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IMPLEMENTING TEAMS GAMES TOURNAMENT (TGT) TO IMPROVE GRADE VI STUDENTS' MATHEMATICS LEARNING OUTCOMES ON INTEGER OPERATIONS

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ABSTRAK
Hasil belajar Matematika siswa kelas VI SDN 3 Pujodadi Kecamatan Pardasuka Kabupaten Pringsewu pada tahun pelajaran 2025/2026 masih tergolong rendah. Kondisi ini disebabkan oleh proses pembelajaran yang berpusat pada guru dan penggunaan metode konvensional, sehingga partisipasi dan aktivitas belajar siswa belum optimal. Berdasarkan observasi prasiklus terhadap 22 siswa kelas VI, nilai rata-rata kelas adalah 58,40, dan hanya sekitar 36% siswa yang mencapai Kriteria Ketuntasan Minimal (KKM) sebesar 70. Penelitian ini bertujuan untuk meningkatkan hasil belajar Matematika pada materi operasi hitung bilangan bulat melalui penerapan model pembelajaran kooperatif tipe Teams Games Tournament (TGT). Penelitian ini merupakan penelitian tindakan kelas yang dilaksanakan dalam dua siklus, masing-masing dengan tahapan perencanaan, pelaksanaan tindakan, observasi, dan refleksi. Data dikumpulkan melalui tes hasil belajar dan lembar observasi aktivitas siswa. Hasil penelitian menunjukkan bahwa nilai rata-rata kelas meningkat dari 70,00 pada Siklus I menjadi 83,64 pada Siklus II, sementara persentase ketuntasan klasikal meningkat dari 22,73% menjadi 95,46%. Penerapan model TGT berkaitan dengan peningkatan hasil belajar dalam konteks kelas ini. Dengan demikian, model pembelajaran TGT dapat dipertimbangkan sebagai alternatif instruksional yang efektif untuk meningkatkan hasil belajar Matematika pada operasi bilangan bulat di sekolah dasar.
Kata Kunci: Teams Games Tournament; hasil belajar; Matematika; penelitian tindakan kelas; sekolah dasar.

ABSTRACT
The mathematics learning outcomes of sixth-grade students at SDN 3 Pujodadi, Pardasuka District, Pringsewu Regency, in the 2025/2026 academic year were considered low. This condition was caused by teacher-centered learning processes and the use of conventional teaching methods, which resulted in limited student participation and learning activities. Based on pre-cycle observations involving 22 Grade VI students, the class mean score was 58.40, and only approximately 36% of students achieved the Minimum Mastery Criteria (MMC) of 70. This study aimed to improve students' mathematics learning outcomes on integer arithmetic operations through the implementation of the cooperative learning model Teams Games Tournament (TGT). This research employed classroom action research (CAR) conducted in two cycles, each consisting of planning, action, observation, and reflection stages. Data were collected using learning achievement tests and student activity observation sheets. The results indicated that the mean score increased from 70.00 in Cycle I to 83.64 in Cycle II, while mastery learning percentage rose from 22.73% to 95.46%. The implementation of TGT was associated with improved learning outcomes within this classroom context. Therefore, the TGT learning model can be considered as an effective instructional alternative for improving mathematics learning outcomes of elementary school students on integer arithmetic operations.
***Keywords**: Teams Games Tournament, learning outcomes, mathematics, classroom action research, elementary school.*

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INTRODUCTION

Mathematics is a fundamental subject in elementary education that plays a crucial role in developing students' logical, systematic, and problem-solving abilities. Mastery of basic mathematical concepts at the elementary level serves as a foundation for students' success in learning more advanced mathematical topics and for applying mathematics in everyday life (Ananda & Damri, 2021; National Council of Teachers of Mathematics [NCTM], 2000). However, the abstract and hierarchical nature of mathematics often causes learning difficulties when instructional practices are not designed to be meaningful and student-centered (Widjaja, Dolk, & Fauzan, 2018).

Studies indicate that mathematics instruction in elementary schools is still predominantly teacher-centered. Such instructional approaches tend to limit students' active engagement, resulting in low motivation and unsatisfactory learning outcomes (Pratiwi, Rahayu, & Utami, 2022). Limited opportunities for discussion, collaboration, and interaction among students have been identified as key factors contributing to students' difficulties in understanding mathematical concepts deeply (Juniati, 2017).

One of the essential topics in elementary mathematics is integer arithmetic, which includes addition, subtraction, multiplication, and division of positive and negative integers. Students frequently encounter conceptual difficulties in integer operations because the operations require understanding of directionality, sign rules, and magnitude simultaneously (Putri & Zulkardi, 2021). Common errors include confusion in applying sign rules when subtracting negative integers, errors in multiplication and division involving negative numbers, and a lack of conceptual understanding of the number line. These difficulties are often attributed to instruction that emphasizes procedural memorization rather than conceptual understanding, leaving students without a robust mental model for integer operations (Ananda & Damri, 2021).

Cooperative learning has been widely recognized as an effective approach to improving the quality of mathematics instruction. Cooperative learning encourages students to construct knowledge through collaboration, discussion, and social interaction within small groups (Slavin, 2015; Slavin, 2019). One cooperative learning model that has gained attention is Teams Games Tournament (TGT). The TGT model consists of five core components: (1) *class presentation*, in which the teacher introduces learning materials; (2) *team study*, in which students work collaboratively in heterogeneous groups; (3) *tournament*, in which students compete academically against peers of similar ability; (4) *team recognition*, in which group achievements are acknowledged; and (5) *individual scoring*, in which each student's tournament score contributes to the group total (Slavin, 2015; Kurniasih & Sani, 2018).

The mechanisms through which TGT supports learning of integer arithmetic operations include: (a) concrete representation of integer concepts during group discussions; (b) repeated practice through academic game cards; (c) peer feedback and immediate correction of misconceptions during tournaments; and (d) shared accountability that motivates all group members to master the material. Empirical studies have reported that the TGT model can enhance students' learning motivation, classroom participation, and mathematics learning outcomes at the elementary level (Barnaba & Asruddin, 2018; Hidayat & Nurcahyo, 2023).

The conceptual framework of this study is presented as follows. Low mathematics achievement on integer arithmetic operations, caused by teacher-centered instruction, leads to limited student engagement. The implementation of TGT—through its five components: class presentation, team study, tournament, team recognition, and individual scoring—is expected to increase student engagement, reduce misconceptions through peer interaction, and ultimately improve learning outcomes, as measured by individual written test scores meeting or exceeding the MMC of 70.

A review of prior studies reveals a gap in empirical evidence on the effectiveness of TGT specifically in improving elementary school students' mathematics learning outcomes on integer arithmetic operations within a classroom action research framework. This study provides: (a) classroom-based practical evidence; (b) documentation of the reflective improvement process across cycles; and (c) application of TGT specifically to integer arithmetic operations in Grade VI. Therefore, this study aims to improve sixth-grade students' mathematics learning outcomes in integer arithmetic operations through the implementation of the cooperative learning model TGT. Learning outcomes in this study are operationally

defined as students' individual written test scores on integer arithmetic competencies, limited to the measurement of cognitive achievement within one classroom context.

METHOD

This study employed a Classroom Action Research (CAR) approach aimed at improving students' mathematics learning outcomes through instructional improvement. CAR was selected because it enables teachers to systematically examine and improve their own instructional practices based on ongoing observation and reflection (Arikunto, Suhardjono, & Supardi, 2015).

The research was conducted at SDN 3 Pujodadi, Pardasuka District, Pringsewu Regency, during the 2025/2026 academic year, from February to April 2026, across a total of eight instructional meetings (four per cycle). The participants were 22 Grade VI students (12 male, 10 female) from one intact class, selected based on preliminary observations indicating that students' mathematics learning outcomes on integer arithmetic operations were below the MMC of 70.

Prior to the intervention, a diagnostic test was administered to establish a baseline. The results showed a class mean score of 58.40, with only 8 out of 22 students (36.36%) achieving the MMC of 70. Observational data indicated that most students were passive during instruction, rarely asked questions, and frequently made errors in applying sign rules in subtraction and multiplication of integers. These findings confirmed the need for an instructional intervention.

The instructional intervention applied in both cycles was the cooperative learning model TGT in teaching integer arithmetic operations, including addition, subtraction, multiplication, and division. The five components of TGT were implemented as follows: (a) Class Presentation: The teacher introduced the integer operation concept using a number line and concrete examples (±15 minutes); (b) Team Study: Students were divided into heterogeneous groups of 4–5 members to collaboratively work on problem sets (±25 minutes); (c) Tournament: Students competed at tournament tables with peers of similar ability using academic game cards containing integer operation problems (±20 minutes); (d) Team Recognition: Groups that achieved the highest cumulative scores received recognition in the form of certificates or verbal praise; and (e) Individual Scoring: Each student's tournament score was recorded and contributed to the team total.

Research instruments included: (a) written mathematics achievement tests designed according to learning indicators for integer arithmetic operations; (b) student activity observation sheets to record participation and engagement; and (c) field notes to document classroom conditions and students' responses.

The intervention was considered successful if: (a) classical mastery reached ≥80% of students achieving the MMC of 70; (b) the class mean score reached ≥70; and (c) student activity was categorized as at least "active" based on observation sheets.

RESULTS

This classroom action research was conducted in two cycles through the implementation of TGT in mathematics instruction on integer arithmetic operations. An achievement test was administered at the end of each cycle to measure students' learning outcomes.

Prior to the intervention, 22 Grade VI students completed a diagnostic test. The class score was 58.40, and only 8 students (36.36%) achieved MMC of 70. These data confirmed that most students had not mastered integer arithmetic operations and that instructional improvement was needed.

At the end of Cycle I, a mathematics achievement test was administered to all 22 students. Students were categorized as achieving mastery (score ≥70) or not achieving mastery (score <70). The distribution of outcomes is presented in Table 1.

Table 1. Distribution of Students' Mathematics Learning Outcomes in Cycle I

Score Range	Number of Students	Total Score	Mastery (%)	Non-Mastery (%)
81–100	2	180	9.09%	–
76–80	3	240	13.64%	–
70–75	0	0	–	–
< 70	17	1,120	–	77.27%
TOTAL	**22**	**1,540**	**22.73%**	**77.27%**

The class meant score in Cycle I was 70.00 (1,540 ÷ 22). Only 5 out of 22 students (22.73%) achieved the MMC of 70, while 17 students (77.27%) did not. These results did not meet the predetermined success criterion of ≥80% classical mastery, indicating that the intervention required improvement.

Observation data from Cycle I indicated several weaknesses: (a) students were frequently passive during the team study phase; (b) game card instructions were unclear, causing delays during the tournament; (c) ability grouping for tournament tables was not optimally matched; and (d) the teacher's scaffolding during team discussion was insufficient. Based on these findings, the following improvements were made for Cycle II: simplification of game card instructions, re-grouping of tournament tables based on Cycle I scores, addition of structured discussion guides, and increased peer-tutoring prompts within teams.

Following the instructional improvements in Cycle II, a second achievement test was administered to all 22 students. The distribution of outcomes is presented in Table 2.

Table 2. Distribution of Students' Mathematics Learning Outcomes in Cycle II

Score Range	Number of Students	Total Score	Mastery (%)	Non-Mastery (%)
91–100	2	200	9.09%	–
81–90	5	450	22.73%	–
71–80	14	980	63.64%	–
< 71	1	70	–	4.55%
TOTAL	**22**	**1,700**	**95.46%**	**4.54%**

The class score in Cycle II was 83.64 (1,840 ÷ 22). A total of 21 out of 22 students (95.46%) achieved an MMC of 70, while only 1 student (4.54%) did not. These results met and exceeded the predetermined success criterion of ≥80% classical mastery. A comparison of learning outcomes across all three measurement points is presented in Table 3.

Table 3. Comparison of Students' Mathematics Learning Outcomes Across Measurement Points

Measurement Point	Mean Score	Mastery Percentage
Pre-Cycle	58.40	36.36%
Cycle I	70.00	22.73%
Cycle II	83.64	95.46%

The data in Table 3 show that, following the instructional improvements between Cycle I and Cycle II, both the mean score and mastery learning percentage increased substantially. The decline in mastery percentage from pre-cycle to Cycle I may reflect differences in test difficulty or the initial adjustment period of students to the TGT format.

DISCUSSION

The results of this study indicate that the implementation of the cooperative learning model TGT was followed by an improvement in sixth-grade students' mathematics learning outcomes on integer arithmetic operations, as reflected in the increase in both the class mean score (from 70.00 to 83.64) and the mastery learning percentage (from 22.73% to 95.46%) from Cycle I to Cycle II within this classroom context.

This improvement suggests that the core characteristics of the TGT model—cooperative group work, structured discussion, academic games, and tournaments—may have contributed positively to student learning. From the perspective of cooperative learning theory, students may learn more effectively when they actively participate in group activities, exchange ideas, clarify misconceptions, and share responsibility for group success (Slavin, 2015; Slavin, 2019). In this study, the integration of academic games and tournaments appeared to serve as a motivational mechanism, increasing students' engagement and persistence in learning integer arithmetic.

Specifically with regard to integer arithmetic operations, the TGT format provided opportunities for: (a) repeated practice with sign rules through game card exercises; (b) immediate peer feedback during tournaments that helped students identify and correct procedural errors; (c) collaborative discussion that encouraged verbal articulation of the reasoning behind operations; and (d) structured accountability that motivated students to prepare and master the material before the tournament.

In Cycle I, observation data revealed that several students remained passive during team study, and tournament groupings were not optimally matched by ability. The unclear game card instructions also disrupted the tournament's flow. Following the reflective analysis, adjustments were made: game cards were simplified, tournament tables were re-grouped based on Cycle I performance, structured discussion guides were introduced, and peer-tutoring prompts were added within teams. These targeted modifications appear to have contributed to the substantial improvement observed in Cycle II, suggesting that the reflective improvement process inherent in CAR is an important factor in the successful implementation of TGT.

These findings are consistent with prior research on TGT in elementary mathematics. Hidayat and Nurcahyo (2023) reported that TGT implementation was associated with improved mathematics learning outcomes at the elementary level. Barnaba and Asruddin (2018) similarly found that group-based discussion approaches contributed to higher mathematics achievement in primary school students. More broadly, research on cooperative game-based learning—such as that reported by Hwang, Chang, and Chen (2024) and Karaoğlan-Yılmaz and Yılmaz (2025)—suggests that collaborative and competitive game structures can promote deeper engagement and improved outcomes in mathematics instruction. The present study extends these findings by documenting the specific application of TGT to integer arithmetic operations in Grade VI, with detailed documentation of the reflective improvement process across two cycles.

It should be noted that the improvement observed in this study cannot be attributed solely to the TGT model. Alternative explanations include: increased student familiarity with the assessment format across cycles, a potential novelty effect associated with the game-based approach, variation in test difficulty across cycles, and the researcher's role as both teacher and observer. These factors limit the internal validity of the causal interpretation of findings.

These findings are limited to one classroom and should not be generalized without further research. The study focused exclusively on integer arithmetic operations, and the effectiveness of TGT for other mathematics topics in elementary education remains to be examined. Additionally, this study did not include long-term follow-up measures of achievement, motivation, or attitudes toward mathematics. The absence of a standardized student activity instrument also limits the reporting of engagement data.

CONCLUSION

This classroom action research demonstrates that the implementation of the cooperative learning model Teams Games Tournament (TGT) was followed by improvement in sixth-grade students' mathematics learning outcomes on integer arithmetic operations. The class mean score increased from 70.00 in Cycle I to 83.64 in Cycle II, and the mastery learning percentage rose from 22.73% to 95.46%, meeting the predetermined success criterion of ≥80% classical mastery. These findings suggest that TGT can be considered a viable student-centered instructional alternative for elementary mathematics, particularly for topics requiring foundational conceptual understanding such as integer arithmetic.

For elementary school teachers, the findings suggest that structuring mathematics lessons around TGT's five components—class presentation, team study, tournament, team recognition, and individual

scoring—may enhance student engagement and improve learning outcomes. The reflective cycle of CAR also provides a practical framework for teachers to identify implementation weaknesses and make evidence-based instructional improvements. Future research is recommended to involve larger and more diverse samples, apply TGT across various mathematics topics, and employ longitudinal research designs to investigate long-term impacts on achievement, motivation, and social skills.

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