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A Comparative study: Cooperative Learning in Science Learning

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Abstrak

Diperlukan model pembelajaran yang sesuai dalam pembelajaran IPA di tingkat sekolah menengah pertama. Hal ini sangat penting bagi pendidik untuk dapat menentukan model pembelajaran yang tepat dalam kegiatan pembelajaran. Oleh karena itu, penelitian ini bertujuan untuk menganalisis respon siswa terhadap model pembelajaran jigsaw dan STAD di SMPN dan MTsN serta membandingkan respon siswa terhadap model pembelajaran jigsaw dan STAD pada mata pelajaran IPA di SMPN dan MTsN. Jenis penelitian ini adalah penelitian kuantitatif kuasi eksperimen dengan membandingkan 8 kelas yang menggunakan model jigsaw dan STAD dalam pembelajaran IPA. Penelitian ini dilaksanakan di 4 sekolah yaitu 2 SMP dan 2 MTs dengan jumlah siswa setiap kelas 35 siswa, jumlah siswa 280 siswa. Dalam analisis data menggunakan SPSS 26. Berdasarkan hasil uji T yaitu nilai sig. (2-tailed < 0,05) dapat dikatakan bahwa terdapat perbedaan respon siswa terhadap model pembelajaran Jigsaw dan STAD pada mata pelajaran IPA di SMP/MTs.

Kata kunci: *Jigsaw, STAD, Ilmu Pengetahuan Alam*

Abstract

A suitable learning model is needed in learning science at the junior high school level. Educators need to be able to determine the appropriate learning model for learning activities. Therefore, this study aims to analyze student responses to jigsaw and STAD learning models in SMPN and MTsN and to compare student responses to jigsaw and STAD learning models in science subjects at SMPN and MTsN. This type of research is quasi-experimental quantitative research by comparing 8 classes that use the jigsaw and STAD models in science learning. This research was carried out in 4 schools, namely 2 SMP and 2 MTs with the number of students in each class of 35 students, the number of students being 280 students. In data analysis using SPSS 26. Based on the results of the T-test, namely the value of sig. (2-tailed <0.05) it can be said that there are differences in student responses to the Jigsaw and STAD learning models in science subjects in SMP/MTs.

Keywords: Jigsaw, STAD, Science

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1. INTRODUCTION

Education has a very important role in the survival of life. Education is an effort to develop the potential of human resources through teaching activities to build or form humans who know (Ratnasari et al., 2017; Taofiq et al., 2018; Usman Fauzan & Aldila Afriansyah, 2017). Education is an effort from humans to be able to gain knowledge and skills where education is useful for developing student intelligence consisting of intellectual, spiritual, emotional, and kinesthetic intelligence to fulfill their survival (Kartikasari et al., 2018; Prihatini, 2017; Wirantasa, 2017). The success of a nation's education automatically also shows the progress of a nation where good education becomes an investment and a means to produce quality human resources. For that national education requires that an educator must have various kinds of professional competence skills (Kurniawan et al., 2019; Pahlevi et al., 2018; Zuhara et al., 2019). Education must be able to produce quality human resources for that an educational process must be made as much as possible.

One of the educational processes that have a major influence on the results of qualified and potential human resources is learning and teaching activities (learning). There

are many learning models scattered in the school environment, factors that support the quality of learning. One of which is adequate learning resources and media, one of the principles that teachers need to consider in managing learning so that it can provide a learning experience for students in developing science and technology (Alfiriani & Hutabri, 2017; Banggur et al., 2018; Wulandari & Mustadi, 2019). Learning is a complex process that is influenced by many factors, the learning process must pay attention to all aspects of learning including teaching materials to be delivered and students as learning subjects, meaning that educators control learning (Mukti & Nurcahyo, 2017; Rusmono & Alghazali, 2019; Yurdakul, 2017). Students are part of learning and teachers using a scientific approach can make learning more active and less boring, and changes in our experience also change the way the brain thinks (Demirci & Akcaalan, 2020; Mulia et al., 2019; Wibowo, 2017).

One of the learning models used in the jigsaw and the STAD model. The jigsaw learning model is a learning model that emphasizes heterogeneous group members (Kamaruddin & Yusoff, 2019; Kumar et al., 2017; Riyanto, 2019). The Jigsaw type is designed to increase students' sense of responsibility toward their learning and the learning of others (Kisaran, 2018; Kusuma, 2018; Wati & Anggraini, 2019). The Jigsaw method is an innovative and cooperative teaching and learning method because it involves the active participation of students, focuses on the cooperation of fellow students and ensures teamwork (Nurbianta & Dahlia, 2018; Sharma et al., 2019). One of the cooperative learning models that produce individual responsibility and focus on achieving team goals is Jigsaw.

A suitable learning model is needed in learning science at the junior high school level. STAD cooperative learning has important implications in science learning which emphasizes the importance of collective activities. Student Worksheet Development using the STAD-cooperative type is assumed to be able to help problem learning solutions (Kim, 2018; Rahayu et al., 2017). A review of the literature shows that STAD has been used in various subjects the reason for using the STAD type of learning model is because the simplest learning model is suitable for educators who just apply cooperative learning (Elpisah & Bin-Tahir, 2019; Jahanbakhsh et al., 2019; Nuayi et al., 2018). For this reason, educators need to be able to determine the appropriate learning model for learning activities.

This research is in line with previous research conducted by the previous study which states that the jigsaw cooperative learning model is a learning model that can invite students to think actively and creatively in the learning process. In his research, he discussed the jigsaw model in science lessons (Soedimardjono & Pratiwi, 2021). However, in his research, no comparison has been made between the jigsaw and STAD models. In his research, he only discussed one model variable, namely the jigsaw. The research sample used was still small in size, namely 1 school, and this research was only conducted at the elementary school level. This research is also in line with other previous research that, used a small sample of 20 students in 6th-grade elementary school to conduct research. In this previous study, comparative tests have not been carried out for the learning model or still use one variable (Nair, 2018). So that in this study, research was conducted using a fairly large sample, namely in four schools with two classes in each school with the number of students in each class being 35 students. And in this study, researchers conducted research at the SMP and MTs levels to see the effect and comparisons and descriptions in each school with the Jigsaw and STAD learning model variables.

This research was carried out because previously no one had researched the jigsaw learning model and the STAD learning model for science subjects at SMP Negeri MTs Negeri. So from this explanation, the researcher aims to conduct research on the jigsaw and STAD learning models in science subjects in SMP and MTs with a large enough sample. The aim is to analyze and compare student responses to jigsaw in science subjects at SMP Negeri MTs Negeri and learning models STAD in science subjects at State Junior High Schools.

Then this study conducted to analyze the differences in student responses to the jigsaw learning model and STAD in State Junior High Schools. The urgency of doing this research as a material for educators to analyze the right learning model to be used in science learning so that learning activities can run optimally.

2. METHODS

This type of research is quasi-experimental quantitative research by comparing 8 classes using the jigsaw and STAD models in science learning. This research was conducted in 4 schools, namely 2 SMP and 2 MTs with 35 students in each class. So the total number of students is 280 students. It is called quasi-experimental research because in this type of research thmany variables cannote controlled (Payadnya & Jayantika, 2018).

The population is the entire object of research and part of the overall object under study and is considered to represent the entire population is called the research sample (Arifin, 2017). The sample in this study was 280 students from SMPN 34 Batanghari, SMPN 35 Batanghari, MTsN 5 Batanghari and MTsN 7 Batanghari in Batanghari district. The sampling technique is purposive sampling. There are many good reasons to use the purposive sampling technique, that is, it is widely used in pilot studies before hypothesis testing with a representative sample (Puspitawati & Herawati, 2018). The sample taken is class VII A and VII B. The research sample table used in this study is shown in Table 1.

Table 1. Research Sample

SMPN 34 Batanghari		**SMPN 35 Batanghari**		**MTsN 5 Batanghari**		**MTsN 7 Batanghari**	
VII A	VII B	VII A	VII B	VII A	VII B	VII A	VII B
35	35	35	35	35	35	35	35

There are two instruments in this study, namely student responses using the Jigsaw learning model and student teams achievement divisions (STAD). There are 26 statement items on student responses with the Jigsaw learning model and 26 statements on student responses with the student teams achievement divisions (STAD) learning model using a Likert scale 5. The scale consists of 5 points for the learning model with 1 (very bad), 2 (not good), 3 (fair), 4 (good), and 5 (very good). Each statement is representative of each indicator of student response to the learning model. This study focuses on 3 dimensions of student responses to the jigsaw learning model and student teams achievement divisions (STAD), namely enthusiasm in participating in learning, use of media, interest in learning science, and easy understanding of the concepts and importance of science.

The jigsaw learning model consists of group learning, individual group learning, and social connectedness (Chang & Benson, 2020). The description of the student response questionnaire instrument grid with the jigsaw learning model in science subjects is shown in Table 2.

Table 2. Grid of Student Response Questionnaire Instruments with the Jigsaw Learning Model in Science Subjects

Variable	**Indicator**	**No. Item Statement**
Student Responses to the Jigsaw	Enthusiasm for Learning	1,2,3,4,5,6
	Media Use	7,8,9,10,11,12,13
	Interest in Studying Science	14,15,16,17,18,19,20
	Easy to Understand the Concept and Importance of Science	21,22,23,24,25,26
Number of Statements		**26**

The categories of student responses to the jigsaw learning model in science subjects are shown in Table 3.

Table 3. Category of Student Response with Jigsaw Learning Models in Science Subjects

Category	Interval Indicator			
	Enthusiasm for Learning	**Media Use**	**Interest in Studying Science**	**Easy to Understand the Concept and Importance of Science**
Very Not Good	26,0-46,8	26,0-46,8	26,0-46,8	26,0-46,8
Not good	46,9-67,6	46,9-67,6	46,9-67,6	46,9-67,6
Enough	67,7-88,4	67,7-88,4	67,7-88,4	67,7-88,4
Good	88,5-109,2	88,5-109,2	88,5-109,2	88,5-109,2
Very good	109,3-130	109,3-130	109,3-130	109,3-130

Student activities in the remaining cooperative learning model form their groups, and examine and identify problems caused by the use of learning resources. Then each group focuses discusses problem-solving, determines the data sources needed, divides the tasks of preparing presentation reports, and each group presents report presentations. interactively and interestingly, and all students give each other feedback on the topics discussed (Sugiharto, 2020). The description of the student response questionnaire instrument grid with the STAD learning model in science subjects is shown in Table 4.

Table 4. Grid of Student Response Questionnaire Instruments with the STAD Learning Model in Science Subjects

Variable	Indicator	No. Item Statement
Student responses to the STAD	Enthusiasm for Learning	1,2,3,4,5,6
	Media Use	7,8,9,10,11,12,13
	interest in Studying Science	14,15,16,17,18,19,20
	Easy to Understand the Concept and Importance of Science	21,22,23,24,25,26
Number of Statements		**26**

(Sugiharto, 2020)

The categories of student responses with the STAD learning model in science subjects are shown in Table 5.

Table 5. Category of Student Response with the STAD Learning Model in Science Subjects

Category	Interval Indicator			
	Enthusiasm for Learning	**Media Use**	**Interest in Studying Science**	**Easy to Understand the Concept and Importance of Science**
Very Not Good	26,0-46,8	26,0-46,8	26,0-46,8	26,0-46,8
Not good	46,9-67,6	46,9-67,6	46,9-67,6	46,9-67,6
Enough	67,7-88,4	67,7-88,4	67,7-88,4	67,7-88,4

Category	Interval Indicator			
	Enthusiasm for Learning	Media Use	Interest in Studying Science	Easy to Understand the Concept and Importance of Science
Good	88,5-109,2	88,5-109,2	88,5-109,2	88,5-109,2
Very good	109,3-130	109,3-130	109,3-130	109,3-130

This study uses quantitative data analysis with the help of SPSS statistics 26, to find descriptive statistics and inferential statistics. Activities related to descriptive statistics are calculating the mean, median, mode, and standard deviation, seeing the difference in data distribution, and so on. While activities related to the inference process are testing data differences and testing the relationship between two data variables; The methods that are often encountered are the T-test, making regression models, and so on (Santoso, 2019). The data analysis requirements test used two tests, namely normality and homogeneity tests. There are two events to explore the assumption of normality, namely the Shapiro Wilk normality test and the Kolmogorov Smirnov normality test contained in the SPSS explore procedure. The homogeneity test is used to test that each group to be compared has the same variance (Wardana, 2020). In this study, descriptive statistics were used, namely calculating the mean, median, mode, frequency, and percent, then inferential statistics were used to test assumptions, namely normality tests with the provision that the sig value > 0.05 was normally distributed, and the homogeneity test with the provisions of the sig value > 0.05, meaning that the data homogeneous. After testing the assumptions and the data has met the requirements, it is possible to test the hypothesis in this study using the T-test, which is to test whether a sample has a significant difference from other samples. In this study, the researcher used an independent sample t-test with the provision that the value of sig. (2-tailed < 0.05 means that the data has a significant difference.

3. RESULTS AND DISCUSSION

Result

The following describes the results of descriptive statistics on student response variables using the jigsaw and STAD learning models in science subjects. The results will be obtained from the distribution of questionnaires in grades VII A and VII B at SMPN 34 Batanghari, SMPN 35 Batanghari, MTsN 5 Batanghari, and MTsN 7 Batanghari Descriptive Statistics Test. Students' responses to the Jigsaw learning model in science subjects were found that at SMPN 34 Batanghari the dominant category was sufficient with a percentage of 68.6%. Then SMPN 35 Batanghari the dominant category was enough with a percentage of 64.6%. In MTsN 5 Batanghari is dominant in the moderate category with a percentage of 68.6%. While in MTsN 7 Batanghari is dominant in the moderate category with a percentage of 72.9%. Then Based on Table 6, the responses of students who use the STAD learning model in science subjects it is found that at SMPN 34 Batanghari the dominant category is sufficient with a percentage of 71.4%. Meanwhile in SMPN 35 Batanghari is dominant in the sufficient category with a percentage of 81.4%. Then in MTsN 5, Batanghari is dominant in the medium category with a percentage of 75.7%. And in MTsN 7 Batanghari is dominant in the medium category with a percentage of 80%.

Assumption test

In this assumption test, two tests will be carried out, namely the normality test which serves to see whether the data is normally distributed or not, and the linearity test which functions to see the linear relationship between the two variables to be tested.

Normality test

A normality test is a test that is useful for determining the data that has been collected is normally distributed or not. The data requirements are said to be normally distributed if the value of sig. > 0.05. The following is a description of the results for the normality test of student responses using the jigsaw and STAD model in science subjects in SMP/MTs as shown in Table 6.

Table 6. Description of the Normality test of Student Responses using the Jigsaw and STAD Learning Models in Science Subjects at SMP/MTs

Variable	School name	Sig.	Distribute
Jigsaw	SMPN 34 Batanghari	0.200	Normal
	SMPN 35 Batanghari	0.200	Normal
	MTsN 5 Batanghari	0.100	Normal
	MTsN 7 Batanghari	0.200	Normal
STAD	SMPN 34 Batanghari	0.200	Normal
	SMPN 35 Batanghari	0.200	Normal
	MTsN 5 Batanghari	0.200	Normal
	MTsN 7 Batanghari	0.100	Normal

Based on Table 6, the normality test of student responses using the Jigsaw and STAD learning models in science subjects in SMP/MTs obtained sig. > 0.05 then the data is normally distributed.

Homogeneity test

The following is a description of the results for the homogeneity test of student responses with the jigsaw and STAD learning models in science subjects at SMP/MTs shown in Table 7.

Table 7. Description of the Homogeneity test of Student Responses using the Jigsaw and STAD Learning Models in Science Subjects at SMP/MTs

Variable	School name	Class	Sig.	Desc. data
Jigsaw	SMPN 34 Batanghari	VII A VII B	0,277	Homogen
	SMPN 35 Batanghari	VII A VII B	0,540	Homogen
	MTsN 5 Batanghari	VII A VII B	0,362	Homogen
	MTsN 7 Batanghari	VII A VII B	0,214	Homogen
STAD	SMPN 34 Batanghari	VII A VII B	0,125	Homogen
	SMPN 35 Batanghari	VII A VII B	0,373	Homogen
	MTsN 5 Batanghari	VII A	0,834	Homogen

Variable	School name	Class	Sig.	Desc. data
	MTsN 7 Batanghari	VII B VII A VII B	0,363	Homogen

Based on Table 7 obtained, the results of the homogeneity test of student responses with the jigsaw and STAD learning models in science subjects, namely the significance value > 0.05, it can be concluded that the data is homogeneous.

Hypothesis test

In this hypothesis test, the test carried out is the T-test. The T-test aims to determine the difference between student responses after learning with the jigsaw learning model and the STAD learning model.

T-test

The following is a description of the results for the T-test of student responses with the Jigsaw and STAD learning models in science subjects at SMP/MTs shown in Table 8.

Table 8. Description of the T-Test of Student Responses Using the Jigsaw and STAD Learning Models in Science Subjects at SMP/MTs

Variable	School Name	Class	Sig.(2-tailed)
Jigsaw	SMPN 34 Batanghari	VII A VII B	0,048
	SMPN 35 Batanghari	VII A VII B	0,045
	MTsN 5 Batanghari	VII A VII B	0,025
	MTsN 7 Batanghari	VII A VII B	0,032
STAD	SMPN 34 Batanghari	VII A VII B	0,042
	SMPN 35 Batanghari	VII A VII B	0,023
	MTsN 5 Batanghari	VII A VII B	0,047
	MTsN 7 Batanghari	VII A VII B	0,021

Based on Table 8, the results of the T-test are obtained, namely the value of sig. (2-tailed < 0.05, it can be concluded that there is a difference between student responses to the Jigsaw and STAD learning models in science subjects in SMP/MTs.

Discussion

A statistical method is used to obtain a description of the analyzed data without the purpose of providing generalizations or conclusions. Based on the data, student responses to the Jigsaw learning model in science subjects were found that at SMPN 34 Batanghari the dominant category was enough with a percentage of 68.6%. Then at SMPN 35 Batanghari, the dominant category was enough with a percentage of 64.6%. Then at MTsN 5 Batanghari was dominant. in the medium category with a percentage of 68.6%. Then at MTsN 7

Batanghari is dominant in the medium category with a percentage of 72.9%. Then based on the description of data, and the responses of students with the STAD learning model in science subjects it was found that at SMPN 34 Batanghari the dominant category was sufficient with a percentage of 71.4%. Then in SMPN 35 Batanghari was dominant in the sufficient category with a percentage of 81.4%. Then in MTsN 5, Batanghari is dominant in the medium category with a percentage of 75.7%. Then in MTsN 7, Batanghari is dominant in the medium category with a percentage of 80%. STAD's main goal is to drastically improve and accelerate student performance (Wyk, 2012).

Furthermore, in this assumption test, there are two tests that will be carried out, namely the normality test which functions to see whether the data is normally distributed or not. There is also homogeneity test which functions to see whether the data is homogeneous or not. Based on Table 6, the normality test of student responses using the Jigsaw and STAD learning models in science subjects in SMP/MTs obtained a sig value. > 0.05 means the data is normally distributed. Based on Table 7 obtained, the results of the homogeneity test of student responses with the jigsaw and STAD learning models in science subjects, namely the significance value > 0.05, it can be concluded that the data is homogeneous. This means that the data can be further tested by testing the hypothesis.

In this hypothesis test, the test carried out is the T-test. The T-test is used for experimental design research that aims to compare the mean values of the two existing treatments (Norfai, 2021). In this hypothesis test, the test carried out is the T-test. The T-test is used for experimental design research that aims to compare the mean values of the two existing treatments (Norfai, 2021). Based on Table 8, the T-test of student responses to the Jigsaw and STAD learning models in science subjects in SMP/MTs obtained the results of the T-test, namely for the jigsaw learning model, the value of sig. 2-tailed < 0.05, it can be concluded with an average 95 percent confidence level. The average student responses to the Jigsaw learning model in science subjects at SMP/MTs at SMPN 34 Batanghari, SMPN 35 Batanghari, MTsN 5 Batanghari, and MTsN 7 Batanghari are not the same or there are differences in student responses to the jigsaw learning model for science subjects at SMP/MTs. Then on the results of the T-test on the STAD learning model the value of sig. (2-tailed < 0.05, it can be concluded with a 95 percent confidence level the average student response to the STAD learning model in science subjects in those are not the same or there are differences in student responses to the STAD learning model for science subjects in SMP/MTs. With these differences in responses, educators must be able to adjust the appropriate learning model for students in each class per school.

This study is relevant to previous research where in the study it examines whether the effective jigsaw learning model is carried out online, carried out using software zoom, and google meet (Istiqomah et al., 2021). The research uses the T-test hypothesis test. But in this study, only online conditions and also in the study only compares the media, and has not compared the learning models. And this study only use a relatively small sample. The results of this study show that the online jigsaw learning model makes students the opportunity to express their opinions and students prefer online jigsaw because they do not face the teacher directly.

This research is also relevant to previous research that has been studied by the previous researcher which examined the jigsaw, STAD, and TAI learning models (Gambari & Yusuf, 2017). However, this study has not analyzed the differences in student responses after learning with the jigsaw and STAD learning models. In this previous study, the sample used was still quite small and this study came from the high school level. So that the researchers carried out a research renewal, namely in this research journal, researchers described student responses to the jigsaw and STAD learning models and the differences in student responses to each jigsaw and STAD learning models. With a fairly large sample of 2

junior high schools and 2 MTs schools with 2 classes each of the school for each class consisting of 35 students.

This research is an update on previous research which examined the improvement of students' social studies learning outcomes by applying the STAD learning model (Patimah et al., 2018). The novelty of this study from previous research is that a study was conducted looking at student responses to the STAD and Jigsaw learning models at the junior high school level in science subjects. Then there are also comparing student responses to the STAD and Jigsaw learning models between schools in class VII, and a larger number of samples from previous research. As well as the novelty of this study, namely discussing the differences in student responses to the jigsaw and STAD cooperative learning models.

This study was conducted with the aim analaze student responses to the jigsaw and STAD learning models in science subjects at SMPN 34 Batanghari, SMPN 35 Batanghari, MTsN 5 Batanghari and MTsN 7 Batanghari. Then to analyze whether or not there is an effect on the application of problem-based learning and learning models. Problem solving at SMPN 34 Batanghari, SMPN 35 Batanghari, MTsN 5 Batanghari and MTsN 7 Batanghari. Learning models are used to help clarify procedures, relationships, and the overall state of what is designed. The importance of doing this research is so that educators can find out what model is right for use in science learning.

The weakness of this research is due to its limitations of the research. These weaknesses include that the samples used in this study were only conducted at SMPN 34 Batanghari, SMPN 35 Batanghari, MTsN 5 Batanghari, and MTsN 7 Batanghar, so the results obtained might make a difference if done in other schools or classes. The data collection method used in this study only used questionnaire data. The variables studied in this study were only student response variables using the jigsaw and STAD models in science subjects. It is hoped that further research can be updated by researching other learning models.

4. CONCLUSION

The results of the study were in the form of hypothesis testing and data analysis, the results of hypothesis testing were the results of the T-test which showed that there were significant differences in student responses to jigsaw and STAD learning models in SMPN and MTsN in science subjects. The limitations of this study include the sample used in this study. only done at Madrasah Tsanawiyah, so the results obtained may be different if done at other levels. Researchers suggest that further research can be updated by researching other learning models and associated with other variables.

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