



IMPROVING GRADE VI STUDENTS' SCIENCE LEARNING OUTCOMES THROUGH THE STAD COOPERATIVE LEARNING MODEL IN A SMALL RURAL SCHOOL

Irni Listya^{1*}, Nurul Putri²

¹ Elementary School Teacher Education Study Program (PGSD), Faculty of Teacher Training and Education, Universitas Terbuka, Makassar, Indonesia.

² Elementary School Teacher Education Study Program (PGSD), Faculty of Teacher Training and Education, University of Muhammadiyah Makassar, Makassar, Indonesia.

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Corresponding Author:

Author Name*: Nurul Putri

Email*: nurul070725@gmail.com

DOI:

ABSTRAK

Penelitian ini dilakukan sebagai respons terhadap rendahnya hasil belajar Ilmu Pengetahuan Alam (IPA) di Kelas VI SD Kecil Raranum Balangan, yang ditunjukkan oleh nilai rata-rata kelas sebesar 62,00 pada penilaian harian prasiklus — di bawah Kriteria Ketuntasan Minimal (KKM) yang ditetapkan sebesar 75. Permasalahan utama yang teridentifikasi mencakup ketidakterbukaan siswa dalam menyampaikan pendapat, lemahnya kemampuan merumuskan gagasan secara mandiri, serta kurangnya budaya diskusi antarsiswa. Penelitian ini bertujuan untuk mendeskripsikan pelaksanaan, menganalisis peningkatan hasil belajar, dan mengkaji peningkatan aktivitas siswa melalui penerapan model pembelajaran kooperatif tipe STAD (*Student Teams-Achievement Division*). Penelitian tindakan kelas ini dilaksanakan di SD Kecil Raranum, Kecamatan Tebing Tinggi, Kabupaten Balangan, dengan subjek penelitian sebanyak 10 peserta didik kelas VI tahun pelajaran 2025/2026 (6 laki-laki, 4 perempuan). Penelitian dilaksanakan dalam tiga siklus menggunakan desain spiral Kemmis dan McTaggart yang mencakup tahap perencanaan, pelaksanaan, observasi, dan refleksi. Data dianalisis secara deskriptif kuantitatif berdasarkan rata-rata skor evaluasi, persentase ketuntasan KKM, dan persentase aktivitas siswa. Hasil penelitian menunjukkan peningkatan rata-rata skor evaluasi dari 70,91 pada Siklus I menjadi 74,09 pada Siklus II, dan mencapai 85,45 pada Siklus III. Ketercapaian KKM meningkat dari 50,00% (5 dari 10 siswa) menjadi 80,00% (8 dari 10 siswa), kemudian menjadi 90,00% (9 dari 10 siswa). Aktivitas belajar siswa meningkat dari 58,33% menjadi 75,00%, dan mencapai 100% pada Siklus III. Temuan ini mengindikasikan bahwa penerapan model pembelajaran kooperatif tipe STAD berkontribusi pada peningkatan hasil belajar dan aktivitas siswa pada mata pelajaran IPA selama siklus tindakan berlangsung.

Kata Kunci: Hasil Belajar; Model Pembelajaran Kooperatif; STAD; Ilmu Pengetahuan Alam

ABSTRACT

This research was conducted in response to the low Natural Science (IPA) learning outcomes in Class VI at SD Kecil Raranum Balangan, as evidenced by a pre-cycle class average score of 62.00 — below the established Minimum Mastery Criteria (KKM) of 75. The primary problems identified included students' reluctance to express opinions, a weak ability to formulate independent ideas, and an absence of classroom discussion culture. This study aims to describe the implementation of the STAD (Student Teams-Achievement Division) cooperative learning model, analyse improvements in student learning outcomes, and examine improvements in student learning activity across action cycles. This classroom action research was conducted at SD Kecil Raranum, Tebing Tinggi District, Balangan Regency, involving all 10 Class VI students (6 male, 4 female) in the 2025/2026 academic year. The study was carried out in three cycles following Kemmis and McTaggart's spiral design, encompassing planning, action, observation, and reflection phases. Data were analysed descriptively using mean evaluation scores, KKM attainment percentages, and student activity percentages. Results indicate that the mean evaluation score increased from 70.91 in Cycle I to 74.09 in Cycle II and reached 85.45 in Cycle III. KKM attainment improved from 50.00% (5 out of 10 students) to 80.00% (8 out of 10 students).

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students), then to 90.00% (9 out of 10 students). Student activity increased from 58.33% to 75.00%, reaching 100% in Cycle III. These findings indicate that STAD-based cooperative learning was associated with improvements in both student learning outcomes and engagement during the action cycles.

Keywords: Learning Outcomes; Cooperative Learning Model; STAD; Natural Science

INTRODUCTION

Science education at the elementary school level plays a strategic role in building the foundations of scientific and critical thinking from an early age. The Natural Science (IPA) subject does not merely transfer factual knowledge but also cultivates scientific habits such as observing, formulating hypotheses, and drawing evidence-based conclusions (Rustaman et al., 2011). However, the reality of Natural Science learning in many Indonesian elementary schools — particularly in remote and underdeveloped areas — remains far from this ideal.

SD Kecil Raranum in Tebing Tinggi District, Balangan Regency, South Kalimantan, is one of the schools facing serious challenges in Natural Science learning. Based on pre-cycle assessment data, the Class VI average score was 62.00, which falls below the established KKM of 75. Classroom observations further revealed that the learning process tends to be conventional and one-directional: teachers deliver content through lectures, students remain largely passive, and meaningful peer interaction is virtually absent.

Several specific problems were identified: (1) students lack confidence in expressing opinions or asking questions; (2) students' ability to formulate independent ideas is very limited; (3) there is virtually no culture of healthy intellectual discussion among students; (4) peer collaboration is minimal; and (5) the class average score consistently falls below the KKM. These conditions align with broader findings that teacher-centred, one-way instruction fails to optimise students' learning potential — particularly in subjects that require exploration, discussion, and inquiry, such as Natural Science (Khanifatul, 2013; Hartono, 2013).

In response to these challenges, the STAD (*Student Teams-Achievement Division*) cooperative learning model was identified as a contextually appropriate intervention. STAD was developed by Robert E. Slavin at Johns Hopkins University and is among the most widely researched cooperative learning models (Slavin, 2015). It integrates whole-class instruction, heterogeneous team study, individual quizzes, individual improvement scores, and team recognition — five components that collectively create a structure of positive interdependence and individual accountability (Slavin, 2015; Huda, 2011).

In STAD, students are heterogeneously grouped by academic ability, gender, and social background. After the teacher presents material, students study together in their groups. Each student is then individually assessed through a quiz, and the score is compared with their personal baseline to generate an improvement score that contributes to the group's total. This mechanism ensures that every student regardless of prior ability has an equal opportunity to contribute to their team's success, thereby fostering intrinsic motivation to help peers understand the material (Rusman, 2014).

The key characteristics of STAD include: (a) team-based learning that enables structured peer interaction; (b) individual accountability through quizzes and improvement scores; (c) positive interdependence, whereby individual success contributes to group success; and (d) team recognition that reinforces collaborative effort (Hartono, 2013; Slavin, 2015).

Cooperative learning is particularly well-suited to Natural Science instruction, as the discipline inherently emphasises process skills, observation, inference, and inquiry — that are most effectively developed through social interaction and collaborative problem-solving (Rustaman et al., 2011). Samatowa (2016) argues that elementary Natural Science should prioritise direct experience and collaborative discussion so that students develop genuine conceptual understanding rather than rote memorisation.

Several studies have reported positive associations between STAD implementation and improved Natural Science learning outcomes at the elementary school level. Juniati and Widiana (2017) found improvements in learning outcomes among Grade IV students following the application of inquiry-based cooperative learning. Kurniasih and Sani (2016) documented improvements in science learning outcomes through structured cooperative approaches. More broadly, meta-analyses of cooperative learning

research consistently identify STAD as one of the most effective structured cooperative methods for improving academic achievement across subject areas and grade levels (Slavin, 2015; Johnson & Johnson, 2009).

Despite this body of evidence, research specifically examining STAD in small rural schools (*sekolah kecil*) with very limited student populations remains scarce in the Indonesian literature. Most existing studies have been conducted in urban or semi-urban settings with considerably larger class sizes, following standard group configurations of four to five students as recommended by Slavin (2015). It remains unclear whether STAD retains its effectiveness when adapted for classes of fewer than 15 students requiring groups of two to three members. This gap forms the primary motivation for the present study.

Based on this background, the study addresses the following research questions: (1) How is the STAD cooperative learning model implemented in Natural Science instruction in Class VI of SD Kecil Raranum Balangan? (2) To what extent do student learning outcomes improve across action cycles following STAD implementation? (3) To what extent does student learning activity improve across action cycles during STAD implementation?

Correspondingly, the study aims to: (1) describe the implementation process of STAD in the research context; (2) analyse changes in student learning outcomes across three action cycles; and (3) examine changes in student learning activity across three action cycles. The findings are intended to provide practical guidance for teachers in small and remote schools seeking evidence-based strategies to improve Natural Science instruction.

METHOD

This study employed a collaborative Classroom Action Research (CAR) design following the spiral model of Kemmis and McTaggart (1988), comprising planning, action, observation, and reflection. CAR was selected to facilitate systematic improvement of classroom practices through iterative cycles (Arikunto et al., 2015). The classroom teacher acted as the researcher-practitioner, while a supervisor served as the external observer.

The study was conducted at SD Kecil Raranum, Tebing Tinggi District, Balangan Regency, South Kalimantan, from October 2 to November 1, 2025. Participants were all 10 Grade VI students, comprising six males and four females. All students participated in the three cycles. The pre-cycle mean score was 62.00, below the Minimum Mastery Criterion (KKM) of 75.

Students were assigned to three heterogeneous teams, two groups of three and one group of four—based on prior achievement, gender, and social participation. The instructional content focused on vegetative and generative reproduction in plants and reproduction in animals.

Data was collected using four instruments. First, a student activity observation sheet assessed six behaviours: listening to the teacher, participating in group discussions, asking questions, expressing opinions, completing group tasks, and presenting answers. Each indicator was scored as 1 when observed and 0 when not observed.

Second, a teacher activity observation sheet assessed the implementation of the five STAD components: class presentation, team study, individual quizzes, individual improvement scoring, and team recognition. Third, an evaluation test comprising 10 multiple-choice and 5 short-answer items was administered at the end of each cycle. The maximum raw score of 20 was converted to a 0–100 scale. The tests were reviewed by the supervising lecturer for content validity. Fourth, field notes documented classroom events and reflections during each cycle.

The study comprised three 70-minute cycles conducted on October 10, October 17, and October 24, 2025. Each cycle followed five STAD components: class presentation, heterogeneous team study, individual quiz, calculation of individual improvement scores, and team recognition (Slavin, 2015).

Individual quiz scores were compared with students' baseline scores. Team scores were calculated from the average improvement points of team members. Teams were recognised as "Super Team," "Great Team," or "Good Team" according to their average improvement scores.

Reflective findings informed of revisions between cycles. In Cycle II, instructions and group roles were clarified, and structured discussion prompts were introduced. In Cycle III, individual guidance and the team-recognition mechanism were strengthened.

Quantitative data were analysed descriptively using the following formulas: mean score, KKM attainment, and student activity. Field notes and observer records were analysed descriptively to identify changes across cycles. The action was considered successful when the mean score reached ≥ 75 , at least 80% of students achieved the KKM, and student activity reached $\geq 75\%$. A subsequent cycle was conducted when one or more criteria had not been achieved.

The same external observer participated in all cycles using structured observation sheets. Before data collection, the researcher and observer discussed the indicators and scoring procedures to establish a shared interpretation and improve observational consistency.

RESULTS

The research was conducted in three sequential cycles. Each cycle produced data on the average learning evaluation scores, KKM attainment levels, and student activity. Table 2 below provides a comprehensive summary of all research results.

Table 2. Summary of Three-Cycle Research Results

No.	Indikator	Pre-Cycle	Cycle I	Cycle II	Cycle III
1	Average Evaluation Score	62,00	70,91	74,09	85,45
2	KKM Attainment (KKM=75)	20,00%	50,00%	80,00%	90,00%
3	Active Student Participation	-	58,33%	75%	100%

Prior to the intervention, the Class VI mean score was 62.00, with only 2 out of 10 students (20.00%) achieving the KKM of 75. Classroom observation confirmed the problems identified in the initial diagnosis: students rarely spoke during lessons, group discussion was absent, and the learning atmosphere was predominantly passive and teacher-directed. These baseline conditions established the necessity for the STAD-based intervention.

In Cycle I, STAD cooperative learning was implemented for the first time. Students were not yet accustomed to structured group-learning patterns, resulting in significant time spent on classroom management. The evaluation results showed an average score of 70.91, which is still below the KKM of 75. KKM attainment reached only 50.00%, meaning only 5 out of 10 students achieved mastery. In terms of activity, only 58.33% of students actively participated in the learning process.

Cycle I reflection identified Several weaknesses were identified: students were unfamiliar with STAD procedures and spent considerable time on classroom management rather than content engagement; group discussion was hesitant and unstructured; and students had low intrinsic motivation to explain material to peers. Field notes recorded that two groups spent more than half of the team study time waiting for teacher direction rather than engaging independently. Based on this reflection, the following improvements were planned for Cycle II: (a) simplified and more explicit procedural instructions at the start of the session; (b) introduction of structured role cards for group members (explainer, questioner, recorder); and (c) more frequent teacher movement between groups to provide targeted guidance.

Cycle II covered generative reproduction in plants. The three refinements planned in Cycle I reflection were implemented. Role cards were distributed to each group member at the start of the team study phase, and the teacher circulated more systematically between groups. The mean score increased to 74.09 — approaching but not yet reaching the criterion of ≥ 75 . KKM attainment improved substantially to 80.00% (8 out of 10 students), meeting the KKM attainment criterion. Student activity increased to

75.00% (45 out of 60 possible observed instances), meeting the activity criterion. However, because the mean score criterion (≥ 75) remained unmet, the study continued to Cycle III.

The learning atmosphere improved noticeably: students were more willing to engage in group discussion and ask questions. However, the quality of peer explanation within groups remained uneven — stronger students tended to dominate discussion while weaker students remained passive within the group setting. Field notes recorded that inter-group competition was beginning to emerge as a motivating factor. Planned improvements for Cycle III included: (a) increasing the frequency of direct individual guidance targeting students who had not yet achieved mastery (S1 and S4); and (b) strengthening the inter-group competition element by displaying a running team score tally on the classroom board throughout the session.

Cycle III produced highly significant improvements. Both targeted improvements from Cycle II reflection were implemented. The teacher provided more focused individual guidance to S1 and S4 during team study, and an inter-group score tally was displayed throughout the session. The mean score reached 85.45, surpassing the criterion of ≥ 75 by a substantial margin. KKM attainment reached 90.00% (9 out of 10 students), surpassing the $\geq 80\%$ criterion. Student activity reached 100% (60 out of 60 possible observed instances), exceeding the $\geq 75\%$ criterion. All three success criteria were met; the action cycles were therefore concluded at Cycle III.

DISCUSSION

The findings of this study demonstrate a consistent upward trend across all measured indicators throughout the three action cycles. The mean evaluation score increased from a pre-cycle baseline of 62.00 to 70.91 in Cycle I, 74.09 in Cycle II, and 85.45 in Cycle III. This trajectory reflects a cumulative process of adaptation to STAD procedures, content engagement, and peer collaboration norms — a pattern consistent with cooperative learning theory.

The relatively modest increase from Cycle I to Cycle II (70.91 to 74.09) is consistent with what cooperative learning literature describes as an accommodation phase, during which students are still internalising the procedural norms and social expectations of the model before they can redirect cognitive energy toward content mastery (Lie, 2008). Johnson and Johnson (2009) note that productive group norms typically require multiple sessions to develop. The more substantial increase from Cycle II to Cycle III (74.09 to 85.45) is consistent with this theoretical prediction: once students had internalised STAD procedures, their cognitive and social resources were more fully available for learning. It should be noted, however, that this pattern may also reflect the cumulative effect of repeated exposure to the *Reproduction of Living Organisms* topic, improvements in teacher facilitation quality across cycles, or a combination of these factors alongside the STAD structure itself.

KKM attainment increased from 20.00% in the pre-cycle to 50.00% in Cycle I, 80.00% in Cycle II, and 90.00% in Cycle III. Expressed in absolute terms, the number of students achieving mastery increased from 2 to 5, then 8, then 9 out of 10.

These changes can be interpreted through the cognitive and motivational mechanisms that STAD is designed to activate. From a cognitive perspective, when students explain material to group members — a core activity in the STAD team study phase — they engage in elaborative processing that deepens conceptual understanding beyond what passive reception of instruction can achieve (Trianto, 2010). This peer-explanation process approximates what Vygotsky (as cited in Trianto, 2010) describes as peer scaffolding within the zone of proximal development, in which a more capable peer mediates understanding for a less capable peer more effectively than direct teacher instruction alone can do under time constraints.

From a motivational perspective, STAD's individual improvement score mechanism creates a system in which every student — regardless of prior ability level — can contribute meaningfully to the group's recognition score by improving relative to their own baseline (Slavin, 2015; Rusman, 2014). This design reduces the free-rider phenomenon common in unstructured group work and gives each student a concrete, personally relevant incentive to engage seriously with the material.

That said, the causal attribution of these gains specifically to the STAD model must be made cautiously. This study did not include a control group, and the same teacher delivered instruction across all cycles with progressively refined facilitation skills. It is therefore not possible to isolate the contribution of STAD's structural components from the contributions of repeated content exposure, teacher professional development, or the Hawthorne effect of students knowing they were being observed. The observed gains should be interpreted as changes associated with STAD-based instruction within this specific context, rather than as definitive evidence of STAD's causal efficacy.

Student activity increased from 58.33% in Cycle I to 75.00% in Cycle II and reached 100% in Cycle III, based on six behavioural indicators observed across all students. This progression reflects a gradual shift from predominantly passive, teacher-directed participation toward active, peer-mediated engagement.

In small rural schools, low student participation is often associated with structural factors such as limited learning stimuli, social isolation, and a strong teacher-student hierarchy that discourages students from speaking up in whole-class settings (Sanjaya, 2016). The STAD model addresses this barrier structurally: small-group discussion forums create a psychologically safer environment for students to express opinions and ask questions compared to full-class interaction. This is consistent with affective learning principles described by Djamarah and Zain (2013), who argue that motivation grows when students feel safe to participate, have their contributions recognised, and can observe a direct relationship between their effort and their outcomes — all of which are structurally embedded in STAD.

The 100% activity rate in Cycle III, while a noteworthy outcome, should be interpreted with appropriate caution. This figure shows the researcher's observation that all six indicators were observed among all students during a single 70-minute session; it does not constitute evidence that a permanent transformation of the learning culture has occurred. Three sessions are insufficient to establish lasting behavioural change, and the observation was conducted by a single observer whose scoring may have been influenced by awareness of the study's goals. Future research employing multiple observers and a longer observation period would be needed to assess whether such activity levels are sustained beyond the action cycles.

The *Reproduction of Living Organisms* topic offered characteristics particularly well-suited to STAD: it consists of interrelated subconcepts that can be distributed among group members, involves mechanisms that benefit from peer explanation, and connects to students' everyday experience of plants and animals in their rural environment. Rustaman et al. (2011) note that Natural Science learning emphasises process skills — observation and inference — that are most effectively developed through social interaction. Samatowa (2016) further argues that elementary Natural Science must prioritise direct experience and collaborative discussion to build genuine conceptual understanding. These contextual factors may have contributed to STAD's effectiveness in this study and should be considered when generalising these findings to other topics.

A methodologically relevant finding of this study is that STAD was implemented effectively with groups of three to four students, smaller than the four-to-five-student groups recommended by Slavin (2015). This adaptation was necessitated by the small total enrolment of 10 students. The results suggest that the core principles of STAD — heterogeneous grouping, individual accountability, positive interdependence, and team recognition — can be preserved with smaller group sizes without necessarily diminishing the model's contribution to learning outcomes. This finding offers a practical methodological insight for teachers in small rural schools who may have assumed that STAD requires larger class sizes to function effectively.

The improvement pattern observed in this study is broadly consistent with findings from comparable research. Juniati and Widiana (2017) reported improvements in Natural Science learning outcomes among Grade IV elementary students following cooperative learning-based instruction. Research reviewed by Slavin (2015) consistently identifies STAD as one of the most effective structured cooperative learning models for improving academic achievement in elementary and secondary contexts. However, direct comparison with these studies is limited by differences in sample size, grade level, instructional content, and research design. The present study's most distinctive contribution lies in its

demonstration that STAD principles can be adapted for implementation in an extremely small rural class while still producing improvements across all measured indicators.

Several limitations constrain the interpretability and generalisability of these findings. First, the very small sample size ($n = 10$) means that percentage figures should be interpreted as individual students rather than as statistically stable proportions; a one-student change represents a 10-percentage-point shift. Second, the three-cycle, one-month study period does not allow conclusions about the sustainability of the observed improvements. Third, the absence of a control group prevents definitive causal attribution; observed gains may reflect STAD's structural contribution, improvements in teacher facilitation, content familiarity from repeated exposure, the Hawthorne effect, or a combination of these factors. Fourth, all observation data were collected by a single observer, limiting the reliability of the activity measurements. These limitations do not invalidate the study's practical contributions but should be acknowledged when interpreting its findings.

CONCLUSION

This classroom action research examined the implementation of the STAD cooperative learning model in Natural Science instruction for 10 Class VI students at SD Kecil Raranum Balangan across three cycles. The implementation was progressively refined through reflection, including smaller groups of three to four students, structured role cards, and targeted individual guidance.

Student learning outcomes improved consistently. The mean score increased from 62.00 in the pre-cycle to 70.91 in Cycle I, 74.09 in Cycle II, and 85.45 in Cycle III. KKM attainment also rose from 20.00% to 50.00%, 80.00%, and 90.00%, respectively. Student learning activity increased from 58.33% in Cycle I to 75.00% in Cycle II and 100% in Cycle III. These findings indicate that STAD implementation was associated with improved learning outcomes and classroom participation, with all success criteria achieved by Cycle III.

However, the findings are limited to this small class and cannot be statistically generalised. The study also cannot establish a strict causal relationship because it used a single-class CAR design without a comparison group, and other factors, such as improved teacher facilitation, content familiarity, and observation effects, may have influenced the results.

Teachers in similar small rural school contexts are advised to provide clear procedural orientation, use structured group roles, apply individual improvement scores consistently, and offer targeted support to students who have not achieved mastery. Future studies should involve more classes or schools, longer intervention periods, comparison groups, multiple observers, and different Natural Science topics or grade levels.

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