominance of conventional teacher-centered instructional approaches, which often emphasize information delivery and memorization rather than student participation and critical engagement. As a result, students tend to become passive recipients of knowledge rather than active constructors of understanding.

To address this challenge, innovative learning models that actively engage students in the learning process are required. One instructional approach that has received considerable attention is the Student Teams-Achievement Divisions (STAD) cooperative learning model. Developed by Robert Slavin, STAD emphasizes collaboration, peer interaction, and shared responsibility among group members. In this model, students work in heterogeneous groups consisting of individuals with different academic abilities, backgrounds, and characteristics. Through collaborative discussion and problem-solving activities, students are encouraged to exchange ideas, assist one another, and develop a deeper understanding of the learning material. These characteristics make STAD a promising strategy for promoting active learning and improving students' analytical and critical thinking abilities (Sari & Susanti, 2025; Gemilang, 2021).

Previous studies have reported that the STAD learning model contributes positively to various learning outcomes, including academic achievement, student engagement, collaborative skills, and critical thinking development. The cooperative structure embedded within STAD encourages students to participate actively in discussions, explain concepts to peers, and evaluate alternative viewpoints. Such learning experiences create opportunities for students to develop higher-order thinking skills while simultaneously strengthening their social competencies. In addition, the model has been recognized for creating a more enjoyable learning environment that motivates students to become active participants in the learning process rather than passive listeners. The flexibility of the STAD model also allows it to be implemented across different subjects and educational contexts (Asmedy, 2021; Anggraeni et al., 2020; Elpisah & Bin-Tahir, 2020).

Observations conducted at SD Negeri 1 Amahusu on March 4, 2024, revealed that learning activities in Grade V were still predominantly conducted through lecture-based instruction. Students tended to receive information passively, while opportunities for discussion, collaboration, and critical analysis remained limited. This condition was particularly evident in the topic "Let's Get Acquainted with Our Earth," which discusses Earth's structure, tectonic plates, and natural phenomena that are abstract and difficult to visualize directly. Consequently, students often experienced difficulties in understanding concepts meaningfully and became less interested in the learning process. Although numerous studies have examined the effectiveness of the STAD model, relatively few have focused specifically on measuring improvements in elementary students' critical thinking skills using comprehensive N-Gain analysis within Social Studies learning contexts. Therefore, this study aims to examine the effect of the STAD cooperative learning model on the critical thinking skills of fifth-grade students in Social Studies learning, particularly on the topic "Let's Get Acquainted with Our Earth," and to determine the magnitude of learning improvement using the N-Gain test.

Method

This study employed a quantitative approach using a quasi-experimental design to examine the effect of the STAD learning model on the critical thinking skills of fifth-grade students at SD Negeri 1 Amahusu. Quantitative research is intended to explain the relationships and effects among variables through systematic measurement and statistical analysis (Dhewy, 2022). The study involved 46 students divided into an experimental group ($n = 23$) and a control group ($n =$

23). A pre-test–post-test control group design was utilized, in which both groups completed a pre-test to measure their initial critical thinking skills, while only the experimental group received instruction using the STAD learning model before both groups completed a post-test. The independent variable was the STAD cooperative learning model, whereas the dependent variable was students’ critical thinking skills, which were assessed through indicators of analysis, synthesis, problem-solving, conclusion drawing, and evaluation (Ridwan, 2021; Syahrizal & Jailani, 2023). Data were collected through observation, essay-based tests, and documentation. Prior to implementation, the test instrument was subjected to validity and reliability testing to ensure its appropriateness for measuring the targeted construct. The research design was developed to determine the effectiveness of the STAD model in improving students’ critical thinking skills and followed the procedures required for quasi-experimental studies (Putra et al., 2025). Data analysis was conducted using descriptive and inferential statistics, including item validity testing using Pearson correlation, reliability testing, normality testing, homogeneity testing, paired-samples t-test analysis, and N-Gain analysis to determine the magnitude of students’ learning improvement following the intervention (Lestari et al., 2024).

Results and Discussion

Result

This study was conducted through several stages. The first stage involved testing the research instrument on fifth-grade students at SDN 1 Amahusu. The second stage was the administration of a pre-test to measure students’ initial critical thinking skills regarding the topic “Let’s Get Acquainted with Our Earth.” The third stage consisted of implementing the STAD learning model in the experimental class, while the fourth stage involved administering a post-test to evaluate changes in students’ critical thinking skills after the intervention.

The research instrument consisted of essay questions designed to assess students’ critical thinking skills. Prior to its use, the instrument underwent validity and reliability testing. Based on the analysis conducted using SPSS version 25, ten essay items were tested. The results indicated that five items met the validity criteria, while the remaining five items were excluded because they did not satisfy the required statistical standards or were considered excessively difficult for students. The five valid items were retained because they were aligned with the indicators of critical thinking skills being measured. Furthermore, the reliability test produced a Cronbach’s Alpha coefficient of 0.636, indicating that the instrument possessed acceptable reliability and was suitable for use in the study.

The pre-test results revealed that students’ initial critical thinking skills were relatively low. Most students obtained scores within the low and very low categories, indicating limited prior knowledge and insufficient critical thinking abilities related to the learning material. The categorization of students’ critical thinking skills is presented in Table 1.

Table 1. Categories of Students’ Critical Thinking Skills

| Score Interval | Category |
|----------------|-----------|
| 80–100 | Very High |
| 66–79 | High |
| 56–65 | Moderate |

| | |
|-------|----------|
| 40-55 | Low |
| ≤39 | Very Low |

Following the pre-test, the STAD learning model was implemented in the experimental class through six instructional stages: (1) conveying learning objectives and motivating students, (2) presenting information, (3) organizing students into groups, (4) guiding group work and learning activities, (5) evaluating learning outcomes, and (6) providing rewards. After the completion of the learning intervention, a post-test was administered to determine the effectiveness of the model in improving students' critical thinking skills. The comparison between pre-test and post-test scores is presented in Table 2.

Table 2. Comparison of Pre-Test and Post-Test Scores

| Group | N | Mean Pre-Test | SD Pre-Test | Mean Post-Test | SD Post-Test | Improvement (%) |
|--------------|----|------------------|----------------|-------------------|-----------------|-----------------|
| Experimental | 23 | 48.7 | 11.1 | 91.5 | 5.9 | 87.8 |
| Control | 23 | 41.7 | 7.0 | 48.2 | 6.5 | 15.5 |

Table 2 shows substantial differences between the experimental and control groups. In the experimental class, consisting of 23 students, the mean pre-test score was 48.7, which increased to 91.5 in the post-test. Meanwhile, the control class, which also consisted of 23 students, showed a smaller increase, from a mean pre-test score of 41.7 to a mean post-test score of 48.2. The percentage increase in the experimental class reached 87.8%, whereas the control class showed an increase of only 15.5%. These results indicate that students who participated in learning activities using the STAD model achieved considerably greater improvements in critical thinking skills than those who received conventional instruction.

Prior to hypothesis testing, prerequisite analyses were conducted through normality and homogeneity tests. The normality test was performed to determine whether the data were normally distributed. The results showed a significance value of 0.200, which exceeded the significance level of 0.05. Therefore, the data were considered normally distributed.

The homogeneity test was conducted to examine whether the variances of the groups were equal. The analysis yielded a significance value of 0.214, which was greater than 0.05. Consequently, the data variances were considered homogeneous, indicating that the assumptions required for parametric statistical testing had been satisfied.

To determine the effect of the STAD learning model on students' critical thinking skills, a paired-samples t-test was conducted. The analysis produced a significance value (Sig. 2-tailed) of 0.000, which was lower than the significance threshold of 0.05. Therefore, the null hypothesis (H_0) was rejected and the alternative hypothesis (H_a) was accepted. These findings indicate a statistically significant difference between students' pre-test and post-test scores, demonstrating that the implementation of the STAD learning model significantly improved students' critical thinking skills.

Furthermore, an N-Gain analysis was conducted to determine the magnitude of the improvement resulting from the learning intervention. The results revealed an average N-Gain score of 0.8440. Based on the established N-Gain criteria, this value falls within the high category. Therefore, it can be concluded that the implementation of the STAD learning model had a high

level of effectiveness in improving the critical thinking skills of fifth-grade students at SDN 1 Amahusu.

Discussion

The significant improvement in students' critical thinking skills, as indicated by the high N-Gain score of 0.8440, demonstrates that collaborative learning through the STAD model functions as a powerful catalyst for cognitive development. Unlike the control class, which predominantly relied on passive learning activities, the experimental class provided students with opportunities to engage in structured discussions, exchange ideas, and evaluate different perspectives. Through collaborative interactions, students collectively identified, analyzed, and interpreted concepts related to the topic "Let's Get Acquainted with Our Earth." These findings suggest that the effectiveness of the STAD model extends beyond conventional group work because it emphasizes shared responsibility and active participation among group members. This learning environment encourages students to justify their reasoning, defend their arguments, and critically evaluate information before participating in individual assessments, thereby transforming conceptual understanding into higher-order critical thinking skills (Slavin, 2019).

The process of cognitive development facilitated by STAD can be explained through the gradual transfer of learning responsibility. Learning begins with the Teacher Responsibility phase, where teachers introduce and explain fundamental concepts through focused instruction. Subsequently, responsibility is gradually shared with students through guided practice and collaborative group activities, allowing learners to construct understanding collectively. The final stage involves independent practice through individual quizzes, where students demonstrate their mastery of the material independently. This gradual progression from teacher-centered instruction to student-centered learning enables learners to internalize knowledge more effectively while developing critical thinking and problem-solving abilities through active engagement and reflection (Slavin, 2019).

The findings are also consistent with Lev Vygotsky's Zone of Proximal Development (ZPD) theory, which emphasizes that cognitive development occurs through social interaction and scaffolding provided by more capable peers. The topic of Earth's structure contains abstract concepts that are often difficult for elementary school students to comprehend through one-way lectures alone. Within STAD groups, students with higher academic achievement assist their peers by simplifying complex concepts into more accessible explanations and examples. This process enables learners to bridge gaps in understanding while simultaneously encouraging collaborative knowledge construction and meaningful learning experiences (Putri Eka Luthfiyah, 2025; Eggen & Kauchak, 2012).

The peer tutoring process embedded in STAD provides reciprocal benefits for all group members. Students who explain concepts to their peers reinforce and deepen their own understanding through metacognitive processes, such as monitoring, evaluating, and restructuring their knowledge. At the same time, students receiving assistance benefit from alternative explanations that make abstract concepts easier to understand. Such reciprocal interactions create a supportive learning environment where students actively negotiate meaning, evaluate information, and construct knowledge together. Consequently, multiple

dimensions of critical thinking, including analysis, interpretation, inference, and evaluation, are stimulated simultaneously during the learning process (Johnson & Johnson, 2014).

The positive impact of cognitive structuring through the STAD model is particularly relevant to the characteristics of Social Studies learning at the elementary school level. Social Studies education not only requires students to understand historical facts and geographical concepts but also encourages them to develop social awareness, problem-solving skills, and sensitivity toward societal issues. Through heterogeneous group discussions, students are encouraged to analyze social phenomena, examine causal relationships, debate alternative viewpoints, and appreciate diverse perspectives presented by their peers. Such learning conditions provide opportunities for students to reconstruct knowledge actively rather than merely memorizing information. As a result, the STAD model strengthens critical thinking skills by facilitating logical and contextual understanding of social issues and phenomena (Solihatin & Raharjo, 2012; Susanto, 2014).

Another important factor contributing to the effectiveness of STAD is the integration of positive interdependence and individual accountability. Each student is responsible not only for their own learning outcomes but also for contributing to the success of the group. This structure encourages meaningful participation and ensures that every student actively engages in learning activities. Furthermore, the division of tasks and collaborative problem-solving processes reduce excessive cognitive burden and help students manage complex information more effectively. Such conditions minimize boredom and frustration while creating a learning environment that supports sustained cognitive engagement and deeper conceptual understanding (Sweller, 2011).

The teacher's role in organizing groups, facilitating discussions, and providing recognition for student achievements also contributes significantly to learning success. Recognition and rewards function as motivational tools that encourage students to remain actively involved in the learning process. Through positive reinforcement, students develop stronger intrinsic motivation and become more confident in expressing opinions, asking questions, and participating in collaborative activities. Consequently, learning becomes more meaningful, enjoyable, and productive for students at the elementary school level (Schunk, 2012).

The implementation of individual quizzes as part of the STAD learning cycle further strengthens student accountability and participation. Because individual performance contributes to the overall group score, students are motivated to support one another and ensure that all group members understand the learning material. This mechanism effectively minimizes the free-rider effect commonly found in group work activities. In addition, supportive peer interactions help reduce academic anxiety and create a psychologically safe learning environment. Reduced anxiety allows students to allocate greater working memory resources toward understanding concepts and solving problems, thereby enhancing learning effectiveness and critical thinking performance (Woolfolk, 2016).

The characteristics of the assessment instruments used in this study also contributed to the successful measurement of students' critical thinking skills. Considering that Indonesian students continue to face challenges in higher-order thinking skills, as reflected in the PISA 2022 results, the integration of learning activities that require analysis, evaluation, and reasoning is essential for improving educational quality. The use of critical-thinking-oriented assessments aligned with the STAD learning process enabled students to practice and demonstrate higher-

order cognitive abilities more effectively. Therefore, the achievement of a high N-Gain score of 0.8440 provides strong empirical evidence that the STAD model can serve as an effective instructional strategy for enhancing critical thinking skills in elementary school students. These findings indicate that the model is applicable not only to Earth Science-related content but also to broader Social Studies learning contexts that require analytical, reflective, and problem-solving competencies. Furthermore, the results confirm that the STAD model significantly improves the critical thinking skills of students at SDN 1 Amahusu and can be considered a valuable alternative for fostering active and meaningful learning in elementary education (OECD, 2023).

Conclusion

Based on the findings and discussion, the STAD learning model proved effective in improving students' critical thinking skills in Social Studies learning. The implementation of STAD provides an alternative solution for teachers who still rely on teacher-centered, theoretical, or conventional instructional approaches by promoting active, collaborative, and student-centered learning. The results demonstrated a significant improvement in students' critical thinking skills, as indicated by an average N-Gain score of 0.8440, which is categorized as high. Through heterogeneous group activities, students were encouraged to actively exchange ideas, solve problems collaboratively, and develop both cognitive and social competencies. These findings suggest that STAD not only enhances students' academic achievement but also fosters meaningful interaction and teamwork among learners. Therefore, the STAD model can be recommended as an effective instructional strategy for Social Studies and other learning materials, provided that its implementation follows the six essential stages: (1) conveying learning objectives and motivating students, (2) presenting information, (3) organizing students into groups, (4) guiding group work and learning activities, (5) conducting evaluation, and (6) providing rewards. Future studies are encouraged to apply this model to different subjects and educational levels to further examine its effectiveness in developing higher-order thinking skills.

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Authors' Note

The authors declare that there is no conflict of interest regarding the publication of this article. The authors confirmed that the paper was free of plagiarism.

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