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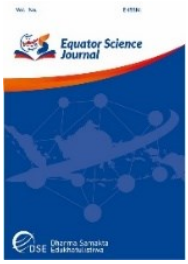

Improving Learning Motivation Through Teams Games Tournament (TGT) Model Integrated with Technology in Biology Learning

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ABSTRACT
This study aims to enhance students' learning motivation in biology through the implementation of the Teams Games Tournament (TGT) learning model integrated with technology. The research was prompted by the low learning motivation observed among Grade X-7 students at SMA Negeri 7 Palu, most of whom exhibit a kinesthetic learning style that has not been adequately supported by appropriate teaching methods. The study employed a Classroom Action Research approach conducted in two cycles, involving 34 students as participants. The TGT model was applied using educational platforms such as Quizizz, Wordwall, Educaplay, and Kahoot, complemented by reward incentives to boost student engagement. The results revealed a significant increase in students' learning motivation, as evidenced by both direct observation and motivation questionnaires. In the pre-cycle phase, 3 students were categorized as having low motivation, 23 as moderate, and 8 as high. In Cycle I, 18 students were in the moderate category and 15 in the high category. By Cycle II, 8 students were categorized as moderate, 19 as high, and 7 as very high. The interactive, competitive, and technology-based TGT model proved effective in creating an enjoyable learning atmosphere tailored to students' characteristics, thereby gradually improving both motivation and learning outcomes. In addition, this study provides a theoretical contribution to the development of collaborative, digital-based learning strategies that align with the demands of 21st-century education. The findings strengthen the theoretical

foundation of learning motivation and open up further opportunities for research on the integration of technology into cooperative learning models.

INTRODUCTION

Learning motivation serves as a critical component in the educational process, directly influencing students' ability to comprehend and master academic content. It functions as the internal driving force that initiates, sustains, and directs learning activities. As defined by Sardiman (2011), learning motivation encompasses the total energy within students that propels them toward educational engagement and goal-oriented behavior. In the absence of strong motivation, students often exhibit passive attitudes and diminished enthusiasm, particularly in subjects perceived as challenging, such as biology. This paper explores the significance of learning motivation in shaping student outcomes and highlights the need for instructional strategies that foster active participation and sustained interest in complex subject areas.

Learning motivation plays a pivotal role in determining students' academic success, particularly in mastering complex subjects such as biology. However, many students exhibit low motivation due to monotonous teaching methods that fail to actively engage them. Observations at SMA Negeri 7 Palu, specifically in class X-7, reveal a lack of focus, enthusiasm, and participation during lessons dominated by teacher-centered approaches using PowerPoint presentations. This issue is compounded by the mismatch between instructional strategies and students' predominant kinesthetic learning styles, as evidenced by their active involvement in physical and competitive activities such as Paskibraka, futsal, and karate. According to Turdjai (2016), learning approaches, strategies, and methods significantly influence academic achievement. In response to these challenges, innovative and interactive learning models are needed. Muh. Nurhidayat et al. (2023) highlight the effectiveness of the Teams Games Tournament (TGT) model in enhancing student motivation. TGT integrates teamwork, educational games, and healthy competition, fostering a dynamic and enjoyable learning environment. This study aims to examine the impact of the TGT model integrated with technology on improving learning motivation in biology among Grade X students at SMA Negeri 7 Palu.

Motivating students to engage meaningfully in the learning process remains a central challenge in education, particularly in subjects perceived as complex, such as biology. Apriyanti (2017) emphasized that one of the key strengths of the Teams Games Tournament (TGT) learning model lies in its ability to stimulate students' intrinsic motivation through active participation. By incorporating elements of games and rewards, TGT encourages students to engage more enthusiastically and absorb material in a more enjoyable and interactive manner.

Further supporting this, Suganda (2021) demonstrated that the TGT model significantly enhances student interest and active participation in biology learning. The integration of technology into the TGT framework has further amplified its effectiveness. Liantri et al. (2024) found that the use of digital platforms such as Quizizz within the TGT model had a substantial impact on improving both student motivation and learning outcomes, particularly in topics like the immune system. Technology not only enriches the learning experience but also provides instant feedback, which reinforces student engagement.

The novelty of this study lies in the simultaneous integration of four educational game platforms Wordwall, Educaplay, Quizizz, and Kahoot—within the TGT model, a combination that has not been widely explored in previous research. Additionally, the implementation of group performance-based rewards at the end of the learning cycle serves as a motivational reinforcement strategy, creating a more competitive and enjoyable learning atmosphere. The combination of TGT and technology creates a dynamic and competitive learning environment that fosters deeper understanding and sustained motivation among students. This study aims to investigate the effectiveness of the technology-integrated TGT model in enhancing learning motivation in biology among Grade X students.

By integrating the Teams Games Tournament (TGT) model with technology, it is expected that students will become more motivated to engage in biology learning, participate more actively in classroom activities, and gain a deeper understanding of the material in a way that is enjoyable,

dynamic, and aligned with their individual learning styles. This approach not only fosters intrinsic motivation but also creates a learning environment that is responsive to students' diverse needs, particularly those with kinesthetic preferences, thereby enhancing both the quality and effectiveness of biology education.

This study aims to examine the effectiveness of implementing the Teams Games Tournament (TGT) model integrated with technology in enhancing students' learning motivation in biology. By utilizing interactive educational platforms such as Quizizz, Kahoot, Wordwall, and Educaplay, the TGT model is expected to create an enjoyable and competitive learning atmosphere. The central research question is: Can the technology-based TGT model improve students' learning motivation in biology education?

METHOD

Research Design

This study employed a Classroom Action Research (CAR) approach to systematically investigate and improve biology learning motivation. The research was conducted at SMA Negeri 7 Palu. The study population consisted of students in Grade X–7 at SMA Negeri 7 Palu. A total of 34 students participated, comprising 14 male students and 20 female students. These participants served as the subjects for all phases of the action research cycles.

This study employed Classroom Action Research (CAR) following the framework articulated by Kurt Lewin in Arikunto (2010). The research comprised two complete cycles, each cycle encompassing four sequential phases: planning, implementation, observation, and reflection. The central aim was to apply the Teams Games Tournament (TGT) learning model—augmented by selected educational technologies—to elevate student motivation in biology lessons.

Fig 1. Classroom Action Research according to Kurt Lewin

In designing the intervention, four digital platforms were chosen to support game-based activities: Wordwall, Educaplay, Quizizz, and Kahoot. These tools were embedded within the TGT structure to provide an interactive and competitive environment. Each lesson plan detailed how team formation, game rounds, and reward mechanisms would integrate with digital quizzes and interactive exercises to sustain engagement.

Student learning motivation was assessed through direct classroom observation of specific behavioral indicators. Researchers documented each learner's interest in the tasks, level of attentiveness, ability to maintain concentration, alertness (evidenced by staying awake and on-task), and persistence in striving to meet the lesson goals. These observable behaviors served as proxies for

intrinsic motivation and allowed for systematic comparison across cycles.

During implementation, the teacher facilitated TGT sessions according to the lesson plan, while an observer recorded motivational indicators in real time. After each cycle, the research team convened to review observational data and reflect on instructional strengths and challenges. Insights gained from these reflections informed revisions to the subsequent cycle's planning, thereby creating an iterative process aimed at continuously enhancing the effectiveness of the technology-integrated TGT model.

Research Instrument

The research instrument consisted of a learning motivation questionnaire containing 30 validated items, administered at the end of each cycle. The questionnaire measured five dimensions of learning motivation. Table 1 presents the indicators and the distribution of questionnaire items.

Table 1. Learning Motivation Indicators Measured by the Questionnaire

No.	Dimension	Indicators	Number of Items
1.	Perseverance in Learning	School attendance	2
		Participation in classroom learning activities	4
		Studying outside school hours	3
2.	Resilience in Facing Dificulties	Attitude toward difficulties	4
		Efforts to overcome difficulties	2
3.	Interest and Attentiveness in Learning	Habit of following lessons	3
		Enthusiasm in participating in teaching learning processes	3
4.	Academis Achievement	Desire for academic success	3
		Quality of learning outcomes	2
5.	Independent Learning	Completion of assignments or homework	2
		Use of out-of-class learning opportunities at school	2
	Total		**30**

Source: Adapted from Uno (2016)

These statements were a mix of positive and negative items, each rated on a five-point frequency scale. Positive items were scored as follows: 5 = Always, 4 = Often, 3 = Sometimes, 2 = Rarely, 1 = Never. Negative items were reverse-scored: 5 = Never, 4 = Rarely, 3 = Sometimes, 2 = Often, 1 = Always. With 30 items, the maximum possible score was 150 and the minimum was 30. Based on the total score, students' motivation levels were classified into five categories, as shown in Table 2.

Table 2. Classification of Learning Motivation Score

Category	Score Range
Very Low	30 - 53
Low	54 - 77
Moderate	78 - 101
High	102 - 125
Very High	126 - 150

Source: Adapted from Sugiyono (2014)

RESULTS AND DISCUSSIONS

Based on the results of the research conducted, as shown in Table 3, Table 4, and Table 5, the findings are as follows:

Table 3. Pre-Cycle Criteria for Grade X-7 Students' Learning Motivation

Category	Number of students
Very Low	0

Category	Number of students
Low	3
Moderate	23
High	8
Very High	0

Based on the pre-cycle learning motivation questionnaire (Table 3), prior to the implementation of the technology-integrated Teams Games Tournament (TGT) model, most students in class X-7 at SMA Negeri 7 Palu demonstrated moderate motivation. Specifically, 23 students (67.6%) scored within the moderate category, 8 students (23.5%) fell into the high-motivation category, and only 3 students (8.9%) were classified as having low motivation. No students were found in the very low or very high categories. The overall mean score placed the cohort solidly in the moderate range, indicating that their intrinsic drive to engage with biology content required enhancement.

This distribution of motivation levels underscores the limitations of conventional, teacher-centered instruction characterized by passive PowerPoint lectures and note-taking in fostering deep engagement. The absence of any students in the highest motivational bracket suggests that existing methods fail to tap into students' full potential, while the presence of a small low-motivation group highlights a subset at risk of disengagement and underachievement. These baseline findings justify the need for an intervention that actively involves students, aligns with their kinesthetic preferences, and introduces elements of competition and immediate feedback. The forthcoming cycles, therefore, focus on leveraging the TGT framework enriched with digital platforms such as Educaplay and Wordwall to create a more dynamic, interactive learning environment aimed at shifting the entire distribution upward toward high and very high motivation levels.

Table 4. Cycle 1 Criteria for Grade X-7 Students' Learning Motivation

Category	Number of students
Very Low	0
Low	0
Moderate	18
High	15
Very High	1

In the first cycle, the technology-enhanced Teams Games Tournament (TGT) model was implemented using Educaplay and Wordwall platforms, featuring image-matching and crossword puzzle activities. Post-implementation observations revealed a marked increase in student enthusiasm and participation compared to the pre-cycle phase. According to the Cycle 1 motivation questionnaire (Table 4), 18 students (53%) fell into the moderate motivation category, 15 students (44%) achieved high motivation, and 1 student (3%) reached the very high motivation level. No students remained in the low or very low categories, indicating an overall upward shift in motivational distribution.

These findings suggest that integrating interactive digital games within the TGT framework effectively elevates student motivation. The image-matching and crossword formats provided immediate feedback and fostered healthy competition, which, in turn, heightened engagement and sustained attention. Compared to traditional teacher-centered lectures, the first cycle's activities aligned more closely with students' kinesthetic and visual learning preferences, promoting active learning and peer collaboration. The substantial movement of nearly half the class into the high-motivation bracket underscores the model's capacity to transform classroom dynamics. Future cycles will build on these insights by incorporating additional game types and refining team structures to further consolidate motivational gains.

Table 5. Cycle 2 Criteria for Grade X-7 Students' Learning Motivation

Category	Number of students
Very Low	0
Low	0

Category	Number of students
Moderate	8
High	19
Very High	7

Although Cycle 1 demonstrated an overall increase in student motivation, the mean score remained within the moderate category. To further elevate motivation levels, Cycle 2 employed the technology-integrated Teams Games Tournament (TGT) model with the addition of tangible rewards. Direct classroom observations in Cycle 2 indicated a noticeable rise in student enthusiasm and active participation compared to Cycle 1, attributing this boost to the introduction of rewards.

The Cycle 2 motivation questionnaire (Table 5) revealed that 8 students (23.4%) still fell into the moderate motivation category, while 19 students (55.8%) achieved high motivation and the remaining 7 students (20.8%) reached very high motivation. No students were classified as having low or very low motivation. This shift marks a significant improvement from the pre-cycle distribution and from Cycle 1, where no students attained the very high category. The proportional increase in the high and very high groups underscores the efficacy of combining gamified team competition with reward incentives.

By the study's predefined success criterion—that a substantial portion of the class attains the very high motivation category—Cycle 2 has fulfilled the research objective. The introduction of rewards within the TGT framework not only maintained the intrinsic benefits of teamwork, competition, and immediate feedback but also provided extrinsic reinforcement that propelled more students into peak motivational levels. Given these results, no further cycles are deemed necessary, as the intervention has successfully maximized the learning motivation of Grade X–7 students in biology at SMA Negeri 7 Palu.

The implementation of the technology-integrated Teams Games Tournament (TGT) model—leveraging Kahoot, Educaplay, Quizizz, and Wordwall across its four core components (instruction, team learning, tournaments, and group rewards)—significantly enhanced intrinsic motivation among Grade X-7 students at SMA Negeri 7 Palu. Furthermore, the addition of tangible rewards at the conclusion of Cycle II produced a marked increase in extrinsic motivation. Classroom observations corroborated these quantitative gains, documenting heightened student enthusiasm, more effective teamwork, and strengthened habits of self-directed study, which altogether supplanted the passivity characteristic of traditional lecture-based instruction.

These outcomes resonate with existing scholarship on the influence of educational resources and motivational theory. Jannah and Sontani (2018) emphasize that adequate learning facilities and infrastructure play a critical role in shaping student achievement. From a behavioral standpoint, Skinner's reinforcement theory underscores how positive stimuli can reliably cultivate desired learning behaviors. In parallel, Andriani and Rasto (2019) argue that optimally targeted motivational strategies are essential for maximizing academic performance.

In summary, the synergy of an interactive, gamified TGT framework and end-of-lesson rewards created a learning environment that was dynamic, meaningful, and enjoyable. This dual approach not only sustained high levels of student engagement but also fostered deeper cognitive processing and social collaboration, demonstrating a viable model for elevating motivation in challenging subject areas.

CONCLUSION AND SUGGESTION

The findings of this classroom action research confirm that the technology-integrated Teams Games Tournament (TGT) model employing Quizizz, Kahoot, Educaplay, and Wordwall effectively enhanced the learning motivation of Grade X-7 biology students at SMA Negeri 7 Palu. Data collected through direct classroom observations and end-of-cycle motivation questionnaires showed a consistent, significant increase in student motivation from the pre-cycle stage through Cycle I and into Cycle II. These results demonstrate that embedding interactive educational game platforms within the TGT framework creates a dynamic learning environment that successfully fosters both intrinsic and extrinsic

motivation in biology education. Nevertheless, this study has several limitations. The number of subjects involved was relatively small and limited to a single class, making it necessary to interpret the findings with caution. Furthermore, the discussion focused solely on learning motivation without thoroughly examining its impact on students' academic achievement or learning outcomes.Future studies should investigate the long-term effects of the technology-integrated TGT model on academic achievement and knowledge retention. Researchers are advised to replicate this intervention across different grade levels, subject areas, and school contexts to assess its generalizability and scalability.

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