

Team Games Tournament Assisted by Math Journal as An Effort to Improve Students' Numeracy Skills

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Abstract : *The research aims to improve students' numeracy skills by applying Team Games Tournament (TGT) type cooperative learning assisted by Math Journal. This research used a quantitative approach with a pre-experimental design method of one group pretest-posttest type. The research subjects were students of Grade VIII of SMP Negeri 2 Perak Jombang. The research has used instruments in the form of questions that consist of pre-test and post-test, questionnaires as supporting data and TGT teaching modules. The test instrument was supported by the results of a student questionnaire. The data analysis technique used is hypothesis testing using paired samples t-test. Based on the results of the paired sample t-test, the significance value is 0.000. The significance value obtained is $0.000 < 0.05$ error level. So it can be concluded that H_0 is rejected, which means that there is an effect of the application of TGT assisted by Math Journal on students' numeracy skills. Therefore, it can be concluded that the numeracy skills of VIII grade students of SMP Negeri 2 Perak increased after the application of TGT assisted by Math Journal.*

Keywords: *Team Games Tournament; Math Journal; Numeracy.*

INTRODUCTION

Numeracy is an ability that individuals have not only the ability to count, but the ability to apply numeracy concepts in solving problems in everyday life (Lestari & Siswono, 2022). Mathematics and numeracy are closely related, although the words and emphasis are different, the definition recognizes that mathematics and numeracy are interrelated but not synonymous (Ginsburg et al., 2006). Numeracy can be interpreted as the ability to apply number concepts and arithmetic operation skills in life. As stated by Satiti et al., (2021) that mathematical literacy is not only for the academic success of students but also for the success of professional life and daily life. The results of the PISA (Program for International Student Assessment) test in 2022, Indonesia's ability score is ranked 12th from the bottom in mathematics. Indonesia's score was 13 points lower than the PISA test score in 2018 (Kemendikbudristek, 2023). Based on this, it can be seen that the numeracy skills of students in Indonesia are still low and have even decreased. The factor that causes the level of numeracy literacy in Indonesia to remain low is the lack of attractiveness of teachers in developing teaching models and media used (Widiastuti & Kurniasih, 2021). The low numeracy skills of students are also caused by the inability of teachers to develop numeracy skills.

Creative and innovative learning innovations are needed to overcome low numeracy skills. Learning innovations in learning basic mathematical concepts can be done one of them by applying learning models in learning activities and assisted by learning media in the classroom learning process. The results of research conducted by Nasrulloh et al., (2023) reinforce that the application of learning models is effective for improving students' numeracy skills or mathematical literacy. The learning model can be defined as a method for designing interesting learning experiences and helping the educational process so as to achieve satisfactory learning objectives (Roziqin & Robiah, 2022). One of the learning models that can be applied is the TGT type cooperative learning model. The TGT cooperative learning model is a learning approach that places students at the center of the learning process. This model requires students to be actively involved in learning activities. In addition, students are grouped into diverse small teams, with the aim of participating in a competition to solve problems and achieve scores, and conduct learning in the form of tournaments working on problems to obtain scores (Agustin et al., 2024).

The Team Games Tournament learning model developed by Robert Slavin (1990), is a learning technique designed to provide opportunities for students to build their own knowledge together as well as to think, share ideas, encourage students to increase cooperation and be responsible in the learning process (Nurhidayah, 2018). The process of applying the TGT learning model shows that students can carry out learning activities with fun and can also become peer tutors for their group friends in understanding the material and working on problems. As well as research conducted by Ermiati et al., (2024) which concluded that learning using peer tutors is effective for improving student learning outcomes. The application of the TGT learning model will be more effective if supported by the use of learning media. The implementation of Team Games Tournament (TGT), especially in the tournament phase, requires the presence of learning media (Putra & Panglipur, 2019). Thus, there is a need for learning media that can improve students' numeracy skills to be understood consistently and continuously according to student needs.

The researcher conducted observations at SMP Negeri 2 Perak involving Mathematics teachers. Based on the results of observations conducted by means of direct interviews, information was obtained that the numeracy skills of SMP Negeri 2 Perak students were in the low category. This is based on the results of the minimum competency assessment (AKM) education report card carried out in 2023. Based on the education report card, the minimum competency assessment results obtained in 2023 increased compared to 2022, but SMP Negeri 2 Perak students are still categorized as having low numeracy skills. This is because students still experience problems when working on national competency assessment questions, namely students who still have not fully mastered basic mathematical concepts, such as addition, subtraction, multiplication and division. This is reinforced by the results of an interview with one of the students, when asked to do the problem the student could not quickly solve it. Therefore, efforts need to be made to overcome this. One of them is by

applying the Team Games Tournament (TGT) cooperative learning model assisted by Math Journal.

Math Journal is a pocket book that is compiled based on basic math materials such as addition, subtraction, multiplication and division materials along with practice questions that are used to assist students in working on problems in everyday life. This study uses math pocketbooks as the media used in learning activities. Aini & Asmana, (2023) obtained research results that student books characterized by RME meet the effective criteria for use in learning. The results of the above research reinforce that pocket books or student books are effective in teaching and learning activities. The use of Math Journal aims to familiarize junior high school students in counting using the steps contained in it and facilitate students in working on numeracy problems. The difference in the application of the Team Games Tournament (TGT) learning model assisted by Math Journal with the application of the previously existing Team Games Tournament (TGT) learning model lies in the media used to assist the application of the Team Games Tournament (TGT) learning model, namely Math Journal media. The design and content of the Math Journal focuses on counting steps that aim to improve students' ability to do numeracy problems.

Based on the preliminary description above, the researcher focused on the application of the Team Games Tournament (TGT) learning model assisted by Math Journal. The study examined the Application of the Team Games Tournament (TGT) Learning Model assisted by Math Journal as an effort to Improve the Numeracy Ability of Class VIII Junior High School Students at SMP Negeri 2 Perak.

METHOD

The research to be conducted by researchers is a pre-experimental study that only involves one experimental group without a comparison or control group. The research design used is One-Group Pretest-Posttest Design, meaning that this research was conducted in one randomly selected class. In the One-Group Pretest-Posttest Design research design, it is measured by using a Pretest conducted before treatment and a Posttest after treatment (Sugiyono, 2015). This research design can be described as follows.

Table 1. Schematic of One-Group Pretest-Posttest Design

Group	Pre-test	Treatment	Post-test
Experiment	o_1	x	o_2

Description :

o_1 : the value of the initial test (pre-test) conducted before being given treatment

x : treatment learning TGT cooperative model to students

o_2 : the value of the final test (post-test) conducted after being given treatment

The population in this study were VIII grade students of SMP Negeri 2 Perak. The sample used in this study amounted to 28 students. The instruments used to measure students' numeracy skills in this study are questions consisting of 2 tests (pre-test and post-test), questionnaires as supporting data and TGT teaching modules assisted by Math Journal. The test instrument contains numeracy math questions used to measure students' numeracy skills before and after the application of the Team Games Tournament (TGT) learning model assisted by Math Journal. The test instrument is supported by the results of a student questionnaire which contains statements to measure students' numeracy skills. Before the test instrument, questionnaire and teaching module were applied in the research, the instrument was validated first by two validators. The validation results showed that the three instruments, namely the test, questionnaire, and TGT teaching module assisted by Math Journal, were very valid.

After the validity test is carried out, hypothesis testing will then be carried out on the data obtained, provided that the normality test is first carried out using the IBM SPSS statistics 22 application.

RESULT AND DISCUSSION

The research was conducted on October 14-15, 2024 with the research subjects as many as 28 students of class VIII with the focus of research on students' numeracy skills. This study was measured using Pre-test and Post-test done by students to determine the effect of treatment on students' numeracy skills. The tools used in this study are teaching modules with the TGT learning model assisted by Math Journal which contains numeracy steps with practice problems, test instruments, and questionnaires used to determine the effectiveness of the application of the TGT learning model with the help of Math Journal. Math Journal is a teaching media in the form of a pocket book that contains a summary of basic math operations such as addition, subtraction, multiplication, and division as well as various practice questions. This book is designed as interesting as possible with creative and colorful visual displays in order to increase students' interest in learning mathematics. With its practical size, Math Journal is easy to carry anywhere so that students can learn anytime and anywhere.

The research was conducted in two meetings with the presentation of material, learning in groups and also games at the first meeting. While the competition and group awards were carried out at the second meeting. Validation of teaching modules by validators obtained an average validation score with a percentage of 85.5% so that the teaching modules in this study were declared very valid and suitable for use in research. The test instrument used in this study is student worksheet 1 (pre-test) and student worksheet 2 (post-test) in the form of numeracy questions related to daily life in the form of essays. The results of the analysis conducted by two validators obtained an average percentage for the validation of the test instrument was 86.5%. So the test instrument used in this study was declared very valid and suitable for use in research.

The third instrument used is a questionnaire which is used as supporting data to draw conclusions at the end of the study. The questionnaire aims to determine the effectiveness of the application of the team games tournament (TGT) learning model assisted by Math Journal. The results of the validity score of the questionnaire that has been validated by two validators obtained an average percentage of 85.5% with a very valid description.

1. Result

a. Pre-test and Post-test Results

The test results obtained in this study can be seen in the following table

Table 2. Student test results

Activity	n	Mean	Min	Max
<i>Pre-test</i>	28	40.53	15	70
<i>Post-test</i>	28	60.89	20	100

b. Normality Test Results

Data testing is carried out using a normality test to determine whether the data is normally distributed.

Table 3. Tests of Normality

	Tes	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
Student	<i>pre-test</i>	.128	28	.200*	.970	28	.581
Learning Outcomes	<i>post-test</i>	.159	28	.069	.942	28	.125

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

Based on the results of the normality test above, it can be concluded that the data is normally distributed because the Shapiro-Wilk significance value > 0.05, so the data is normally distributed and parametric statistical tests can be performed

c. Hypothesis Test Results

Table 4. Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Pre Test - Post Test	-20.357	17.529	3.313	-27.154	-13.560	6.145	27	.000

Based on the test results that have been carried out, a significance value of 0.000 is obtained. Significance of 0.000 < the significant level of 0.05, it can be concluded that

H_a is accepted, which means that there is an effect of Team Games Tournament (TGT) model learning assisted by Math Journal on the numeracy skills of class VIII students of SMP Negeri 2 Perak.

2. Discussion

The research was conducted by applying the Team Games Tournament (TGT) learning model assisted by Math Journal to VIII grade students who aimed to improve numeracy skills. Researchers conducted research on students' numeracy skills based on three indicators of numeracy skills according to (Baharuddin et al., 2021) which include (1) being able to use various kinds of numbers and symbols related to basic mathematics to solve problems in various contexts of daily life (2) analyzing information displayed in various forms (graphs, tables, charts, diagrams and others) (3) interpreting the results of the analysis to predict and make decisions. This study used instruments in the form of questions consisting of pre-test and post-test to measure students' numeracy skills.

The learning activities in the process of applying the team games tournament (TGT) learning model assisted by Math Journal were carried out in two meetings with a time allocation of 2×40 at each meeting. The first meeting researchers gave a pre-test to students to determine students' numeracy skills before the application of the team games tournament (TGT) learning model assisted by Math Journal. In the second meeting after the application, students took the post-test to determine the effect of applying the team games tournament (TGT) learning model assisted by Math Journal.

Data must be normally distributed before the data is tested using a two-sample paired t test. The results obtained using the IBM SPSS Statistic 22 application showed a pre-test significance value of $0.581 > 0.05$ and a post-test significance value of $0.125 > 0.05$. Based on the significance value obtained and in accordance with the normality test criteria using the Shapiro-Wilk test, it can be concluded that both data are normally distributed. After the normality test is performed and the data are found to be normally distributed, a paired sample t-test is performed using the IBM Statistics SPSS 22 application to test the proposed hypothesis. The result of the paired samples t-test is significance = 0.000. The significance value obtained is < 0.05 , it can be concluded that H_0 is rejected and H_a is accepted. This means that there is an effect of the team games tournament (TGT) learning model assisted by Math Journal on the numeracy skills of 8th grade students at SMP Negeri 2 Perak. Thus it can be concluded that the team games tournament (TGT) learning model assisted by Math Journal can improve the numeracy skills of students of SMP Negeri 2 Perak.

Students can improve their numeracy skills by using the team games tournament (TGT) learning model assisted by Math Journal to improve numeracy skills consistently periodically by working on the questions in the Math Journal. The team games tournament learning model makes students compete to do well and correctly so that the group gets a good

score. This makes students have the enthusiasm to learn about numeracy more vigorously supported by the use of Math Journal.

The results obtained are relevant to the research conducted by (Samak et al., 2024) entitled The Effect of Team Games Tournament Type Cooperative Learning Model (Tgt) on Numeracy Skills in Mathematics Subjects in Class I SDN Socah 2 Bangkalan obtained the results that the use of Team Games Tournament affects and has a significant impact on students' numeracy skills in Mathematics subjects. The application of Team Games Tournament to improve students' numeracy skills conducted by (Kusuma, 2024), shows that there is an influence obtained when applying the Team Games Tournament learning model assisted by Smart Snakes and Leaders media on students' numeracy skills. This shows that the Team Games Tournament learning model combined with learning media can improve students' numeracy skills.

CONCLUSION

The results of the study can be used to conclude that the numeracy skills of 8th grade students of SMP Negeri 2 Perak have increased after the application of the Team Games Tournament (TGT) learning model assisted by Math Journal. The increase in students' numeracy skills is based on the results of the paired t test which obtained a significance value of 0.000. The significance value obtained is smaller than the error rate used which is 0.05, it means that H_0 is rejected and H_a is accepted. So it can be concluded that there is an effect of Team Games Tournament (TGT) learning assisted by Math Journal on students' numeracy skills. The effect can be seen from the average student test results which show the average post-test is higher than the average pretest score. This means that the application of the Team Games Tournament (TGT) learning model assisted by Math Journal is able to improve students' numeracy skills. These results are supported by the effectiveness questionnaire of the application of the Team Games Tournament (TGT) learning model assisted by Math Journal which shows that the application of the Team Games Tournament (TGT) learning model assisted by Math Journal is effective in the learning process. Therefore, it can be concluded that students' numeracy skills, especially VIII grade students of SMP Negeri 2 Perak, improved after the application of the TGT learning model assisted by Math Journal.

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