

Team Games Tournament with Discovery Learning to Improve Science Learning Outcomes and Engagement

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Article Info

Article History :

January 2026

Accepted

February 2026

Published

April 2026

Keywords:

Classroom Action Research; Discovery Learning; Learning Outcomes; Student Engagement; Team Games Tournament

Abstract

Student engagement and learning achievement remain important challenges in science education, particularly in promoting active participation and meaningful understanding of scientific concepts. This study aimed to investigate the effectiveness of implementing the Team Games Tournament (TGT) model through Discovery Learning in improving students' science learning outcomes and engagement. The research employed a Classroom Action Research (CAR) design consisting of two cycles, each involving planning, action, observation, and reflection stages. The study was conducted with 25 seventh-grade students at SMP Taman Dewasa Jetis. Data were collected through achievement tests, classroom observations, and documentation and were analyzed using descriptive techniques. The results revealed a substantial improvement in students' academic achievement, with the average score increasing from 59.92 in the pre-cycle stage to 82.56 in Cycle II. In addition, students demonstrated higher levels of engagement, participation, and motivation throughout the learning process. These findings indicate that the integration of TGT and Discovery Learning effectively supports both cognitive and behavioral aspects of learning. This study contributes to science education by providing empirical evidence that combining cooperative and constructivist learning approaches can create a more engaging learning environment and improve students' achievement in science classrooms.

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p-ISSN 2252-6412

e-ISSN 2502-4523

INTRODUCTION

Education is a consciously and systematically designed endeavor aimed at creating an interactive learning process, enabling learners to develop their full potential across multiple dimensions, including spiritual, intellectual, moral, personal, self-regulatory, and practical skills that are beneficial both individually and within the broader social context. Therefore, education plays a crucial role in driving the progress and development of a nation. It is also a primary determinant of a country's level of advancement, as it produces high-quality human resources who serve as the key agents of development. (Hamdani et al., 2019; Suardi, 2018). In line with the critical role of education in producing high-quality human resources, efforts to improve the quality of education cannot be separated from the quality of teachers, who serve as a key factor in the success of the learning process in schools.

In efforts to enhance the quality of education, teacher quality is a highly critical component. Teachers play a significant role in determining the success of the learning process in schools. They are required to design and implement effective instruction aligned with educational objectives, as well as to provide motivation and support so that students' learning potential can develop optimally. Motivation itself is one of the key factors influencing students' academic success. (Rahman, 2021). Optimal learning outcomes can be achieved when students possess a strong internal drive or desire to learn.

Teacher quality is a highly critical component in improving the overall quality of education. Teachers play a decisive role in the success of the educational process in schools. They are expected to design and implement effective instruction aligned with educational objectives, as well as to provide motivation and support to ensure that students' learning potential develops optimally. In the learning process, teachers, as educators, are responsible for students' learning outcomes and for ensuring their understanding of the material that has been taught. Positive interactions between teachers and students can lead to beneficial outcomes in the learning process; conversely, ineffective interactions may result in suboptimal learning outcomes

(Parnawi, 2019; Suardi, 2018). Despite the pivotal role of teachers in determining the success of the learning process, its implementation in practice has not yet fully met expectations.

The reality in the field indicates that the learning process continues to face various challenges. These are caused by several factors, including the instructional methods employed by teachers and the level of difficulty of the material being studied, both of which contribute to low student motivation. In fact, motivation plays a crucial role in fostering student engagement throughout the learning process. The selection of inappropriate instructional models can hinder students' intellectual development. Although each student possesses different interests and learning styles, the methods currently implemented have not fully accommodated this diversity. As a result, students' interest and concentration during learning activities tend to decline (Rahmadani, 2019). Therefore, challenges in the learning process—particularly those influenced by the choice of instructional methods and the level of material difficulty—have an impact on students' low motivation. This underscores the need for appropriate instructional models that can accommodate student diversity and enhance their engagement and concentration.

Based on observations conducted by the researcher at SMP Taman Dewasa Jetis, out of 25 students observed, the majority—18 students—still exhibited passive behavior during the learning process. Meanwhile, six other students were only able to respond to the teacher's questions when provided with prior guidance. This condition is attributed to students' limited understanding of the material being taught, resulting in incomplete mastery of concepts and a lack of confidence in answering questions. In addition, students appeared to feel bored and drowsy with the instructional methods used, such as question-and-answer sessions, practice exercises, and problem discussions. This situation made the learning process less engaging, thereby contributing to low student participation and suboptimal learning outcomes. Further observation of students' learning styles revealed that 12 students tended toward visual learning, 10 students exhibited kinesthetic learning preferences, and the remaining students were

auditory learners. Therefore, teachers need to design appropriate and varied instructional strategies that accommodate visual, kinesthetic, and auditory learning styles, so that the learning process becomes more effective and meaningful for all students.

The Teams Games Tournament (TGT) learning model encourages students to actively interact and engage in discussions with their group members in understanding the given material. The implementation of the TGT model has been shown to have a positive impact on improving students' learning outcomes and engagement, as the activities carried out during the learning process promote students' direct involvement in learning (Rambembuoh et al., 2025). The cooperative learning model of the Teams Games Tournament (TGT) type is an effective instructional strategy for enhancing students' engagement and learning outcomes through a combination of group collaboration and academic competition. Recent studies indicate that the implementation of TGT significantly improves students' learning activities and achievement compared to conventional instructional approaches (Safira & Sukardi, 2024). Furthermore, the TGT model has been shown to significantly improve science learning outcomes, as evidenced by increases in average scores and the level of student learning mastery in each instructional cycle (Sari et al., 2025). Furthermore, the integration of game elements within the TGT model makes the learning process more engaging and is able to enhance students' motivation and involvement in learning activities (Qothrunnada & Sutriyani, 2025). Other studies also indicate that the TGT model contributes to the enhancement of students' collaboration skills, which are essential competencies in 21st-century learning (Aditya & Wahyudi, 2024). Overall, these findings are further reinforced by the results of a systematic literature review, which indicate that the TGT model remains relevant and effective, particularly when integrated with digital learning media (Dita, 2025). In addition to TGT, another instructional model that emphasizes student-centered activity is Discovery Learning. Through activities such as exchanging ideas, engaging in discussions, participating in seminars, and reading, students are encouraged to independently discover learning concepts with limited guidance from the teacher. The

implementation of the Discovery Learning model can help improve students' retention and their ability to transfer knowledge across more contextual learning situations (Marbun et al., 2022).

Although numerous studies have demonstrated that the Teams Games Tournament (TGT) learning model is effective in improving students' learning outcomes, engagement, and collaboration skills, most of these studies examine TGT as a standalone model without integrating it with other instructional approaches that emphasize students' knowledge construction. In addition, research on TGT generally focuses on quantitative improvements in learning outcomes, while studies linking TGT with discovery-based learning processes (Discovery Learning) remain relatively limited, particularly in the context of science education at the junior secondary school level.

On the other hand, Discovery Learning has been proven to enhance students' conceptual understanding and thinking skills; however, its implementation is often less than optimal due to limited active participation and social interaction among students during the learning process. Therefore, there is a need for an instructional approach that not only emphasizes the process of concept discovery but also enhances students' engagement and motivation through interactive and enjoyable learning activities. Based on this rationale, the present study offers a novel contribution by integrating the Teams Games Tournament (TGT) model with Discovery Learning within a systematic instructional framework. This integration is expected to combine the collaborative and competitive strengths of TGT with the constructivist approach of Discovery Learning, thereby not only improving students' learning outcomes but also enhancing their engagement and the overall quality of the learning process, particularly in science education at the junior secondary school level.

Previous literature reviews have highlighted that cooperative learning research is predominantly grounded in constructivist learning principles, emphasizing active student participation through collaborative activities conducted either with or without technological support (Aliyu et al., 2022). Such studies commonly involve pair work and small-group interactions, reflecting the importance of social learning and shared knowledge

construction. However, the existing body of research has largely focused on higher education contexts, with comparatively limited attention given to primary and secondary school settings. Therefore, the findings of the present study contribute to filling this gap by providing empirical evidence that cooperative learning strategies, particularly the integration of TGT and Discovery Learning, can effectively enhance student engagement in secondary education classrooms.

In line with the identified problems and the proposed novelty, this study is conducted under the title *"Team Games Tournament through Discovery Learning to Improve Science Learning Outcomes and Student Engagement in Seventh-Grade Junior Secondary School Students."* The study aims to implement the Team Games Tournament learning model integrated with Discovery Learning among seventh-grade students at SMP Taman Dewasa Jetis in the subject of science. The research problem is addressed through Classroom Action Research (CAR) to evaluate the effectiveness of the implementation of the Team Games Tournament model through Discovery Learning in improving students' learning outcomes and engagement.

METHODS

This study employs a Classroom Action Research (CAR) design consisting of four stages: planning, acting, observing, and reflecting (Suharsimi, 2014). The research was conducted in two cycles, with each cycle comprising two instructional meetings. The stages of the Classroom Action Research (CAR) are illustrated in the following figure 1.

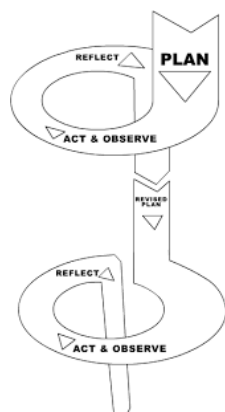


Figure 1. The Stages of PTK Design Based on the Kemmis and McTaggart Model

The study was conducted from October to November 2024 in VII-4 at SMP Taman Dewasa Jetis, Yogyakarta, in the subject of science. The research subjects were determined using purposive sampling, consisting of all 25 students in VII-4, based on the consideration that this class exhibited issues related to low student engagement and learning outcomes.

Data collection was carried out progressively in accordance with the research cycles. Quantitative data were analyzed using descriptive statistical techniques. Students' learning outcomes in each cycle (pre-cycle, Cycle I, and Cycle II) were calculated to determine the minimum score, maximum score, class average, and the percentage of learning mastery. The mastery percentage was computed based on the number of students who achieved the *Kriteria Ketuntasan Minimum* (KKM). These results were then compared across cycles to identify improvements in students' learning outcomes following the implementation of the Team Games Tournament (TGT) model through Discovery Learning.

Meanwhile, qualitative data obtained from observations were analyzed descriptively through data reduction, data display, and conclusion drawing. The observational data were used to identify changes in students' activity, participation, and motivation during the learning process. The results of this analysis were then interpreted to explain how the learning process occurred and to identify the factors that influenced the improvement in learning outcomes.

RESULTS AND DISCUSSION

In the pre-cycle stage, the researcher administered an initial test to determine the baseline condition of students' learning outcomes. Subsequently, in each cycle, instructional interventions were implemented, and at the end of each cycle, a test was conducted to measure improvements in learning outcomes. During the learning process, the researcher or observer carried out observations of students' activities using prepared observation sheets. In addition, documentation was collected to complement the research data. The data obtained were then analyzed to examine the development of students' learning

outcomes from the pre-cycle to Cycle II. The learning outcomes for each cycle are presented in Table 1.

Table 1. Learning Mastery in the Pre-Cycle, Cycle I, and Cycle II

Data	Pre-Cycle	Cycle I	Cycle II
Number of students whose scores exceed the minimum completeness criteria (KKM)	7	15	20
Number of students whose scores have not exceeded the minimum completeness criteria (KKM)	18	10	5
Lowest Score	32	50	56
Highest Score	78	88	95
Mean Score	59.92	76.64	82.56
Average Percentage of Mastery (%)	28%	60%	80%

These findings suggest that the implementation of the instructional model had a positive impact on students' learning outcomes. The improvement further indicates that learning processes involving active student participation are more effective than conventional approaches. This is consistent with the view that active student engagement in the learning process can significantly enhance conceptual understanding and learning outcomes (Hamdani et al., 2019). These findings are in line with previous studies indicating that active learning and student engagement are significant predictors of academic achievement because students who actively participate in learning activities tend to develop deeper conceptual

understanding and retain knowledge more effectively (Bond et al., 2021). Moreover, cooperative learning environments facilitate meaningful interaction and collaborative knowledge construction, which contribute to improved learning outcomes and motivation (Sailer & Homner, 2020). It can be inferred that instructional approaches that actively involve students in collaborative learning, knowledge construction, and meaningful interaction are more likely to foster engagement and improve learning outcomes. Therefore, the positive impact observed in this study may be attributed to the integration of cooperative and inquiry-based learning processes that encourage students to become active participants in their own learning.

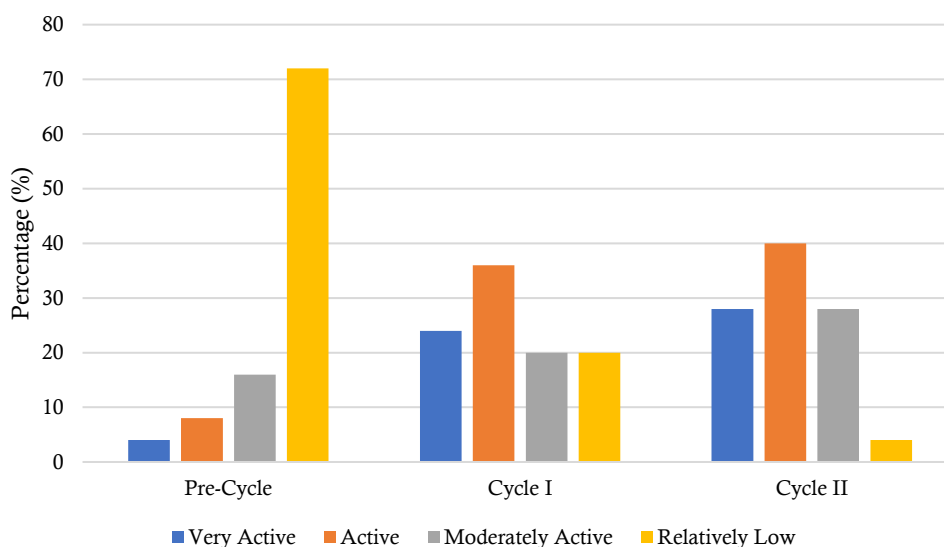


Figure 2. Percentage of Learning Engagement of Class VII-4 Students

Based on Figure 1, it can be observed that after the implementation of the TGT model through Discovery Learning, the results of the observation of students' learning engagement among the 25 students in Class VII-4 show a considerable increase from the pre-cycle to Cycle II. In the pre-cycle stage, the percentage of students categorized as very active, active, and moderately active was relatively low, indicating that the majority of students were still classified as less active. Entering Cycle I, there was an increase in the proportions of very active and active students, although a number of students remained in the moderately active category, and some were still classified as less active. In Cycle II, the improvement in engagement became more pronounced, with a significant increase in the percentage of students categorized as very active and active, while the proportion of moderately active students remained relatively stable. Consequently, the number of less active students continued to decline. Thus, the percentage of students not included in the three main categories can be interpreted as those who were still less active, and this proportion shows a decreasing trend following the implementation of the instructional intervention.

The improvement can be attributed to the synergy between competitive collaboration in TGT and conceptual discovery processes embedded in Discovery Learning. Through the TGT model, students were encouraged to actively participate in group discussions, exchange ideas, and engage in academic competitions that fostered motivation and responsibility toward group achievement. At the same time, the Discovery Learning approach provided opportunities for students to explore problems, investigate concepts independently, and construct their own understanding through guided inquiry activities. This combination created a more interactive and student-centered learning environment, enabling learners to become more engaged both cognitively and socially. As students became more involved in collaborative problem-solving and knowledge construction, their confidence, participation, and overall learning engagement increased substantially throughout the cycles. These findings are consistent with previous research (Tadesse et al., 2024) indicating that the integration of cooperative learning pedagogies into classroom instruction can significantly enhance

student engagement and academic achievement compared to conventional teacher-centered approaches. By fostering active participation, peer interaction, and shared responsibility for learning, cooperative learning environments create more meaningful and effective learning experiences, ultimately leading to improved learning outcomes and higher levels of student engagement.

1. Pre-Cycle

The pre-cycle stage indicates that the learning process still relied on conventional methods such as question-and-answer sessions, practice exercises, and collective discussions. Based on the results of the initial test, the lowest score obtained was 32 and the highest score was 78, with a class average of 59.92. The percentage of students achieving learning mastery was still relatively low, at 28%. Observational findings revealed that most students tended to be less active during the learning process. Students showed limited participation in discussions, and only a few were actively responding to questions. In addition, students appeared to be less motivated, easily bored, and lacking focus during instruction. This condition suggests that teacher-centered learning has not been able to optimally enhance student engagement. This finding is consistent with the view that the use of less varied instructional methods can lead to low student motivation and participation in learning (Rahmadani, 2019). Low learning motivation also has an impact on students' learning outcomes, as motivation is a key factor in determining learning success (Rahman, 2021).

2. Cycle I

The learning process began to implement the Team Games Tournament (TGT) model integrated with Discovery Learning. In the game stage of the Team Games Tournament (TGT), students participated in learning activities packaged as educational games. The teacher first prepared discussion questions presented in the form of games and displayed them on the board. Each group lined up according to their respective teams. In turn, representatives from each group came forward to take part in the game that had been prepared. During this process, students were required to go through certain stages of the game before answering the

questions available on the board. Upon reaching the questions, students read and responded based on the understanding they had gained from prior group discussions. The answers provided contributed points to their respective groups. This activity was conducted in turns until all group members had the opportunity to participate. At the end of the session, students, guided by the teacher, presented the results of their discussions or answers and drew conclusions from the learning activities that had taken place. The test results in Cycle I showed improvement, with the lowest score increasing to 50 and the highest score reaching 88. The class average also rose to 76.64, and there was an increase of 32% in the percentage of students achieving learning mastery.

Based on observational results, students' engagement began to increase with the introduction of the tournament activities. Students appeared more enthusiastic in participating in the learning process, particularly during group discussions and game sessions. However, several challenges were still identified. During the tournament, the high level of student enthusiasm led to a rather noisy classroom atmosphere, which disrupted concentration and reduced the effectiveness of learning. In addition, the group discussion process had not yet been fully optimal. Some students tended to rush through the discussions due to their eagerness to participate in the tournament and their desire to outperform other groups. As a result, their understanding of the discussed material was not yet sufficiently deep, and collaboration within groups had not reached its full potential.

This condition indicates that in Cycle I, improved classroom management and greater emphasis on the quality of the discussion process are still required to ensure more effective learning in the subsequent cycle.

3. Cycle II

In Cycle II, improvements were implemented based on the reflections from Cycle I, including more effective group management and clearer guidance provided to students. The learning process continued to apply the TGT model through Discovery Learning, with a stronger emphasis on student engagement and collaboration. The test results in Cycle II demonstrated a more significant improvement, with the lowest score reaching 56 and

the highest score 95. The class average increased to 82.56, and the percentage of students achieving learning mastery also showed a substantial rise.

This improvement indicates that the integration of TGT and Discovery Learning is able to optimize the learning process. The TGT model promotes interaction and collaboration among students, while Discovery Learning facilitates students in independently discovering and understanding concepts. This finding is consistent with the view that learning approaches combining collaborative activities with concept discovery processes can enhance students' understanding and learning outcomes (Marbun et al., 2022).

The observational results also indicate that students became more active, confident, and capable of working collaboratively in groups. This suggests that cooperative learning models such as TGT not only improve learning outcomes but also foster students' social skills, including collaboration and communication (Hamdani et al., 2019). Furthermore, the increase in students' motivation in Cycle II indicates that engaging and interactive learning can enhance students' interest in learning. This is consistent with the view that learning motivation plays a crucial role in improving students' learning outcomes (Rahman, 2021).

The inclusion of the tournament stage in TGT provides a more varied and interactive learning experience, thereby accommodating diverse student characteristics. Consequently, the combination of TGT and Discovery Learning not only helps students understand concepts independently but also enhances their engagement and the overall quality of the learning process.

CONCLUSION

Based on the findings, the implementation of the Team Games Tournament (TGT) model through Discovery Learning effectively improved students' science learning outcomes and engagement. The increases in average scores, learning mastery, and active participation indicate that the intervention successfully enhanced both cognitive achievement and behavioral engagement. This study contributes to the literature by providing empirical evidence that integrating cooperative competitive learning with inquiry-based instruction

can create a more engaging and effective learning environment in secondary science education. Future studies are recommended to examine the applicability of this integrated approach across different subjects and educational settings.

ACKNOWLEDGEMENT

The author would like to express sincere gratitude to SMP Taman Dewasa Jetis for granting permission and providing institutional support for the implementation of this study. Special appreciation is extended to the science teacher who facilitated classroom activities, supported the implementation of the intervention, and provided valuable guidance throughout the research process. The author also acknowledges the cooperation and support of fellow members of the PPL PPG Prajabatan Batch 2 of 2024, who contributed to classroom observations, data collection, and academic discussions that supported the successful completion of this research. The author was responsible for the study conceptualization, research design, data collection, data analysis, interpretation of findings, and manuscript preparation.

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