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Disaster Mitigation through Team Games Tournament (TGT) Model Based on Start with A Question in Learning

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Abstract: Along with the increasing frequency of natural disasters, disaster mitigation education becomes crucial in geography learning. However, students at SMA Negeri 7 Seluma Bengkulu often struggle to understand disaster mitigation concepts due to a lack of interactive and engaging learning methods. This study aims to analyze the effectiveness of the Team Game Tournament (TGT) learning model in improving students' understanding of disaster mitigation. This study used an experimental approach, with class X.1 as the experimental class of 25 students and class X.3 as the control class of 25 students. The instruments used to collect data included observations to see the application of the learning model and questionnaires to measure students' understanding of disaster mitigation. Data analysis was conducted using the Anova test. The findings indicate that the Start with a Question-based Teams Games Tournament learning model significantly enhances students' understanding of disaster mitigation compared to the traditional lecture method, as evidenced by a significance value (2-tailed) of 0.001 < 0.05. This research suggests that integrating interactive learning models can improve disaster preparedness among students.

Keywords: Active Learning; Disaster Mitigation; Geography Education; Team Games Tournament

Introduction

Indonesia is a country prone to various natural disasters, such as earthquakes, floods, landslides and tsunamis (Padli et al., 2024; Prasetyo et al., 2024; Selviani et al., 2024). The high frequency of disasters in Indonesia demands an increase in community awareness and preparedness in dealing with potential risks (Andrian, 2017). One effective way to build this awareness is through disaster mitigation education in the school curriculum, especially in geography subjects (Jonassen & Strobel, 2006; Sari et al., 2023; Selviani et al., 2024).

Disaster mitigation education is becoming increasingly important along with the increasing frequency of natural disasters in various regions, including Indonesia (Cottinghatt, 2023; Islami, 2021). As a country prone to earthquakes, floods and landslides, awareness and preparedness of the community against disasters must be instilled early on, one of which is through geography education in schools. (Agra et al., 2019).

However, based on observations at SMA Negeri 7 Seluma Bengkulu, many students still have difficulties in understanding the concept of disaster mitigation. Because disaster mitigation learning in schools is often still theoretical and less interactive, students tend to only memorize concepts without understanding the real application. This leads to low student preparedness in dealing with emergency situations in their environment. Therefore, innovation is needed in learning methods that can improve students' understanding of disaster mitigation more effectively.

One solution that can be applied is the use of the Team Games Tournament (TGT) learning model based on Start with a Question (SWQ). The relationship between the Team Games Tournament (TGT) learning model based on Start with a Question (SWQ) and meaningful science education lies in the principle of learning activities that encourage students to be directly involved in the learning process.

According to Teague et al, (2021) TGT involves teamwork, so students learn to discuss, share

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knowledge, and work together to achieve a common understanding. This supports more meaningful learning, as students not only receive information but also interact with their peers to construct knowledge together, in line with the constructivist principle that knowledge is constructed through experience and social interaction (Prayag, Mills, Lee, & Soscia, 2020; Zheng, Xu, & Li, 2024).

SWQ begins learning with questions, a model that encourages students' curiosity and invites them to ask questions and seek answers through experiments, research, and discussion. This allows students to actively engage in the learning process, develop critical thinking skills, and apply the concepts they have learned in more concrete situations, which is the core of meaningful science education (Souza & de Castro Brombilla, 2014; Wang & Davies, 2015).

In this context, the TGT and SWQ approaches are in line with the principles of constructivism, which emphasizes the importance of direct experience and social interaction in building knowledge. Additionally, both models support disaster literacy, which is the ability of students to understand, analyze, and respond to disaster-related issues through relevant and contextual learning. Thus, the implementation of TGT + SWQ not only enhances scientific concept understanding but also prepares students to become individuals capable of addressing disaster challenges.

This model incorporates an element of competition through team games, which not only increases students' learning motivation but also encourages them to think critically and understand the material more deeply (Nyoman, et al., 2024; Prasetyo et al., 2024). With this approach, students will be more active in discussing, solving problems, and applying disaster mitigation concepts in real life (Ilham et al., 2024; Indika et al., 2023; Sari et al., 2025).

Teams Games Tournament is a series of carefully designed learning activities that combine three learning techniques, small groups, games, and tournaments. It is designed to complement general instruction at the elementary, middle and high school levels. Teams Games Tournament aims to create an effective classroom environment where all students are actively involved in the learning process and consistently encouraged to achieve maximum results (Devries, 1980). In TGT, students will play a tournament in the form of an attractively designed game (Endang, Eraku, & Lihawa, 2020). According to Veloo & Chairhany, (2013), this model encourages students to be competitive, cooperate with other students and be themselves more active and creative in their learning. Their findings showed that students who used the cooperative TGT model performed better than those who underwent the conventional learning model. The cooperative learning TGT model consists of three main components which are class presentation, groups and academic competition (Selviani, et al., 2023).

According to Indrayani et al., (2017) in its implementation, the TGT model encourages each student to have the responsibility of learning and working together personally to realize and apply the concept of disaster mitigation in real life. The TGT model has several advantages that make it effective in learning. Some of the advantages of the TGT model include (1) high student participation in learning; (2) students become excited in learning; (3) the knowledge gained by students does not only come from the teacher but through the results of students' efforts to learn independently; (4) can foster positive attitudes in students, such as cooperation, tolerance, and can accept other people's opinions. Some of the advantages of the TGT model are positive in creating better student learning outcomes.

To make learning more meaningful Teams Games Tournament is combined with Learning Start with a Question (LSQ). Previous research shows that the application of disaster mitigation concepts in learning has a positive impact in improving both theoretical knowledge and practical skills of students. The Learning Start With a Question (LSQ) method is an active learning method that begins with Learning Start With A Question is one of the active learning that can provide opportunities for students to ask questions at the beginning of learning related to the material to be learned, then the educator explains what the students are asking. (Afandi & Nurjanah, 2018; Istihani & Herlinda, 2018)

This study aims to explore the effectiveness of implementing the Team Games Tournament (TGT) model based on Start with A Question (SAQ) in improving students' understanding and awareness of disaster mitigation in Geography learning. Through this model, it is expected that students not only understand the theory of disaster mitigation but also have better preparedness in facing real disaster situations.

Method

This research was conducted at SMA Negeri 7 Seluma Bengkulu in the even semester of the 2023/2024 academic year. Class X which is located in Rimbo Kedui Village, South Bengkulu Seluma District, Seluma Regency, Bengkulu Province. This type of research is an experimental design. Experimental design is a research method used to seek the effect of certain treatments on others under controlled conditions (Sugiyono, 2016)

This research tries to answer how to improve disaster mitigation in geography learning by using the

Teams Games Tournament learning model based on Start with a Question. The population in this study were all grade X students at SMA Negeri 7 Seluma Bengkulu in the 2023/2024 school year. In this study the authors took a sample of two classes, class X. 1 class served as the Experiment class of 25 students. While class X. 3 as the control class of 25 students. The experimental class used the Teams Games Tournament model based on Start with a Question, while the control class used a varied lecture learning model.

The data collection techniques used in this study were questionnaires, observations, observers. The instruments were prepared based on disaster mitigation learning objectives. Data in this study were obtained using questionnaires and observation sheets. Questionnaires and observation sheets were used to obtain information about disaster mitigation in geography learning by using the Teams Games Tournament learning model based on Start with a Question.

Data analysis techniques in accordance with the formulation of the problem and the hypothesis proposed, then the data analysis technique used is Anova test. Analysis of variance or ANOVA is one of the multivariate analysis techniques serves to distinguish the mean of more than two groups of data by comparing the variance.

Result and Discussion

This study used an experimental method to compare the effects of treatment. The experimental class used the Teams Games Tournament learning model based on Start with a Question. While the control class used a varied lecture learning model. Data regarding meaningful learning was obtained by students filling out a questionnaire made by the teacher after learning. Based on the questionnaire sheet in the form of 25 valid statements that are still in accordance with the indicators to measure the meaningfulness of disaster mitigation learning, the results are obtained in the form of Figure 1.

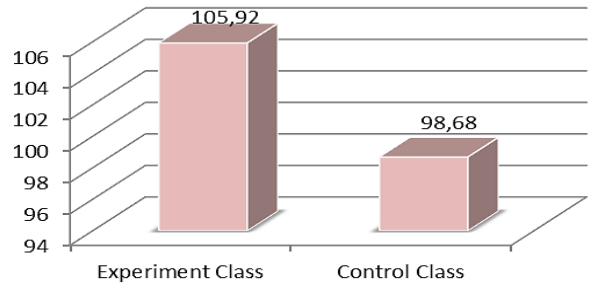

Figure 1. Graph of disaster mitigation learning outcomes

From Figure 1, the average score of disaster mitigation learning obtained in the experimental class using the Start with a Question learning model based on Teams Games Tournament is 105.92. While in the control class that uses a varied lecture learning model. 98,68. It can be concluded that the class using the Start wiht a Question-based Teams Games Tournament learning model obtained a more meaningful learning process compared to the class using the varied lecture learning model.

The normality test aims to determine whether the normal distribution of the data obtained with the help of the SPSS application by looking at the normal probability plot which compares the cumulative distribution of the actual data with the normal distribution. The results of normality testing can be summarized in the following table.

Table 1. Normality Test Results of Meaningful Learning

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Experiment	.152	25	.138	.953	25	.298
Control	.119	25	.200*	.983	25	.943

*. This is a lower bound of true significance.
a. Lilliefors Significance Correction

Based on table 1 of normality test results for the experimental class, the value is 0.138. In accordance with the rules, the value of 0.138> 0.05, then the data is normally distributed. While for the control class obtained a value of 0.200. In accordance with the rules, the value of 0.200> 0.05, then the data is normally distributed.

The homogeneity test aims to determine whether the variance of the samples taken from the same population is uniform. The homogeneity test uses the Levene Test. The results of homogeneity testing can be seen in Table 2.

Table 2. Results of Homogeneity Test for Meaningful Learning

		Levene Statistic	df1	df2	Sig.
Meaningful Learning	Mean	.019	1	48	.890
	Median	.001	1	48	.974
	Median with adjusted df	.001	1	47.641	.974
	Trimmed mean	.011	1	48	.916

From Table 2, the significance value of Based on Mean is 0.890, Based on Median is 0.974, Based on Median and with adjusted df is 0.974, and based on trimmed mean is 0.916. So, it can be concluded that the sig value is 0.890> 0.05, meaning that the data distribution is homogeneous.

Analysis of Variance is a comparative statistical formula that can be used to determine whether there are differences in phenomena between many groups, in this case between two or more groups.

Table 3. Anova Test Results of Meaningful Learning

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	655.220	1	655.220	11.907	.001
Within Groups	2641.280	48	55.027		
Total	3296.500	49			

Based on the results of the one-way anova test, it can be concluded that the significance value (2-tailed) is 0.001 so that the significance value of the experimental class data and the control class (2-tailed) 0.001 <0.05. This means that there is a difference in learning meaningfulness between the experimental class given special behavior using the Start with a Question learning model based on Teams Games Tournament and the control class using a varied lecture learning model. The experimental class gets a higher meaningfulness of understanding disaster mitigation than the control class that uses a varied lecture learning model. So, it can be concluded that classes that use the Start with a Question-based Teams Games Tournament learning model in learning are proven to increase the meaningfulness of disaster mitigation in geography.

This research was conducted to test the meaningfulness of learning using the Team Games Tournament (TGT) learning model based on Start with a Question better than the varied lecture learning model in Geography learning. The type of research used is experimental research. The research subjects were students of class X1 and X3 SMA Negeri 7 Seluma. Class X1 as the experimental class and class X3 as the control class.

From the results of this study, there are differences in learning meaningfulness between experimental classes that are given special behavior using the Start with a Question-based Teams Games Tournament learning model. The experimental class gets higher learning meaningfulness than the control class which does not use the Start wiht a Question-based Teams Games Tournament learning model with a significance value (2-tailed) of 0.001. So that the significance value of the experimental class data and the control class (2-tailed) 0.001 <0.05. So, it can be concluded that classes that use the Teams Games Tournament learning model based on Start with a Question in learning are proven to increase understanding of disaster mitigation.

Learning natural disaster mitigation through the Team Games Tournament (TGT) model based on Start with A Question (SWQ) is proven effective in improving students' understanding of the importance of disaster preparation and management. In the context of natural disasters, such as earthquakes, tsunamis, or floods, a good understanding of disaster mitigation is very important to reduce the negative impacts that can be caused (Atmojo, 2020). Through the TGT model, students are invited to work together in groups to solve problems related to disaster mitigation, such as ways of evacuation, disaster-resistant infrastructure development, and preventive efforts that can be made to minimize losses when a disaster occurs (Pratikno, Rahmat, & Sumantri, 2020).

The SWQ model focuses on starting learning with questions that stimulate students' curiosity. These questions do not simply require factual answers, but demand students to think critically, analyze, and find solutions based on the information they have. In other words, the questions asked can motivate students to think more deeply and engage in a more complex reasoning process. Examples of Questions/Activities in SWQ: For example, in a lesson on disaster mitigation, a teacher might ask questions such as, "What would happen if we did not implement disaster mitigation measures in earthquake-prone areas? How can we design solutions to reduce the impact of earthquakes?" These questions encourage students to not only answer directly, but also to analyze the impact of an event and create solutions based on their understanding of disaster mitigation concepts. Students must think about the cause-and-effect relationship between the lack of mitigation and its impact. Synthesis (HOTS): Students are asked to design concrete steps that can be implemented for mitigation.

This SWQ reinforces HOTS because it requires students to think higher than simply remembering facts; they must analyze situations, consider various variables, and find appropriate solutions. The TGT model facilitates social interaction and collaboration within teams to solve problems. In the context of HOTS, TGT provides opportunities for students to critically analyze information, compare different solutions, and make decisions based on group discussions. Example of Activities in TGT: During games or discussions in TGT, students can be given questions that require them to think critically, such as "Based on the data provided, what is the most effective disaster mitigation solution for this area?", "What are the advantages and disadvantages of the proposed solutions? Choose the best solution based on the analysis of the available data."

In TGT, students work in teams to complete these tasks, which hone their analysis and evaluation skills. For example. Analysis (HOTS): Assess the effectiveness of solutions based on available data. Evaluation (HOTS): Select the best solution and provide in-depth reasons why it is more effective than the others. Creativity (HOTS): Design more innovative solutions or develop new ideas for the problem at hand.

The success of this model is also driven by the Start with A Question approach, which activates students' curiosity from the start of learning (Rosyida et al., 2023).

By starting the learning with a relevant question about disasters, students are encouraged to find out more about the ways mitigation can be done to reduce the impact of disasters. This question-based learning stimulates critical thinking, so that students are more sensitive to the importance of disaster mitigation knowledge, not only as subject matter, but also as knowledge that can be applied in everyday life.

The Start with A Question approach to learning provides opportunities for students to think more critically about the phenomenon of natural disasters that occur around them. These results are in line with the research conducted by Rusmawati et al, (2013) relevant questions about natural disasters, such as "What can we do to reduce the impact of flooding in our neighborhood?" encourage students to find solutions that are applicable and based on the knowledge they have. In this way, students not only understand disaster mitigation theory but also develop practical skills in dealing with emergency situations related to natural disasters.

In line with Thalita et al., (2019), with the title Application of the TGT learning model to increase the learning activeness of class IV students. The results of his research state that the use of the TGT type cooperative learning model can increase student activeness. This increase can be seen in each indicator of student activeness research. most students received the predicate of very active criteria, while those who received the predicate of active criteria or the predicate was quite active were only a small number of students. Student activeness is a supporting factor for meaningful learning. Through action scenarios to improve student learning behavior, the use of TGT type cooperative approach in geography learning can improve student learning behavior in geography learning at SMAN 2 Tumijajar Tulang Bawang Barat (Yudaningsih et al., 2013)

In the absence of a curriculum on disaster mitigation, there are several things that can be done by schools, including disaster mitigation learning TGT so that it is useful and adds insight and experience for teachers and students. This is one way or method of debriefing students and teachers in terms of disaster mitigation. With the understanding of TGT in disaster mitigation, students and teachers will be able to be more alert in the implementation of disaster mitigation.

Overall, the use of SWQ-based TGT model in natural disaster mitigation learning is able to increase students' awareness of the dangers associated with natural disasters and the importance of preparedness. This team-based learning also helps students to be better prepared to work together and take appropriate steps when a natural disaster occurs. Hopefully, these skills will equip them to be more responsive and able to face challenges arising from natural disasters in the future.

Conclusion

The use of Team Games Tournament (TGT) model based on Start with A Question (SWQ) in learning natural disaster mitigation is very effective to improve students' understanding and skills in dealing with emergency situations. The main function of TGT in this context is to facilitate cooperation between students, which is crucial in dealing with natural disasters, where coordination and good communication between individuals can affect safety and survival. Through team-based learning, students are taught to think collectively, solve problems together, and plan appropriate mitigation measures. Recommendations for implementing this model in other geography classes include applying this method to other topics that require in-depth understanding and collaboration, such as climate change, natural resource management, and other environmental issues. The TGT + SWQ model can be applied to improve students' critical and analytical thinking skills in various geographical contexts.

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The authors declare no conflict of interest

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