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Student Interest in Mathematics using Routine and Non-Routine Problems in the Rotating Trio Exchange Cooperative Learning Model

Minat Belajar Matematika Siswa Menggunakan Soal *Routine* dan *Non-Routine* pada Model Pembelajaran Kooperatif Tipe *Rotating Trio Exchange*

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Abstract

Types of questions and the way the teacher teaches can affect student learning interests. One learning model that can increase students' interest in learning is the Rotating Trio Exchange cooperative learning model. This study examined the differences in students' learning interests using routine vs non-routine questions in the Rotating Trio Exchange cooperative learning model. The type of research used is quasi-experimental, with a sample of 44 junior high school students. The instruments used in this study were fractional material test questions, questionnaires, and observation sheets. Data analysis used a validity test, reliability test, normality test, homogeneity test, Wilcoxon test, and independent sample t-test. This study concluded that there were differences in the average learning interest of students who used routine and non-routine questions in the Rotating Trio Exchange cooperative learning model.

Keywords: *Cooperative Learning Model; Rotating Trio Exchange; Routine vs Non-Routine Questions; Students' Interest.*

Abstrak

Jenis pertanyaan dan cara guru mengajar dapat mempengaruhi minat belajar siswa. Salah satu model pembelajaran yang dapat meningkatkan minat belajar siswa adalah model pembelajaran kooperatif Rotating Trio Exchange. Tujuan penelitian ini adalah melihat perbedaan minat belajar matematika siswa yang menggunakan soal rutin vs non rutin pada model pembelajaran kooperatif tipe Rotating Trio Exchange. Jenis penelitian yang digunakan adalah penelitian Eksperimen Semu dengan jumlah sampel 44 siswa SMP. Instrumen digunakan penelitian ini adalah soal tes materi pecahan, angket dan lembar observasi. Analisis data menggunakan uji validitas, uji reliabitas, uji normalitas, uji homogenitas, uji wilcoxon dan uji independent sampel t-test. Hasil penelitian ini menyimpulkan bahwa terdapat perbedaan rata-rata minat belajar siswa yang menggunakan soal rutin dan non rutin pada model pembelajaran kooperatif tipe Rotating Trio Exchange.

Kata Kunci: *Minat Siswa; Model Pembelajaran Kooperatif; Rotating Trio Exchange; Soal Rutin vs Non-Rutin.*

Introduction

A student in problem-solving must think, analyze the problem, find a formulation critically according to the problem, examine the formulation data, and try to find a problem-solving strategy that allows getting a solution[1]. The trend of learning in mathematics today is learning that focuses on the active participation of students[2][3]. Students' problem-solving abilities are divided into two: problem-solving abilities on routine questions and problem-solving abilities on non-routine questions[4].

Routine questions generally include the application of a mathematical procedure that is the same or similar to what has just been learned, while in non-routine questions, to include the application of the correct procedure, deeper thinking is required [5][6]. Non-routine problems are more complex than routine problems, so strategies to solve problems may not appear directly and require a high level of creativity and originality from the problem solver[7]. Therefore, the most important goal of learning mathematics should be to build the ability of our students to solve problems[8]. According to Nguyen et al., non-routine questions cannot be solved using known methods and formulas[9]. Solving non-routine problems requires careful analysis, creative effort, and using one or more strategies[10]. According to Rahmawatiningrum et al., solving

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non-routine problems requires higher thinking skills[11]. Non-routine questions are questions that, for a solution, additional reflection is needed because the procedure is not as clear or not as clear as the procedure learned in class.

Teachers often use routine questions in every lesson, and this is inversely proportional to non-routine questions that teachers rarely use because sure students can only solve them. In this study, researchers wanted to familiarize students with using non-routine questions in cooperative learning. The cooperative learning model is a learning model that requires students to learn and work in small groups collaboratively with a heterogeneous group structure[12]. Cooperative learning can improve student learning towards better learning, mutual assistance in some social behaviors, and can increase student interest in learning mathematics[13]. This learning model allows students to fully develop their knowledge, abilities, and skills in an open and democratic learning environment[14]. Students are no longer objects of learning but can also act as tutors for their peers[15].

The Rotating Trio Exchange cooperative learning model developed by Silberman is an in-depth way for students to discuss various problems with several classmates[16]. Silberman states that the Rotating Trio Exchange cooperative learning model is a learning model that can increase students' active participation during learning by optimizing small discussion activities between group members[17]. The Rotating Trio Exchange cooperative learning model is an effective way to change learning patterns in the classroom. This model is student-centered, leading students to interact, express, and express

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their own opinions, discover knowledge, and express it to friends[18]. The rotating Trio Exchange type cooperative learning model is designed to make students active from the start of learning. Students can work together and help each other to build attention, arouse their curiosity, and stimulate students to think[19]. Looking at its characteristics, the advantages of Rotating Trio Exchange cooperative learning can facilitate students to solve problems in the types of routine and non-routine questions.

The research results by Dinç Artut explain that the cooperative learning model involving the completion of non-routine questions has a pleasant effect on students; students are more enthusiastic about learning mathematics[20]. Meanwhile, according to Klang et al., cooperative learning positively impacts student interest and strengthens friendships[21]. Whereas in this study, the researcher wanted to pay attention to students' interests which were not only seen from the Rotating Trio Exchange type of a cooperative learning model but more to the differences in assignments in the form of routine vs non-routine questions.

This study compares students' interest in learning mathematics with routine vs non-routine questions using the Rotating Trio Exchange cooperative learning model. The contribution of this research will provide a reference for prospective teachers and teachers that the selection of appropriate learning models and assignments will impact student learning interest. If students' interest in learning increases, especially in mathematics, it will affect the increase in student understanding.

Method

This research is quasi-experimental. The population of this study was students of SMP Negeri 3 Manipa, Maluku province. The sample of this research was class VII students, with a total of 44 students. The research instruments were test questions on fractional material, questionnaires, and observation sheets. The test item instrument is given as an essay consisting of

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fractional test questions in routine and fractional test questions in the form of non-routine. The two test questions are in the form of story questions.

Data collection was carried out in 3 steps. First, observations are made to see how the teacher's teaching process is by the Learning Implementation Plan. For example, students work in groups in the learning process when the Rotating Trio Exchange type cooperative learning model is applied. Second, the test questions for fractional material aim to see the impact of student learning outcomes from applying the Rotating Trio Exchange cooperative learning model. Third, the student interest questionnaire aims to see student interest after applying routine vs non-routine questions to the Rotating Trio Exchange cooperative learning model.

The results of this study used two statistical techniques, namely descriptive statistics and inferential statistics.

a) Descriptive statistics to determine the value of the independent and dependent variables. In this analysis, a discussion is made regarding comparing the use of routine and non-routine questions in the cooperative learning model of the Rotating Trio Exchange type in increasing students' interest in learning mathematics to find out what is obtained through a questionnaire.
b) Inferential statistics, tested for validity, reliability test; normality test; homogeneity test; and Independent Test Sample t-Test to know differences in students' learning interests using routine vs non-routine questions in the Rotating Trio Exchange cooperative learning model.

Results and Discussion

Researchers collect data from questionnaires for routine and non-routine questions. The results of descriptive statistics from routine questions show that the lowest score of students' interest in learning is 50, the highest score is 80, the average value is 62.63, and the standard deviation is 8.54. While the results of descriptive statistics from non-routine questions show that the lowest student interest in learning is 50, the highest score is 89, the average value is 69.08, and the standard deviation is 11.81.

As a result, before the hypothetical test was performed, the data normality test using the Kolmogorov-Smirnov[a] test was performed using SPSS. The test results show that the Kolmogorov-Smirnov[a] significance value on routine questions is $0{,}200 < \alpha = 0{,}05$, then the data is normal, while the non-routine questions are $0{,}200 > \alpha = 0{,}05$, which is normal.

A homogeneity test is done to find out whether the same thing or not. The homogeneity test was carried out on the questionnaire data on two samples, routine and non-routine questions. The test results show that the significance value is $0{,}055 > \alpha = 0{,}05$, so the distribution is homogeneous.

Validity testing was carried out on questionnaire data. See Table 1.

Table 1. Questionnaire Validity Test

No	r-test	r-table	Description
1	0,185	0,044	Valid
2	0,364	0,044	Valid
3	0,265	0,044	Valid
4	0,369	0,044	Valid
5	0,203	0,044	Valid
6	0,269	0,044	Valid
7	0,217	0,044	Valid
8	0,232	0,044	Valid
9	0,315	0,044	Valid
10	0,322	0,044	Valid
11	0,360	0,044	Valid
12	0,355	0,044	Valid
13	0,086	0,044	Valid
14	0,476	0,044	Valid
15	0,102	0,044	Valid
16	0,572	0,044	Valid
17	0,440	0,044	Valid
18	0,302	0,044	Valid
19	0,441	0,044	Valid

The results of the questionnaire validity test above can be explained that$r_{hitung} > r_{tabel}$ based on the significance value test $\alpha = 0{,}05$, meaning that the items mentioned above are valid. The following table also shows the reliability testing performed on the questionnaire data. See Table 2.

Table 2. Questionnaire Reliability Test

Cronbach's Alpha	N of Items
,740	20

Based on Table 2, the results of the questionnaire reliability test obtained a significance value of $0{,}0740 > \alpha = 0{,}05$, which means that the 20 questions were reliable, so the interest questionnaire is feasible to use.

An independent sample t-test was used to determine whether there was a difference in the average student interest in learning from the two unpaired samples. The test was conducted to fulfill the research objective, which aims to determine the differences in students' interest in learning using questions and non-routine questions in the Rotating Trio Exchange learning model. In this case, we can find out the difference in the results of routine and non-

routine questions. Independent test data from the t-test sample were assisted using SPSS. See Table 3.

Table 3. Results of Independent Sample T-Test on Routine and Non-Routine Questionnaires

		Levene test for equality of variances		T-test for equality of means						
		F	Sig.	T	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Angket Soal Rutin_Non Rutin	Equal variances assumed	3,884	,055	-2,075	42	,044	-6,45455	3,11014	-12,73106	-,17803
	Equal variances not assumed			-2,075	38,253	,045	-6,45455	3,11014	-12,74933	-,15976

Table 3 show that the significance value (2-tailed) is $0{,}044 < \alpha = 0{,}05$, so, H_O is rejected. Thus, it can be concluded that there is a difference in the average learning interest of students who use routine and non-routine questions in the Rotating Trio Exchange cooperative learning model.

In this study, which was conducted to determine students' learning interests based on cooperation in the Rotating Trio Exchange cooperative learning model on non-routine problem solving, it was found that working in cooperative-based groups was effective on non-routine problem-solving skills. This finding is by the literature findings[22][23], which suggest cooperative learning methods are effective in teaching mathematics. Simamora emphasized that students generally improve their problem-solving skills when learning mathematics in groups based on cooperation[24]. They can solve more abstract

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problems and improve their mathematical understanding. Non-routine problems require more critical thinking and creativity[25]. Cooperative problem-solving is useful for practicing new problem concepts that require discussion and higher-order thinking skills[26]. Hence, it is possible to conclude that participating in cooperative groups supports solving these problems. Similarly, students in group experiments showed better problem-solving performance[27].

According to Mastuti et al., the tendency to learn mathematics today is learning that focuses on active participation[28]. Routine problems generally involve applying identical or similar mathematical procedures to problems that are not studied, while in routine problems, achieving a good procedure requires more reflection[29]. So the strategy to solve the problem may not appear immediately and requires a high level of creativity and originality in problem-solving[3031]. Therefore, the most important goal of learning mathematics is to strengthen the ability of our students to solve problems[32]. Interest in learning is an individual machine to carry out learning activities to increase knowledge, skills, and experience. According to Azmidar et al., interest in learning has an important direct role, especially in mathematics[33].

The learning process coincides, and teacher and student observations are also carried out. The teacher's observation process is carried out by researchers with the observer's (colleagues') assistance. The results of the preliminary activity are known; namely, the researcher opens the lesson with greetings, the researcher prepares the students to pray and takes attendance,

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the researcher gives appreciation, the researcher gives motivation, and the researcher conveys the learning objectives. The results of the core activities are known; namely, the researcher poses basic questions, the researcher organizes students into several groups, the researcher does not facilitate students to make an activity schedule that refers to the agreed maximum time, the researcher monitors student activities while completing the project, the researcher does not conduct an assessment during monitoring carried out by referring to the assessment rubric and the researcher evaluates the students at the end of the lesson. The closing activity results were known; the researcher guided the students to conclude, ended the learning activity by giving a message to keep learning, and asked the students to pray and closing greetings.

After completing the teaching and learning activities, the researcher conducted a post-test to find students' interest in learning using the Rotating Trio Exchange learning model about routine and non-routine questions. According to two classes that were taught using the Rotating Trio Exchange cooperative learning model in routine and non-routine questions in this study, the researchers measured student interest in learning. Using the Rotating Trio Exchange cooperative learning model in routine questions with a total of 22 students, 15 students (68.13%) won a very good rating (A), four students (18, 18%) won a good score (B), three students (13.64%) obtained a sufficient record (C). The results of the post-test descriptive statistics showed that the lowest score was 60, the highest score was 100, the mean value was 82, and the standard deviation was 11.38. Meanwhile, in using the Rotating Trio Exchange cooperative learning model in non-routine questions with a total of 22 students, ten students (45.45%) won a very good rating (A), nine students (40.91%) got a good rating and a good rating. (B), Three students (13.64%) obtained sufficient notes (C). The statistical results of the descriptive post-test showed that the lowest score of students' interest in learning was 64, the highest score was 100, the average score was 77.27, and the difference was 9.47. Based on the hypothetical test results, it was carried out using the Wilcoxon test and the independent sample t-test. The Wilcoxon test result is a significance value (2-tailed) lower than $< \alpha = 0.05$, so, Ho is rejected. Thus, it can be concluded that there are differences in the Rotating Trio Exchange cooperative learning model using routine and non-routine questions.

The descriptive statistics on routine questionnaires show that the lowest score of students' interest in learning is 50, the highest score is 80, the average value is 62.63, and the standard deviation is 8.54. While the results of descriptive statistics on non-routine questionnaires show that the lowest student interest in learning is 50, the highest score is 89, the average value is 69.08, and the standard deviation is 11.81. The results of the independent test

sample t-test significance value (2-tailed) are $0.044 < \alpha = 0.05$, therefore Ho is rejected. Thus, it can be concluded that there is a difference in the average interest in student learning using non-routine routine questions in the Rotating Trio Exchange type cooperative learning model.

Conclusion

The learning interest of students using routine vs non-routine questions using the Rotating Trio Exchange cooperative learning model is known through the test results of the student interest questionnaire data test. In the class that used routine questions, the average value of students' learning interest was 62.63, while in the class that used non-routine questions, the average value of students' learning interest was 69.08. Furthermore, the independent sample t-test show that the significance value (2-tailed) is 0,044 $< \alpha = 0{,}05$. Thus, it can be concluded that there is a difference in the average learning interest of students who use routine vs non-routine questions in the Rotating Trio Exchange type of cooperative learning model.

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