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The influence of Think-Pair-Share (TPS) cooperative learning methods on the results of studying physics assessed from student attention

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Abstract. The purpose of this study was to see the effect of the TPS Cooperative learning method on physics learning outcomes in terms of student attention. The research method used was an experimental method. One group was used as the experiment group, namely the physics treatment with the TPS model, While the other group as a control group treated with a model of learning physics discussion. From each group then divided into groups that have high activity and low activity. Based on the results of the analysis, it can be ignored that there is no significant interaction effect between the TPS cooperative learning method and attention to physics learning outcomes. This can be proven where F_count < Ftable (3.289 <4.11) at a very significant level of 5%. which means that there is no significant effect between the Think-Pair-Share cooperative learning method with student attention. So that the Think-Pair-Share cooperative learning method is not appropriate to use to assess the level of student attention.

Introduction

Learning is a complex activity [1]. The complexity of the study can be viewed from two subjects, namely of students and lecturers [2]. From a student perspective, learning is experienced as a process, student experience a mental process in dealing with learning materials. From the lecturer's point of view, the learning process appears as learning action about something. Considering the importance of physics in various fields of human life [3][4], it is necessary to pay attention to the quality of teaching physics courses such as mechanics, modern physics, basic physics, etc. To acquire physics, students must take a good learning process [5][6].

Observations researchers for conducting research teaching and learning on students at a university in Jakarta still use the model learning lectures that faculty be controlling center of learning, and an active student who representing his friend, so that only a few students were able to grow and be able to express his opinion. Actually, in this condition, the lecture method not entirely unfavorable if applied in learning. In other words, each learning method has its own advantages and disadvantages

[7][8]. However, with the understanding and application of methods, models and different approaches will provide a new feel for the students in a situation of learning [1][9].

In addition, students still do not have the courage to express their opinions, and the monotonous learning conditions cause students to be less active and less interested in the learning process. This will affect the lack of attention and student achievement, especially in pure physics subjects [10]. One way to obtain good physics knowledge and overcome weaknesses in the learning process is to apply the Think-Pair-Share (TPS) model. The learning model is designed to influence student interaction patterns with family groups to formulate answers to questions that have been raised by the lecturer [11]. The interactions that occur during learning can increase motivation and provide stimulation to think so that it is very useful in the learning process.

The TPS learning model is an effective way to vary the atmosphere of class lecture patterns [12]. Assuming that all recitations or lectures require arrangements to control the class as a whole, and the procedures used in TPS can give students more time to think, respond, and help each other. The strategy used in TPS is to exchange ideas in pairs. This is consistent with the understanding of this learning model itself that the TPS is learning that gives students the opportunity to work independently and in collaboration with others [13][14].

In this case, lecturers play an important role in guiding students in conducting intimate lectures, so as to create a more lively, active, creative, effective, and enjoyable learning atmosphere. That through this learning model, students can directly resolve the problem, understand the collection of material and help each other, to draw conclusions about the results of the course and present it to the class as one of the measures for evaluating the learning activities that have been implemented. This shows that the use of cooperative learning model TPS is an effort to improve student learning outcomes, especially in physics. The purpose of this study was to determine the effect of the Think-Pair-Share (TPS) type of cooperative learning method on learning outcomes of physics as assessed by students' attention.

2. Method

In this research used experimental method is to give different treatment to two groups of student learning. One group was used as the experimental group, the treatment given to physics teaching model Think-Pair-Share (TPS), while the other group as a control group treated with a discussion of physics teaching model. From each group then divided into students who have high student activity and low student activity.

This research design was made to make it easier to understand the researcher's report and is expected to provide a clear picture using the experimental method with a 2 x 2 factorial design as follows:

Table 1. Research design

Student attention	Learning methods	
	Think-Pair-Share (TPS) X_1	Discussion X_2
High student attention Y_1	X_1Y_1	X_2Y_1
Low student attention Y_2	X_1Y_2	X_2Y_2

X_1Y_1 : High student attention using the Think-Pair-Share (TPS) method
X_2Y_1 : High student attention using the discussion method
X_1Y_2 : Low student attention using the Think-Pair-Share (TPS) method
X_2Y_2 : Low student attention using the discussion method

This research was conducted at a tertiary institution in Jakarta with a sample size of 80 fourth semester students consisting of two classes with 40 students in each class. Each class in this study contained four groups with different levels and types of learning methods.

3. Result and Discussion

Based on the results of data collection using tests on the use of the Think-Pair-Share (TPS) cooperative learning method and using a questionnaire on the attention of students at one of the universities in Jakarta, the researcher will describe the research data which are grouped into three parts consisting of data on independent variable 1, namely the use of the TPS cooperative learning method or what is commonly referred to as the X1 variable, 2 independent variable data, namely student attention or what is commonly referred to as the X2 variable, and the dependent variable data, namely the learning outcomes of physics learning or commonly called the Y variable.

Students who became respondents were 40 students who were taught with the TPS cooperative learning method and received high and low attention from class VIII-7 and 40 students who were taught using the discussion method received high and low attention from class VII-3. The 40 students are a source of data that is estimated to represent the existing population. Furthermore, the respondent is given a and then analyzed for a test based on data analysis techniques. Before testing the hypothesis, it is necessary to test the normality of the data in each class to determine whether the two classes are normally distributed. Homogeneity testing will be conducted to determine whether these two classes of homogeneous.

The first data analysis requirement test is the normality test. The test used was the Liliefors test which was carried out on 8 groups of data, namely data groups X_1, X_2, Y_1, Y_2, X_1Y_1, X_1Y_2, X_2Y_1, and X_2Y_2. From each of these data groups, the calculated L value is sought. also determine the value of L table. For the data group, amounting to 20 respondents and using a significant level of 5% obtained L table = 0.190. Meanwhile, for the data group with a total of 10 respondents and using a significant level of 5%, it is obtained L table = 0.258. To determine whether the data group is normal or not, it is determined based on the test criteria, namely if the value of L count <L table then the data is normally distributed and if the value of L count> L table then the data is not normally distributed.

a. Test data liliefors X1
    Based on the results of calculations in the table, the value of L count = 0.152, while from the Liliefors table for α = 0.05 and n = 20, the value of L table = 0.190 is obtained. Because the value of L count <L table, the data or samples are normally distributed.

b. Test data liliefors X2
    Based on the results of calculations in the table, the value of L count = 0.1495 is obtained, while from the Liliefors table for α = 0.05 and n = 20, the value of L table = 0.190 is obtained. Because the value of L count <L table, the data or samples are normally distributed.

c. Test data liliefors Y1
    Based on the calculation results in the table, the value of L count = 0.159 is obtained, while from the Liliefors table for α = 0.05 and n = 20, the value of L table = 0.190 is obtained. Because the value of L count <L table, the data or samples are normally distributed.

d. Y2 data liliefors test
    Based on the results of the calculations in the table, the value of L count = 0.115 is obtained, while from the Liliefors table for α = 0.05 and n = 20, the value of L table = 0.190 is obtained. Because the value of L count <L table, the data or samples are normally distributed.

e. Test data liliefors X1Y1
    Based on the results of the calculations in the table, the value of L count = 0.142, while from the Liliefors table for α = 0.05 and n = 10, the value of L table = 0.258. Because the value of L count <L table, the data or samples are normally distributed.

f. Test data liliefors X1Y2
    Based on the results of the calculations in the table, the value of L count = 0.188 is obtained, while from the Liliefors table for α = 0.05 and n = 10, the value of L table = 0.258 is obtained. Because the value of L count <L table, the data or samples are normally distributed.
g. Test data liliefors X2Y1
    Based on the results of the calculations in the table, the value of L count = 0.203, while from the Liliefors table for α = 0.05 and n = 10, the value of L table = 0.258 is obtained. Because the value of L count <L table, the data or samples are normally distributed.
h. Test data liliefors X2Y2
    Based on the calculation results in the table, the value of L count = 0.141, while from the Liliefors table for α = 0.05 and n = 10, the value of L table = 0.258 is obtained. Because the value of L count <L table, the data or samples are normally distributed.

The next requirement is data homogeneity testing. The homogeneity test of research data was carried out through the F test (Fisher) and the Bartlett test from the group learning outcomes, namely the learning outcomes of students who were taught using the Think-Pair-Share (TPS) cooperative method and the discussion method and the data of students who had high attention and low attention. The results of the calculation of the analysis of variance in the table above obtained F count = 1.387, while the value from the distribution table F with α = 0.05 and n = 40 obtained F table = F (0.05, 1, 20) = 2.168, so F count smaller than F table. This shows that Ho is accepted with a significant level of 0.05 and it can be concluded that the two data have the same or homogeneous variants.

Table 2. Descriptive Statistics for Two-Way ANOVA

Student activity	Providing Learning Methods		
	TPS	discussion	Total
High	$N_{11} = 10$	$N_{12} = 10$	$1_{10} = 20$
	$\bar{Y}_{11} = 79$	$\bar{Y}_{12} = 76{,}5$	$\bar{Y}_{10} = 77.75$
	$\sum Y_{11} = 790$	$\sum Y_{12} = 765$	$\sum Y = 1555$
	$\sum Y^2 = 63150$	$\sum Y^2 = 59475$	$\sum Y^2 = 122625$
Low	$N_{21} = 10$	$N_{22} = 10$	$N_{20} = 20$
	$\bar{Y}_{21} = 75$	$\bar{Y}_{22} = 69$	$\bar{Y}_{20} = 72$
	$\sum Y_{21} = 750$	$\sum Y_{21} = 690$	$\sum Y = 1440$
	$\sum Y^2 = 56600$	$\sum Y^2 = 48000$	$\sum Y^2 = 104600$
Total	$N_{01} = 20$	$N_{01} = 20$	$N_{00} = 40$
	$\bar{Y}_{01} = 75$	$\bar{Y}_{01} = 71{,}25$	$\bar{Y}_{00} = 74.875$
	$\sum Y = 1500$	$\sum Y = 1425$	$\sum Y = 2995$
	$\sum Y^2 = 116200$	$\sum Y^2 = 103575$	$\sum Y^2 = 227225$

The data is then processed to get a summary table, hypothesis testing using two-way ANOVA as Table 3. From table 3 interaction (I) the two-way ANOVA summary table, it is obtained that the price of F count <F table (3.289<4.11) then H0 is accepted and it is concluded that there is no significant interaction effect between the use of the Think-Pair-Share (X) learning method and student's attention (Y) to physics learning outcomes.

The results of hypothesis testing obtained F count (I) <F table (I) at a significant level of 5%. This means that in the test receiving H0 it is accepted and it is concluded that there is no significant interaction effect between the use of the Think-Pair-Share (X) learning method and students' attention (Y) on physics learning outcomes. This can also be seen from the results of the descriptive analysis in which groups of students who have high student attention and are taught using the Think-Pair-Share cooperative learning method obtained a mean of 79 and groups of students who have low student attention and are taught using the Think-Pair cooperative learning method. -Share the mean 75. While

the group of students who had high student attention and were taught by the discussion method obtained a mean of 76.6, and the group of students who had low student attention taught by the discussion method obtained a mean of 69. From these results it can be concluded that there is no significant interaction effect between the methods. Think-Pair-Share cooperative learning with attention to physics learning outcomes.

Table 3. Hypothesis testing

Source of Variance	Db	JK	RJK [s^2]	F_h	F_t 0.05
Inter-column [AK]	1	250.625	250.625	4.114602335	4.11
between rows [AB]	1	330.625	330.625	5.427991609	4.11
Interaction [I]	1	200.325	200.325	3.288808829	4.11
between groups [A]	3	781.575	260.525	4.277134258	4.11
In Group [D]	36	2192.8	60.91111111	-	-
Total in Reduction [TR]	39	2974.375	-	-	-
Average / Correction [R]	1	224250.63	-	-	-
Total [T]	40	227225	-	-	-

Conclusion

Based on the discussion, it can be concluded that there is no significant interaction effect between the Think-Pair-Share cooperative learning method and attention to physics learning outcomes. This can be proven where F count < F table (3.289 < 4.11) at a very significant level of 5%, which means that there is no significant effect between the Think-Pair-Share cooperative learning method with student attention. So that the Think-Pair-Share cooperative learning method is not appropriate to use to assess the level of student attention.

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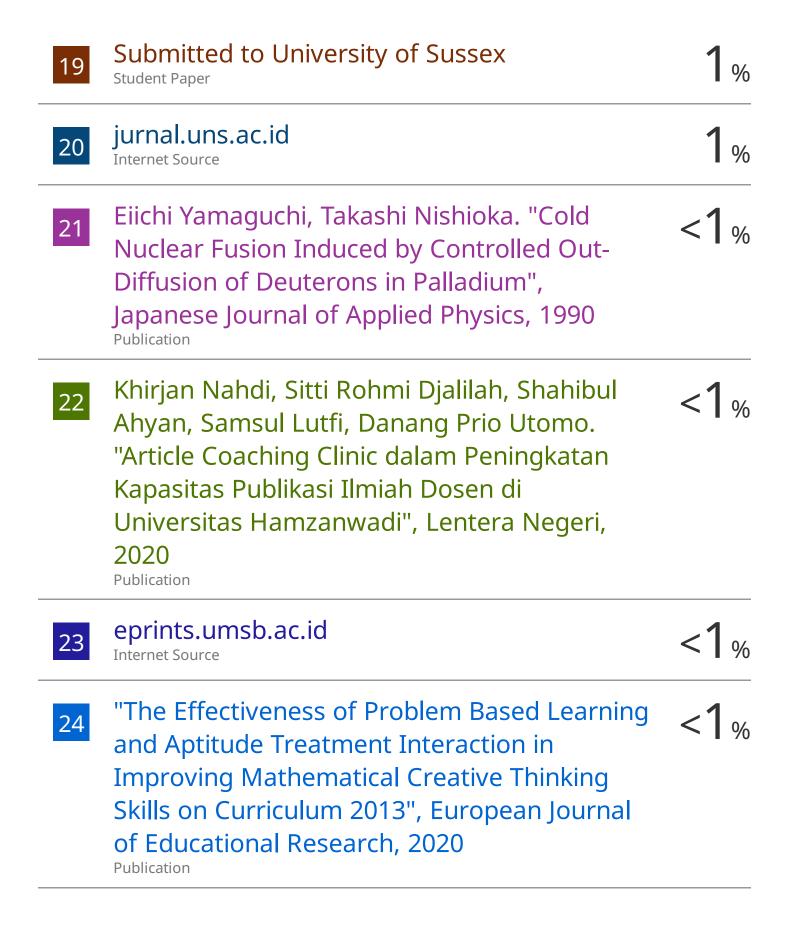
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