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Effect of Teams Games Tournament Learning Model Assisted by Question Ball Media on the *IPAS* Learning Outcomes

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Abstract: Low learning outcomes, especially in *IPAS* subjects, are often caused by students becoming passive and disengaged in class when learning is dominated by lecture methods (teacher-centered). Thus, the purpose of this study is to investigate how well the Teams Games Tournament (TGT) model, combined with question-ball media, affects fourth-grade students' learning outcomes. In this study, a quantitative, one-group pretest-posttest design was used, with 24 students from SDN 03 Sidigede as the research subjects. The instrument in this study was a validated learning outcome test, and the data analysis involved normality testing and N-Gain analysis using IBM SPSS version 25. According to the analysis, using the TGT model with question-ball media improved student learning outcomes. This is indicated by the N-Gain values in the moderate improvement category for the concept understanding and skills processes, which are 0.57 and 0.54, respectively. These findings indicate that implementing the TGT model with the help of question ball media not only improves learning outcomes but also encourages active student participation in learning, strengthens learning motivation, and helps students understand *IPAS* concepts more contextually through game activities and group work.

Keywords: Learning Outcomes; Question Ball; TGT Learning Model.

Introduction

Education is crucial for shaping character, imparting knowledge, and developing a range of skills to prepare future generations to face the complex problems of the modern world. Individuals are encouraged to reach their full potential through a structured educational process that encompasses cognitive (knowledge), affective (attitudes), and psychomotor (skills) dimensions. Specifically, primary school education provides a strong foundation for developing students' critical and logical thinking abilities and social skills, enabling them to interact productively with their environment. Therefore, the learning process in elementary school should be designed with strategies that are engaging, fun, and that foster active student participation.

One subject that plays an important role in fostering students' scientific thinking is Natural and Social Sciences (*IPAS*). This subject combines Natural Sciences (*IPA*) and Social Sciences (*IPS*) to provide students with a deeper understanding of various social and natural phenomena [1]. Students are guided to understand scientific ideas through IPAS learning and are also encouraged to consider the practical applications of this knowledge. However, the actual situation shows that IPAS learning is still primarily used in traditional ways in elementary schools, with teachers mostly using lecture techniques and failing to actively engage students in the thinking and problem-solving processes.

IPAS learning activities are often repetitive and dominated by the lecture method, according to observations made on December 12, 2024, at SDN 03 Sidigede. There is also very little creative variation in learning models and media. Teachers are struggling to create more innovative learning experiences due to several issues, particularly time and resource constraints. As a result, the class became less engaged and struggled to stay focused during lessons. The teacher has tried to adopt a project-based learning model, but the results have not been optimal due to insufficient support for learning media that fully engage students.

Elementary school students are generally still in the concrete thinking stage, so they need direct learning experiences to understand a concept more deeply [2]. This view aligns with other findings showing that the learning process achieves optimal results when students are involved in interaction and collaboration with their peers [3]. This indicates that effective learning for elementary school students must prioritize collaborative activities and real-world practice. This approach is crucial for students to achieve a deeper conceptual understanding.

The implementation of the Merdeka Curriculum in elementary schools also requires a shift in approach from teacher-centered learning to student-centered learning. This curriculum emphasizes the importance of project-based learning and character development in accordance with the Pancasila Student Profile. In such conditions, the teacher plays a central role in determining learning models and media that align with students' characteristics and needs. The learning process must be designed to spark curiosity, encourage a spirit of collaboration, and foster students' intrinsic responsibility for all learning activities.

One learning model considered effective for achieving this goal is Teams Games Tournament (TGT). This model is a form of cooperative learning that emphasises collaboration among students through learning activities presented in a fun, game-like, competitive atmosphere. The application of the TGT model in *IPAS* learning in elementary school class IV has been shown to increase student

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motivation and learning achievement by integrating game elements into academic activities [4]. During implementation, students were divided into heterogeneous ability groups, then participated in an academic tournament featuring quizzes and educational games. This activity encourages students to help one another understand the material while fostering a spirit of healthy competition.

To make learning with the TGT model more engaging and meaningful, interactive media that aligns with the characteristics and learning needs of elementary school students is required. The question ball is one of the tools that has worked well. This medium consists of a light ball with predetermined numbers or questions, which is passed from student to student in sequence. The use of the question ball media in learning can increase student engagement, develop critical thinking skills, and boost self-confidence [5]. Every student has the opportunity to respond directly to questions, which enhances the dynamic and cooperative nature of the learning process.

The ability of media ball questions to foster an engaging and dynamic learning environment gives them an advantage over traditional learning materials. Students actively participate in the learning process through these interactive exercises, rather than passively absorbing information. Through this activity, students are encouraged to collaborate with their peers, develop self-confidence, and dare to voice their opinions. Utilizing this medium also helps develop students' social skills, including improving teamwork and appreciating others' opinions. Other research results indicate that the use of interactive learning media can improve learning outcomes, including for students with low academic abilities, because they feel more motivated and less stressed during the learning process [6].

Previous research has also shown that the TGT model effectively improves learning outcomes. The significant difference between pretest and posttest scores indicates that the implementation of the TGT learning model positively contributes to improved learning outcomes [7]. However, very little research currently combines the TGT model with question ball media, especially in elementary school *IPAS* learning.

Given these conditions, further research is needed to determine how effectively the Teams Games Tournament (TGT) learning model, supported by question-ball media, affects elementary school students' *IPAS* learning outcomes. It is hoped that this research, which focuses on improving student learning outcomes, will significantly advance the creation of creative and engaging teaching methods. Furthermore, the findings of this study are expected to serve as a reference for teachers when determining the appropriate combination of teaching models and media that align with students' profiles in implementing the Merdeka Curriculum.

Therefore, the purpose of this study is to determine how the TGT learning model, supported by question ball media, affects the learning outcomes of fourth-grade students at SDN 03 Sidigede. It is hoped that students will be more engaged and motivated, and will understand *IPAS* material more deeply through fun, competitive learning.

Research Methods

Research Design

This study uses a Pre-Experimental One Group Pretest-Posttest Design, which involves a single group of students who receive a pretest before the intervention and a posttest after the intervention, without a control group. This design was used because field conditions did not allow for the formation of a comparison group, but it still enabled the researcher to obtain data on changes in learning outcomes after the treatment [8]. The pretest was given to assess students' initial abilities, while the posttest was used to evaluate learning outcomes after learning with the Teams Games Tournament (TGT) model assisted by question-ball media.

Population and Sample

The research population consists of all fourth-grade students at SDN 03 Sidigede for the 2024/2025 academic year. The sampling technique used was saturated sampling, as the number of students was less than 30, so the entire population was used as the sample [9]. Thus, a total of 24 fourth-grade students, comprising 8 girls and 16 boys, formed the research sample.

Data Collection

Research data were collected through learning outcome tests in the form of essay questions structured around the competency achievement indicators for the material studied. The tests were administered twice: a pretest to determine initial abilities and a posttest to measure learning outcomes after the treatment. Before use, the test instruments have undergone validity and reliability testing, making them suitable as research measurement tools.

Data Analysis

Data analysis is conducted through several stages. Normality testing of the pretest and posttest data was performed using the Shapiro-Wilk test in IBM SPSS Statistics 25 at the 0.05 significance level. The data is considered normally distributed if the significance value is greater than 0.05, while a significance value less than 0.05 indicates that the data is not normally distributed [10]. To measure the improvement in learning outcomes, N-Gain analysis was used by comparing pretest and posttest scores. The N-Gain values were then categorised as low, medium, or high to determine the effectiveness of implementing the TGT learning model assisted by question ball media.

Results and Discussion

This research falls under the category of Pre-Experimental Design with a One-Group Pretest–Posttest Design. The instrument used to measure *IPAS* learning outcomes is an essay test. Before the N-Gain test is performed, the pretest and posttest results are tested for normality using the Shapiro-Wilk test. The Shapiro-Wilk test is recommended in educational research because it is

sensitive to small samples [11]. The test results are presented in the following table.

Table 1. Normality Test of *IPAS* Concept Understanding

	Shapiro-Wilk		
	Statistic	df	Sig.
Hasil pretest	.932	24	.107
Hasil posttest	.982	24	.933

Based on the analysis results, the significance value for the pretest learning outcomes of *IPAS* understanding is 0.107 > 0.05, and for the posttest, it is 0.933 > 0.05. Therefore, both the pretest and posttest data for *IPAS* learning outcomes are normally distributed.

Table 2. Normality Test of *IPAS* Process Skills

	Shapiro-Wilk		
	Statistic	df	Sig.
Hasil pretest	.945	24	.146
Hasil posttest	.985	24	.405

Based on the analysis results, the significance value of the pretest learning outcomes of *IPAS* process skills is 0.146 > 0.05, and the significance value of the posttest is 0.405 > 0.05. Thus, both the pretest and posttest data on *IPAS* learning outcomes are normally distributed.

After the normality test requirements are met, the analysis proceeds to the Normalized Gain (N-Gain) test. The N-Gain method is considered more accurate for observing improvement compared to the usual difference in values [12]. The results of the N-Gain test are presented as follows.

Table 3. N-Gain Test Viewed from *IPAS* Learning Outcome Indicators

No	*IPAS* Understanding	Pretest	Posttest	N-Gain
1	Remembering (C1)	50.0	75.0	0.50
2	Understanding (C2)	35.0	81.8	0.72
3	Applying (C3)	40.0	68.8	0.48
4	Analyzing (C4)	45.0	86.3	0.75
5	Evaluating (C5)	42.0	72.2	0.52
6	Creating (C6)	48.0	71.4	0.45
Average		43.3	75.9	0.57

The analysis of the N-Gain test calculation indicates that the overall improvement in understanding IPAS concepts falls into the moderate category, with an average value of 0.57. This value falls within the range of moderate improvement criteria, which is $0.3 \leq g \leq 0.7$, also used in other cooperative model studies [13].

Table 4. N-Gain Test Calculation Viewed from Process Skills

No	*IPAS* Skills	Meeting 1	Meeting 2	Meeting 3	N-Gain
1	Observing	65.0	71.0	77.2	0.35
2	Questioning	40.0	60.0	79.0	0.65
3	Planning	45.0	59.0	73.6	0.52
4	Processing	50.0	65.0	80.0	0.60
5	Evaluating	48.0	63.0	78.2	0.58
6	Communicating Results	55.0	67.0	79.3	0.54
Average		50.5	64.2	77.9	0.54

The N-Gain test for *IPAS* process skills yielded an average value of 0.54. This value is classified as a moderate improvement because it falls between $0.3 \leq g \leq 0.7$. This shows that, after participating in the Teams Games Tournament (TGT) model-learning with question-ball media, students' process skills improved.

In the learning outcomes for understanding *IPAS*, students were given a pretest to assess their abilities before the TGT (Team Game Tournament) model, with the question-ball media implemented. Subsequently, in the final meeting, students took a posttest to see the extent of the improvement in their learning outcomes after participating in the learning using this model.

Based on the results of the N-Gain test analysis per indicator of *IPAS* learning outcomes, it is known that for the remembering indicator (C1), a score of 0.50 was obtained, which is categorized as moderate. Students' ability to recognize and recall basic concepts of force, such as muscle force, friction force, magnetic force, and spring force, improved after the implementation of the TGT model. Students are helped to remember concepts through teamwork activities and by answering questions during the game stage using question balls. The basic questions that arise in the game help students repeat information, thus strengthening memory. Repeating information in an engaging learning environment has been proven to strengthen students' concept retention[14].

For the understanding indicator (C2), the score obtained was 0.72, which is categorized as high. Students showed improvement in re-explaining the concept of force, along with examples from everyday life. Discussion within the team encourages students to exchange explanations and to understand the material more deeply. Randomly generated questions thru the question ball make students accustomed to explaining concepts in a more varied way. The teacher's role is to facilitate clarification when misconceptions arise within the group. Learning that allows for discussion and active information processing optimally enhances conceptual understanding [15].

For the indicator of applying (C3), a score of 0.48 was obtained, which is categorized as moderate. Students are beginning to use the concept of force to solve the problems presented in the LKPD and the game questions. Game and tournament activities that require students to think quickly encourage them to apply theory to real-life situations or contextual examples. The TGT model provides students with the opportunity to learn through direct experience, making the concept of force easier to understand in a practical way. Learning experiences that provide direct action can improve students' ability to apply concepts [16].

The analyzing indicator (C4), a score of 0.75 was obtained, which is categorized as high. Students' ability to describe different types of forces, distinguish their functions, and assess the relationships between concepts has improved.

The tournament stages help students practice making quick decisions, evaluating information, and comparing answer choices. The teacher helps guide the analysis process by providing direction when students are asked to explain their reasons for choosing a particular answer. Learning activities that provide space to break down information and compare concepts can gradually train students' analytical abilities [17].

The evaluating indicator (C5) had a score of 0.52, placing it in the moderate category. Students are beginning to consider the most appropriate answers and provide logical reasons based on the concept of force. During the tournament, students assessed their group members' answers and compared them to concepts they had already learned. Post-tournament reflection activities also provide students with the opportunity to assess group strategies and correct misunderstandings. Evaluative activities like this align with a learning process that emphasizes critical decision-making based on specific criteria [18].

The creating indicator (C6) had a score of 0.45, placing it in the moderate category. Students are starting to demonstrate the ability to construct new explanations, provide additional examples, or formulate creative ways to illustrate the concept of force. The team's work stages allow students to propose new ideas, while games and tournaments build their courage to present alternative answers to their peers. Although the improvement at this level is not as significant as other cognitive indicators, students still showed development in creativity in understanding the material on force. The use of interactive learning models such as TGT can encourage creativity through collaborative and competitive activities [19].

The results and percentages for each learning outcome indicator in the *IPAS* subject show that fourth-grade students at SD Negeri 03 Sidigede experienced a significant increase in pretest and posttest scores. The results of the N-Gain test, which showed a moderate interpretation value of $0.57 < 0.70$, were the main cause of this increase. The results of this study indicate that using question ball media combined with the Teams Games Tournament model can improve students' *IPAS* learning outcomes. These findings align with the fact that after treatment and posttest, students' learning outcomes generally improved [4]. This finding is also supported by evidence that using a game-based learning model can enhance concept retention and learning motivation in elementary school students [20].

Meanwhile, the learning outcomes for *IPAS* process skills in this study include six indicators: observing, questioning, planning, processing, evaluating, and communicating results. After implementing the TGT (Teams Games Tournament) model with the help of Question Ball Media, assessments were conducted at each meeting to track the development of students' process skills. With an average score of 0.54, which falls within the moderate range, the N-Gain test results indicate that the process skills of fourth-grade students at SDN 03 Sidigede were successfully improved through the application of this model.

The first indicator shows a moderate N-Gain value of 0.35. During this activity, students observed various objects and phenomena related to force, including spring force, magnetic force, muscle force, and friction. According to student observations, most can already identify the changes caused by forced style, but some still lack the focus to conduct thorough observations. observation skills are the foundation of all scientific activities because, through good observation, students can discover concepts independently [21].

The second indicator is questioning the highest N-Gain value obtained, which is 0.65, categorized as high. This skill seems to be developing rapidly because, in the TGT model, students are given the opportunity to choose questions and answer them through a question-ball game. Throughout the activity, the students appeared enthusiastic and actively discussed with their group members. Learning that allows students to ask questions can stimulate critical thinking skills and improve conceptual understanding [22].

Next, the planning indicator shows an N-Gain value of 0.52, which is categorized as moderate. This skill is observed in students' ability to plan experimental steps, prepare tools and materials, and choose appropriate working methods for conducting the investigation. Although some students still need guidance, these results show improvement in their ability to plan scientific activities. The skill of planning experiments demands students' ability to determine the appropriate tools, materials, and procedures to obtain valid results [23].

The fourth indicator, the N-Gain processing result, is 0.60, which falls within the moderate range. This ability is demonstrated by analyzing data collected from investigative activities and processing the results of student experiments. According to observations, some students still need assistance with proper data analysis, even though other students are already able to draw conclusions from the experimental results. This result indicates that, to work more systematically, students' data-processing skills still need strengthening. Students will be more skilled in using tools, materials, and analyzing data if they receive clear instructions during the learning process [24].

The fifth indicator is evaluating the acquisition of an N-Gain value of 0.58, which is categorized as moderate. Students are assessed based on their ability to evaluate and draw conclusions from experimental activities. Although some students still struggle to draw accurate conclusions, the majority have already demonstrated an understanding of the activity's objectives. Students generally have difficulty drawing conclusions because they are not yet fully able to connect the results of experiments with theoretical concepts [25].

The final indicator, Communicating Results, shows an average N-Gain of 0.54. This ability is demonstrated by students' ability to present experimental findings both orally and in writing, whether through group discussions or question-and-answer sessions. While some students can already explain the experimental results clearly, others still need help in structuring their explanations systematically. The ability to communicate concepts logically through written, oral, or visual means, such as tables and images, is a component of scientific communication skills [26].

N-Gain of 0.54 (moderate), students' *IPAS* process skills generally improved. This finding reinforces that the TGT model, with the help of question-ball media, can create an engaging, fun, and competitive learning process. Students are more active in asking questions, discussing, and sharing experiment results through games and competitions. This aligns with other research, which finds that the TGT model encourages group collaboration and accountability in a

constructively competitive environment, thereby strengthening students' capacity for scientific thinking [27-29].

Conclusion

The study's overall results indicate that using the TGT (Teams Games Tournament) learning model with question-ball media significantly improved students' learning outcomes in *IPAS* subjects, particularly in the "Forces Around Us" material. The N-Gain values for concept understanding and process skills learning outcomes, both classified as moderate improvement, were 0.57 and 0.54, respectively, measuring this increase. Thus, the interactive and engaging TGT model proved successful in boosting students' activity, motivation, and deeper understanding of the material.

Author's Contribution

M. N. Furqon: played a role in research design, field implementation, data collection and analysis, and manuscript preparation. S. Masfuah: provides academic guidance, conceptual direction, and conducts a critical review of research substance and methodology. E. A. Ismaya: contributed to providing academic input, improving writing, and conducting final reviews to ensure the quality and suitability of the manuscript.

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