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EFFECTIVENESS OF TGT ASSISTED BY QUIZIZZ PAPER MODE ON CRITICAL THINKING SKILLS AND SCIENTIFIC ATTITUDES OF STUDENTS ON ENERGY TOPICS

Maulida Fitriya[1], Arif Billah[2]

[1,2]Science Education Department, Faculty of Teacher Training and Education, Universitas Islam Negeri Salatiga, Indonesia

Abstract

This study aims to analyze the effectiveness of the Teams Games Tournament (TGT) model assisted by Quizizz Paper Mode media on energy topic on students' critical thinking skills, and determine the scientific attitude of students through the application of the TGT model assisted by Quizizz Paper Mode media on energy topic in class VIII junior high school. This study used a quantitative true experimental method with a control group pretest-posttest design. Data were collected through pretest and posttest results, scientific attitude questionnaire, and learning implementation observation sheet. Based on the results of the test data analysis with an independent sample t-test, we obtained t_{count} 2.86 > t_{table} 2.018 with a significance value of 0.007 < 0.05, it can be concluded that H_0 is rejected and H_1 is accepted. The analysis of the scientific attitude questionnaire obtained an average percentage of students' scientific attitudes of 78% (high category). It can be concluded that the TGT model assisted by Quizizz Paper Mode media on energy topic is effective on critical thinking skills and has a good impact on the scientific attitude of students. The application of TGT assisted by Quizizz Paper Mode media can help students understand the use of Quizizz Paper Mode digital media that can be applied to other topics.

Keywords: Teams Games Tournament, Critical Thinking, Scientific Attitude.

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[2]Correspondence Address:
Science Education Department, Faculty of Teacher Training and Education,Universitas Islam Negeri Salatiga, Indonesia
E-mail: arifbillahbadr@uinsalatiga.ac.id

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INTRODUCTION

Currently, Indonesia has entered the 21st century. The 21st century is a century in which technology and information develop very rapidly (Daryanto & Karim, 2017). There are several 21st century skills that must be possessed by students, namely the 4C skills (collaboration, communication, critical thinking and problem solving, creativity, and innovation). One of them is critical thinking skills, which are important in problem solving and truth discovery in everyday events (Nuryanti et al., 2018). Not only do students need thinking skills, but they also need attitude skills for their implementation. In science learning, the attitude that students must have a scientific attitude. In reality, science learning in the classroom has not been maximized for empowering 21st-century skills.

According to the results of the researcher's interview with one of the science teachers at MTs Negeri 5 Magelang, it is known that science teachers at MTs Negeri 5 Magelang are still accustomed to using direct learning and have not tried other innovative learning models. The ability to receive learning topic in physical science also tends to be low compared to biological science. Physics is one of the branches of science regarding theories, principles, laws, facts, and concepts of a natural phenomenon (Jafar, 2021). Students' response to questions that require the implementation of formulas is very low. However, science teachers at MTs Negeri realize the importance of critical thinking skills for students in this digital era and the importance of scientific attitudes in the implementation of science learning. Thus, learning innovations are needed that can support interactive activities for students.

A number of studies have shown that the Teams Games Tournament (TGT) model is an innovative interactive learning step that can be used to teach 21st century skills, especially critical thinking and scientific attitudes in science education. In line with Ismayawati (2016) which showed that students' critical thinking skills improved more with the TGT model compared to the group investigation model, Karini (2020) analyzed how students' attitudes towards science are influenced by the TGT learning approach in lesson study settings. It is known that students' scientific attitudes can be strengthened through the TGT learning model. TGT learning can be combined with interactive quiz media to further attract the attention and involvement of students in supporting classroom learning implementation. Like one of the platforms, Quizizz, which is already known and used by most students, Quizizz is one of the platforms that have become interactive learning media (Zhao, 2019). In its development, Quizizz has a new system, namely Paper Mode, which makes it easier for students to answer questions with a QR code (Pratiwi & Indana, 2022).

Based on this explanation, a study was conducted entitled The Effectiveness of Teams Games Tournament Assisted by Quizizz Paper Mode on Energy Topic on Critical Thinking Skills and Scientific Attitudes of Class VIII Learners to analyze the effectiveness of the Teams Games Tournament (TGT) model assisted by Quizizz Paper Mode media on energy topic on students' critical thinking skills, and determine the scientific attitude of students through the application of the TGT model assisted by Quizizz Paper Mode media on energy topic in class VIII MTs Negeri 5 Magelang in the 2023-2024 school year.

METHOD

Research Design

This type of research is quantitative research using the true experimental method. Thus, researchers can control all external variables that affect the implementation of experimental research. In addition, the samples used cluster random sampling from a population, as shown in Figure 1 below:

R	O_1	X	O_2
R	O_3		O_4

Figure 1. Research design
Source: (Sugiyono, 2016)

This study used a control group pretest-posttest design as shown in Figure 1 above. There are two randomly selected classes (R), one as an experimental class that is given the TGT model treatment assisted by Quizizz Paper Mode media (X), and the other as a control class that is not given treatment (Sugiyono, 2016).

Research Targets

The research was conducted at MTs Negeri 5 Magelang, which is located on Jalan Ngablak-Grabag KM.0, Ngablak District, Magelang Regency, from April to May 2024 in the even semester of the 2023-2024 academic year. The study population consisted of all VIII grade students at MTs Negeri 5 Magelang in the 2023–2024 academic year, which was divided into 6 classes (VIII A to VIII F). The sample selection technique was carried out using the cluster random sampling method, which is a sampling technique with special considerations (Sugiyono,

2016). The samples in this study were VIII A students, totaling 22 students as the experimental class. While class VIII B consists of 22 students as the control class.

There are two variables in this study, namely the independent variable and the dependent variable. The independent variable that causes the dependent variable in this study is the Teams Games Tournament learning model, assisted by Quizizz Paper Mode Media. The dependent variable in this study is the critical thinking skills and scientific attitudes of class VIII students at MTs Negeri 5 Magelang in the 2023-2024 academic year on energy topic.

Data Collection Technique

The data collected included the results of the pretest, posttest, and student scientific attitude survey questionnaires. Pretest and posttest tests were distributed to students in control and experimental classes to evaluate students' critical thinking skills before and after learning. There are 10 questions in the pretest question and 10 questions in the posttest question in the form of essays that are arranged according to critical thinking indicators. The following indicators of critical thinking, according to Norris and Ennis (1989) in Affandy (2019), are used in making questions in this study:

Table 1. Critical thinking's indicator

Number	Indicator	Sub Indicator
1	Provides a simple explanation	a. Focusing on a problem b. Analyzing an argument c. Answering questions that are clarifying or challenging questions
2	Building basic skills	a. Considering the authenticity of a source b. Making an observation and considering the results
3	Making inferences	a. Making a deduction and considering the results b. Identifying assumptions
4	Providing further explanation	a. Making a decision and considering it b. Identifying assumptions
5	Organizing strategies and tactics	a. Formulating and deciding on a course of action b. Presenting an argument orally/written

Source: (Affandy, 2019)

The pretest and posttest questions that have been prepared are then analyzed using SPSS 29.0.2 software to evaluate the validity, reliability, difficulty level, and differences between questions before use. The results of the question trial showed that 8 pretest and 8 posttest questions were considered valid and reliable. The differentiating power is 82.5% good and 12.5% sufficient. Then, it is known that there are two medium questions, one difficult question, and five easy questions after assessing the level of difficulty in the pretest and posttest questions. The results of the pretest and posttest data will then be analyzed with the help of SPSS 29.02 software through the independent sample t-test test to determine whether there is an average difference between two independent sample groups. Testing rules: if $t_{count} > t_{table}$ and P < 0.05, then H_0 is rejected and H_1 is accepted (Sugiyono, 2016).

The requirements for the independent sample t-test are the normality test and the data homogeneity test. The scientific attitude questionnaire is used to assess the scientific attitudes of students in class VIII A (experimental group) who have received learning using the Teams Games Tournament model assisted by Quizizz Paper Mode media as respondents. This scientific attitude questionnaire consists of 15 questions in accordance with the six indicators of scientific attitudes put forward by Carin (1997). Table 2 are the six indicators of scientific attitudes, according to Carin (1997).

Table 2. Scientific Attitude's Indicator

Number	Indicator
1	Curiosity
2	Prioritizing evidence
3	Skeptical or not easy to believe
4	Accept differences
5	Work together
6	Positive attitude towards failure

Source: (Carin, 1997)

The data from the scientific attitude questionnaire will be analyzed with the help of Microsoft Excel software to determine the average scientific attitude of students after getting Team Games Tournament learning assisted by Quizizz Paper Mode media, both overall and for each indicator.

RESULT AND DISCUSSION

In this research, class VIII A (an experimental class) used the Teams Games Tournament (TGT) learning model with the help of Quizizz Paper Mode media. Researchers created a teaching module that has been validated by science subject teachers, with the learning steps (syntax) of the Teams Games Tournament as a reference in carrying out learning. The implementation of Teams Games Tournament learning assisted by Quizizz Paper Mode are shown in table 3 below:

Table 3. Implementation of teams games tournament (TGT) learning, assisted by quizizz paper mode

Syntax (Slavin, 2015)	**Picture**
Class Presentation: The researcher presented material on potential energy, kinetic energy, mechanical energy, and its application in life. The students listening and paying attention to the researcher's explanation and asking questions about material that has not been understood.	
Study in groups: The researcher divides students into groups of 4–5 students. The students discuss the problems and prepare the material for the game with the group.	
Game: The researcher asks questions according to the material that has been presented. The students answer each question with each group member.	
Tournament The researcher distributes Q-Cards to each group, displays questions from Quizizz media using a laptop, and scans the answers of each group with a smartphone. The students answer the questions on the Quizizz media by lifting the Q-Card in turn.	
Reward The researcher rewards the group with the highest score. The students give applause and appreciation to the winning group.	

Source: (Data Researcher, 2024)

Learning begins with introduction, core (Teams Games Tournament), and closing activities. Followed by this activity (Teams Games Tournament), as seen in the table above. It can be seen that all learning steps (syntax) of the Teams Games Tournament based on Slavin, (2015) indicators have been fully implemented. Before carrying out learning activities, researchers gave pretest questions conducted offline in class to determine the average critical thinking skills of students before implementing learning. After two meetings of learning activities were completed, researchers gave posttest questions and gave scientific attitude questionnaires to students who were also done offline in class.

There are two dependent variables in this study, namely the critical thinking of grade VIII students and the students' scientific attitudes towards energy topic. The following are the results and discussion of each variable:

Effectiveness of Teams Games Tournament (TGT) Cooperative Learning Model Assisted with Quiz Paper Media on Critical Thinking Skills

Pretest and posttest data were collected from experimental and control classes to evaluate the critical thinking skills of each class. The goal was to find out if there was a difference between the control class and the experimental class before and after learning. Initially, there was little difference in the average pretest results between the two classes, with an average value for the experimental class of 47.386 and the control class of 48.636. However, the learning model applied had a different impact on students' critical thinking skills.

This can be seen from the posttest data in both classes, which shows a difference in the average value, namely the control class 75.68 < experimental class 81.36. The average score of pretest and posttest answers in the control class and experimental class is shown in Figure 2 below:

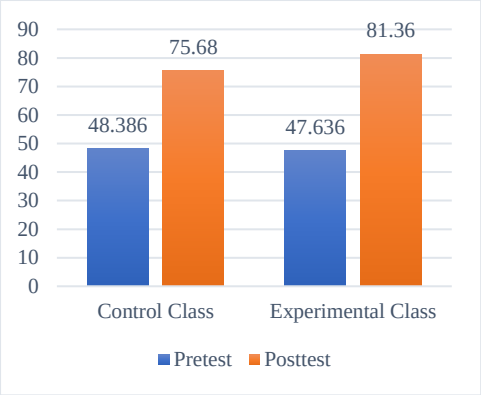

Figure 2. Diagram of pretest and posttest results
Source: (Researcher data, 2024)

Next, a normality test and a homogeneity test were carried out as a requirement for carrying out the independent sample t-test. The following are the test results with the help of SPSS 29.02 software, as follows:

Table 4. Normality test results (Shapiro-Wilk)

Category	*Shapiro-Wilk*	Signification	Conclusion
Control Class Pretest	0,140	0,05	Normal
Control Class Posttest	0,766		
Experiment Class Pretest	0,136		
Experiment Class Posttest	0,358		

Source: (Data Researcher, 2024)

Based on table 4 above, normality test results show that the results of the pretest and posttest questions in the experimental class and control class are normally distributed because the significance value in the Shapiro-Wilk test is > 0.05 for each question tested.

Table 5. Homogeneity test results (Levene Statistic)

Test of Homogeneity of Variance				
Pretest and Posttest	Levene Statistic	df1	df2	Signification
Based on Mean	3,123	1	42	0,084
Based on Mean	0,299	1	42	0,588

Source: (Data Researcher, 2024)

Based on table 5 above, homogenity test results show that the pretest questions and posttest questions in the control class and experimental class are homogeneously distributed because, based on the significance value based on the mean from the Levene statistical test, the pretest results are 0.084 > 0.05 and the posttest results are 0.588 > 0.05.

Table 6. Independent sample T-test results

Hasil *Posttest*	*Df*	t_count	t_table	Uji-T	*Sig (2-tailed)*	Conclusion
Kelas Kontrol	42	2,860	2,018	0,007	0,05	$H0$ ditolak
Kelas Eksperimen	42	2,860	2,018	0,007	0,05	$H1$ ditolak

Source: (Data Researcher, 2024)

The t-test results table shows the results of student posttests in the control class and experimental class, obtained $t_{count} > t_{table}$ with a significance value of 0.007 <0.05. Thus, it can be concluded that the use of the Teams Games Tournament (TGT) learning model with the support of Quizizz Paper Mode media is effective in improving the critical thinking skills of class VIII students in learning energy topic at MTs Negeri 5 Magelang in the 2023-2024 academic year. This is in line with the research of Yuliyanti & Sunarsih, (2019) on the effect of the TGT-type cooperative model on critical thinking skills in grade IV mathematics subjects, with the results of the hypothesis test of the posttest question from the t test results obtained: t_{count} 2.53 > t_{table} 2.08. Thus, it can be concluded that the TGT model has proven effective in improving critical thinking skills in mathematics.

Another study on the application of the Teams Games Tournament (TGT) model with a crossword puzzle game to improve students' critical thinking skills showed that the average score of students' critical thinking skills in the pretest was 55%. However, after using the TGT model with the TTS game, the score increased to 83% (Aisyah, 2020). The findings of this study indicate that the application of the Teams Games Tournament (TGT) model using Quizizz Paper Mode media can have a positive impact on students' critical thinking skills through active and interactive involvement in the learning process. In addition, the use of Quizizz Paper Mode as an interactive tool also supports students in developing critical thinking skills. As found in Siboro (2022) the use of the PjBL model assisted by Quizizz media also has a significant impact on improving students' critical thinking skills.

Students' Scientific Attitudes through the Application of the Teams Games Tournament (TGT) Learning Model Assisted with Paper Mode Quizizz Media

This study shows the high scientific attitude of students in the experimental class by applying the Teams Games Tournament (TGT) learning model assisted by Quizizz Paper Mode media. With evidence of the results of the scientific attitude questionnaire, as shown in Table 5 below:

Table 7. Results of scientific attitude questionnaire data analysis

No	Indicator	Mean	Percentage (%)	Category
1	Curiosity	67,3	77	High
2	Prioritizing evidence	68,3	78	High
3	Skeptical or not easy to believe	62,5	71	High
4	Accept differences	69	78	High
5	Work together	71,3	81	Very High
6	Positive attitude towards failure	71	81	Very High

Source: (Data Researcher, 2024)

Table 7 above, results of scientific attitude questionnaire data analysis show that in the indicator of being able to work together and be positive about failure, students' scientific attitudes are in a very high category in the Likert scale percentage score criteria. This is because in the application of the Teams Games Tournament (TGT) model, there are syntaxes of learning in groups, tournaments, and awards. In the syntax of learning in groups and tournaments, students discuss and work together with their groupmates to understand the topic and solve Quizizz Paper Mode questions. Then, in the award syntax, students who lose in the tournament give appreciation to the winning group. So, it is very visible that there is empowerment through cooperation and positive responses to failure. In other indicators, the percentage of students' scientific attitudes was in the high category. Meanwhile, the average percentage of all indicators is 78% (high).

According to research conducted by (Hubba & Ninawati (2019), the application of the TGT learning model in the classroom had a significant impact on the scientific attitudes of fifth grade elementary school students. Another study conducted by Karini (2020) also examined the effect of the TGT learning model with the Setting

Lesson Study on the scientific attitudes of fourth grade elementary school students. The results showed that the TGT learning model was able to improve students' scientific attitudes, as evidenced by the results of the t-test, with a t_{count} of 9.56 exceeding the t_{table} of 1.99. Therefore, it can be concluded that the application of the TGT learning model in the lesson study setting has a significant effect on students' scientific attitudes.

Several studies have shown that the application of the TGT model has proven effective in improving students' scientific attitudes. In the application of Teams Games Tournament (TGT), Quizizz Paper Mode media can be used as a means to increase student involvement in the learning process. Quizizz Paper Mode media helps researchers prepare questions that are in accordance with the topic being studied and can be used in carrying out tournament syntax. It can be concluded that the scientific attitude of students through the application of the Teams Games Tournament (TGT) model assisted by Quizizz Paper Mode media is in the high category.

CONCLUSIONS AND SUGGESTIONS

Conclusion

The results of this research show that the application of the Teams Games Tournament (TGT) learning model using Quizizz Paper Mode media is effective on critical thinking skills and has a positive impact on the scientific attitude of class VIII students in learning energy topics at MTs Negeri 5 Magelang in the 2023-2024 school year. In addition, TGT assisted by Quizizz Paper Mode media can help students understand the use of Quizizz Paper Mode digital media that can be applied to other materials.

Suggestion

The use of the Teams Games Tournament (TGT) Learning Model with Quizizz Paper Mode Media is expected to provide insight into the development of new learning models that can improve students' critical thinking skills and scientific attitudes. It is hoped that this research can become a reference for further research regarding innovative learning models, especially in science learning.

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