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The Influence of The *Jigsaw* Type Cooperative Learning Model on Students' Critical Thinking

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Abstract
This study aims to analyze the effect of the *jigsaw* type cooperative learning model on students' critical thinking skills, and see how big and positive or negative the influence that occurs between the two variables. This research uses a quantitative approach method of true experimental type. by using the Pretest-Posttest Control Group Design research design. The population of this study was all class VIII MTs Tarbiyah Islamiyah consisting of 2 classes totaling 55 students. The sample used was class VIII-b as many as 30 students. the sampling technique used was random sampling technique. Data were collected through test questions on SPLDV material before and after treatment of the jigsaw learning model. The data were analyzed using parametric statistical tests, namely simple linear regression tests with SPSS 22.0 The results of the analysis showed that the Sig.2 (2-tailed) value was 0.040 and 0.040 < 0.05, meaning that there is a significant influence between the influence of the Jigsaw learning model on students' critical thinking abilities.

Keywords: jigsaw, critical thinking

1. Introduction

Education is a major factor in the aspects of progress and development in a nation, therefore the quality of education is the only interesting topic to discuss in the world of education. As explained in article 20 paragraph 1 of the Law on education in 2013, namely Education is conscious and planned to create an environment and learning process that allows students to actively develop potential strength, mastery, and social, national, and religious skills. The purpose of education is "to create someone who has quality and character so that they have a broad view of the future to achieve an expected goal". There are many branches of education that are studied in life, one of which is mathematics.

Mathematics is one of the fields of education that aims to develop the ability to think logically, analytically, critically, systematically and creatively in solving an existing problem (Pasaribu, 2021). Mathematics plays a very important role in the lives of students, both directly and indirectly. Mathematics can train students' critical thinking power in dealing with mathematical problems that need to be solved, on the other hand, solving a mathematical problem also requires students' critical thinking power (Purwaningsih & Harjono, 2023). Mathematics is the subject that students dislike the most, because it is often considered a very difficult subject. (Yandry, 2018). One of the

difficulties students have in solving math problems is due to the lack of students' ability to think critically in solving these problems.

Students' critical thinking skills in mathematics have a close relationship so that it is needed to understand problems and solve math problems. Critical thinking is a high thinking skill that can increase the critical analysis power of a learner (Saputra, 2020)). Critical thinking skills are a skill to carry out activities or cognitive processes and mental actions to gain knowledge, understanding and skills in order to be able to find a way out and make decisions deductively, inductively and evaluatively according to the stages carried out by thinking deeply about things that can be reached.

The indicators in students' critical thinking skills are: (1) interpretation, namely the ability to understand, explain and give meaning to data or information, (2) Analysis / Idea Finding, namely the ability to identify the relationship of information used to express thoughts or opinions, (3) Evaluation, using the right strategy in solving problems, complete, and correct in performing calculations, (4) Self-regulation, namely a person's ability to regulate his thinking. Critical thinking helps students to develop effective strategies in dealing with various types of problems, both in mathematics and in everyday life.

One of the causes of a student's weak critical thinking skills is due to lack of systematic thinking skills and lack of critical recognition of basic mathematical concepts (axioms, definitions, theorems) related to the mathematics topic being discussed. The teaching and learning process in class requires active involvement from students, but in reality it still shows a different trend. In the mathematics learning process, there is still a tendency to minimize the role and involvement of active learners. The dominance of educators in the learning process causes students to be passive. In the classroom usually most often educators teach with conventional learning models. (Arrasyid) said that this conventional learning model causes students to be less active in the learning process, easily bored, and less enthusiastic about the concepts conveyed by the teacher.

The shortcomings of conventional learning models are not only due to the lack of student activeness in the teaching and learning process, but also because learning models that tend to be monotonous, such as lectures, can make students feel bored and less motivated. These shortcomings can have impacts such as: Decreased learning motivation causes students to be less motivated to learn because they feel learning is less interesting and relevant, learning achievement is not optimal due to lack of understanding of concepts that can hinder the achievement of optimal learning achievement, and difficulty dealing with new problems because students lack the skills to deal with new problems that have never been studied before.

The results of previous research (Aminah., 2022; Kahar., 2020) show that most educators still use conventional learning methods, namely the lecture method in teaching and learning process activities which cause learning to be monotonous which makes students not have curiosity and low critical thinking skills. One of the efforts made by educators to make the teaching and learning process activities in the classroom more enjoyable is to use a learning model that can involve student learning activities to improve their critical thinking skills, namely the cooperative learning model.

(Reynaldi, 2022) said that the cooperative learning model is considered good to help students learn in groups, exchange ideas, work on math problems together and can motivate students. One

of the learning models that can be used is the jigsaw type cooperative learning model. The jigsaw learning model is one of the cooperative learning approaches that is considered effective in improving various cognitive aspects of students, including critical thinking skills. The jigsaw learning model is one of the cooperative learning methods that is very effective in improving students' understanding of a subject matter. This model is designed to encourage students to actively interact, share knowledge, and be responsible for group learning. From the above understanding, it can be concluded that to improve students' critical thinking skills, a jigsaw-type cooperative learning model can be used. This is because by using the jigsaw type cooperative learning model, students are It is possible to be actively involved in the learning process so that it has a positive impact on students' critical thinking skills.

2. Methods

2.1 Research type and research design

According to the approach, this research uses quantitative research which is useful for knowingstudents' critical thinking skills in understanding mathematics material, Thus, the type of research carried out by researchers is experimental research. This research uses a pre-experimental method with the aim of analyzing the influence of one variable on another variable, using a pretest-posttest control group design.

According to Sugiyono (2008: 113) that The Pretest-Posttest Control Group design involves two groups being given a pretest to measure baseline conditions and determine differences between the experimental and control groups. In this design, two groups are selected at random and then given apretest to assess whether there are differences between the two groups. After that, both teams were given treatment. The first group is the group with treatment, namely by using the jigsaw type cooperative study model (experimental group) and the second group is the group with the discussion method learning approach (control group) the method that has been used in the class. After the treatment,both groups were given a posttest.

The design can be described as follows.

Table 1. Experimental Design

Team	Pretest	Action	Posttest
practice	O_1	X	O_2

Description:

X= The games provided use the Jigsaw type cooperative learning model.

O_1= Pretest score

O_2= Posttest score

2.2 Population and Sample

The population of this study includes all students in class VIII MTs Tarbiyah Islamiyah, which consists of two classes, namely VIII-A and VIII-B:

Table 2. Total Population

No.	Class IX	total students.
1	VIII-A	25
2	VIII-B	30
	Total	55

This research used a sample of 30 students from class VIII-B who were selected using random sampling techniques. According to Sugiyono (2017), Simple Random Sampling is a method of selecting samples randomly from the population without considering certain criteria, so that each member of the population has the same opportunity to be selected. In this research, one of the experimental classes used the Jigsaw type cooperative learning model.

2.3 Data collection techniques

a) Observation

Observation is a method used to observe student and teacher activities during the learning process.

b) Test

Test is a method used to collect data by giving tests to the object under study.

2.4 Research instrument validity technique

2.4.1 validity test of test questions

Validity testing is the process of determining whether the data obtained after research is truly valid or not, using the measuring instruments that have been prepared. This test functions to demonstrate the validity or suitability of questionnaires and test sheets used by researchers in collecting and measuring research data from respondents.

Test questions are considered valid if:

• A question is considered valid if the calculated r value is greater than table r.

• A question is considered invalid if the calculated r value is smaller than the table r.

Table 3. Critical thinking validity

Question no.	R Table	R count	Details
1	0,752	0.361	true
2	0,627	0.361	true
3	0,638	0.361	true
4	0,565	0.361	true
5	0,831	0.361	true
6	0,869	0.361	true
7	0,606	0.361	true
8	0,662	0.361	true
9	0,859	0.361	true
10	0,829	0.361	true

2.4.2test reliability of test questions

Reliability testing is testing carried out to ensure that the measuring instrument used can provide consistent results in measuring the same symptoms. Reliability testing aims to determine whether the question sheets show consistency when measurements are carried out repeatedly. The basisfor taking the *Cronbach alpha* reliability test.

A question is declared reliable if the Cronbach alpha value exceeds 0,6.

Table 4. Table of Reability Calculation Results Using *SPSS 22.0*

Statistical reliability

Cronbach's Alpha	N of Items
.902	10

From the output table of the critical thinking question sheet reliability test, it can be seen that the *Cronbach's Alpha* value or if r-count> *r-table* is 0.902>0.60 so that the 10 test questions are declared reliable.

3. Result and Discussion

3.1 Results

In the research conducted, the method used was a test. The data collected by researchers is used To measure students' critical thinking abilities in mathematics lessons.. The first step in collecting datais by teaching with a conventional learning model to students, then giving a pretest question sheetabout *spldv* material to be answered by students. On a different day, researchers taught with adifferent learning model, Namely, a Jigsaw type cooperative learning model for students. then gavepost test questions in the form of the same questions as the previous pretest for students to answer.

To see whether there is an influence between variables X and Y, it is necessary to carry outthe following prerequisite tests:

a. Normality test

The Kolmogorov Smirnov normality test is part of the classic assumption test. This normality test aims to determine whether the residual value is normally distributed or not. A good regression model is to have normally distributed residual values. The method used in testing data normality is using SPSS 22.0.

The following are the results of the Kolmogor Smirnov normality test using the help of SPSS 22.0

One-Sample Kolmogorov-Smirnov Test

		Residues without standardization
N		30
Normal Parameters[a,b]	Has meaning	.0000000
	Std. Deviation	4.71730232
The most significant difference	also	.148
	true	.130
	false	-.148
Test Statistic		.148
Asymp. Sig. (2-tailed)		.093[c]
a. Normal distribution test		
b. Based on data		
c. Lilliefors Significance Correction.		

After conducting a normalitytest using SPSS 22.0, it shows that the significance value is shows that the significance value is 0.093. Based Based on the normality test decision

above, it is said that the significance value is greater than 0.05. **0.093> 0.05**, so the distribution is to be normal. The results using SPSS 22.0 above state that **normal**.

b. Homogeneity test

The homogeneity test is a test that aims to see the two classes tested have the same basic abilities first tested for equality of variance. The following are the results of the homogeneous test using the help of SPSS 22.0

Test of Homogeneity of Variances

Student learning achievement

Levene Statistic	df1	df2	Sig.
3.029	1	58	.087

After conducting the homogeneity test using SPSS 22.0 above, a significant value of 0.087 was obtained. The homogeneity test results show that the data is considered normal if the significance value is more than 0.05. The results of this homogeneity test using SPSS 22.0. Then it can be concluded that the variance between groups is the same or homogeneous.

c. Hypothesis Testing

To determine the effect of the jigsaw learning model on students' critical thinking skills, it is done by using the Simple Regression Coefficient test (p-value), the test is used to determine whether the independent variable (X) has a significant effect on the dependent variable (Y). This test is used to make a decision whether the hypothesis is accepted or rejected.

The basis for decision making in the simple regression test can refer to two things, namely:
- If the significant value <0.05 means that variable X has an effect on variable Y
- If the significant value> 0.05 means that variable X has no effect on variable Y

The results of hypothesis testing using SPSS 22.0 are as follows:

ANOVA[a]

type		Addition of squares	df	Squared mean	F	Sig.
1	Linear relationship	106.531	1	106.531	4.622	.040[b]
	Residuals	645.335	28	23.048		
	Total	751.867	29			

a. Dependent Variable: CRITICAL THINKING

The results of a simple regression test show that the significance value is 0.04, which is smaller than 0.05, so it can be concluded that there is a significant influence between variable X

and variable Y. Data analysis using SPSS 22.0 strengthens this result, which shows that the application of the learning model Jigsaw type significantly influences students' critical thinking abilities.

3.2 Discussion

Based on the quantitative analysis conducted, it can be concluded that the jigsaw learning model has a significant influence on students' critical thinking skills. the results of the analysis are in accordance with those conducted by Aminah (2022) and Kahar (2020) who stated that the conventional learning model of the lecture method is a less effective learning model to improve critical thinking skills, and the jigsaw learning model is a suitable learning model to improve students' critical thinking skills in the teaching and learning process. because the jigsaw learning model requires students to encourage discussion and exchange of ideas and build a sense of individual responsibility. therefore the jigsaw learning model is a cooperative learning model that can improve students' critical thinking skills.

As an implication of this research, teachers are expected to be able to leave conventional learning models that make students feel bored and start using learning models that tend to be interesting and not boring in the learning process such as the jigsaw learning model.

4. Conclusion

The findings of this study indicate a significant positive impact of implementing the jigsaw cooperative learning model on students' critical thinking skills. This conclusion is supported by the higher post-test scores compared to the pre-test scores. The pre-test was administered before the implementation of the jigsaw model, while the post-test was given after the intervention. The significant difference in scores suggests an improvement in the quality of learning. Specifically, the jigsaw model has proven effective in enhancing students' critical thinking skills, particularly in the context of SPLDV. The results of a simple regression analysis, with a significance level of 0.040, further support this finding. Since 0.040 is less than the significance level of 0.05, the null hypothesis (H_0) is rejected, and the alternative hypothesis (H_1) is accepted. Based on these results, it is recommended that educators at all levels consider adopting and adapting the jigsaw learning model to optimize student learning and critical thinking development."

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