



# The Comparison of Jigsaw Cooperative Learning Model with STAD on Mathematics Subjects in Junior High School

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## ABSTRAK

Kemampuan berpikir analitis merupakan salah satu kompetensi yang harus dimiliki oleh siswa. Berpikir analitis adalah kemampuan berpikir yang melibatkan proses memecah materi menjadi potongan-potongan kecil dan menentukan hubungan dan struktur keseluruhan. Guru dituntut untuk mengembangkan model pembelajaran yang lebih inovatif dan menyenangkan dalam proses pembelajaran guna merangsang berpikir analitis siswa dengan menggunakan model pembelajaran JIGSAW dan STAD untuk lebih mengasah keterampilan prosesnya. Tujuan penelitian ini adalah untuk menganalisis pengaruh berpikir analitis dan keterampilan proses siswa dengan menggunakan model pembelajaran JIGSAW dan STAD. Penelitian ini menggunakan metode kuantitatif dengan tipe asosiatif dan komparatif, dimana pengambilan data menggunakan kuesioner responden. Subyek penelitian ini adalah 180 siswa. Dari hasil yang diperoleh dapat disimpulkan bahwa dari hasil uji T, perbedaan berpikir analitis menggunakan model STAD dan menggunakan model Jigsaw dan variabel keterampilan proses menggunakan model STAD dan model Jigsaw pada mata pelajaran matematika. Dari hasil uji korelasi diketahui bahwa terdapat hubungan antara berpikir analitis dengan keterampilan proses siswa yang menggunakan model pembelajaran Jigsaw. Sehingga penelitian ini berdampak pada perbandingan berpikir analitis dengan keterampilan proses siswa menggunakan model pembelajaran JIGSAW dan STAD.

## ABSTRACT

The ability to think analytically is one of the competencies that must be possessed by students. Analytical thinking is a thinking ability that involves the process of breaking down material into small pieces and determining the relationships and overall structure. Teachers are required to develop a learning model that is more innovative and fun in the learning process in order to stimulate students' analytical thinking by using the JIGSAW and STAD learning models to further hone their process skills. The purpose of this study is to analyze the impact of students' analytical thinking and process skills using the JIGSAW and STAD learning models. This study uses quantitative methods with associative and comparative types, where the data is taken using questionnaire respondents. The subjects of this study were 180 students. From the results obtained, it can be concluded that from the T test results, the difference in analytical thinking using the STAD model and using the Jigsaw model and the process skills variable using the STAD model and Jigsaw model in mathematics subjects. From the results of the correlation test, it is known that there is a relationship between analytical thinking and student process skills using the Jigsaw learning model. So that this research has an impact on the comparison of analytical thinking with student process skills using the JIGSAW and STAD learning models.

## 1. INTRODUCTION

Education is very important in developing potential, talent, achievement attitude and human resources (Kurniawan et al., 2021; Mason, 2020; Quay, 2016). In general, mathematics is one of the most important subjects in education. Mathematics is a form of concepts related to formulas and forms of completion that are structured systematically (Firdaus & Wilujeng, 2018; Joffe, 2017). The mathematics subject itself contains symbols, calculations and abstract concepts (Arifin & Herman, 2018; Aryani & Hiltrimartin, 2014; Setiaji et al., 2020). That way student will automatically get used to thinking analytically in logical thinking. The ability to think analytically is one of the competencies that must be possessed by students. Analytical thinking is a thinking ability that involves the process of breaking down material into small pieces and determining the relationships and overall structure (Ilma et al., 2017; Nuryanti., 2018; Salbiah, 2017). Analytical thinking can determine the cause of an event and the arguments that support a statement (Hendriana, 2012; Kharisma, 2018; Yanti & Prahmana, 2017). There are three levels of analytical thinking skills that students must have, namely the ability to remember, understand and be able to apply (Ashworth, 2018; Setiawan, 2020; Sugianto et al., 2014). That way student' thinking skills in the process

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skills of students in applying logical thinking to collect and analyze information. Applying the scientific method and developing it are part of process skills. Skills are very important to generate new knowledge through learning activities that refer to behaviors that reveal their understanding of the world (Stender et al., 2018; Vansteensel et al., 2017; Vartiainen & Kumpulainen, 2020). Students are able to apply the scientific method by understanding, developing and discovering an invention (Labouta et al., 2018; Solé-Llussà et al., 2019; Stylinski et al., 2020). In this learning, students are required to experience for themselves, seek, try and draw conclusions from the process of the skills they do (Kruit et al., 2018; Mutlu, 2020; Solé-Llussà et al., 2019). So that student process skills are very important for students because they are preparation and practice in facing the realities of life.

Teachers are required to develop a learning model that is more innovative and fun in the learning process so that it can stimulate students' analytical thinking to further hone their process skills. The application of the cooperative learning model with the jigsaw method seems appropriate to be used in the teaching and learning process at the junior high school level. The jigsaw learning model is a learning that brings together material from the results of student discussions by discussing the sub-chapters of material that have been explained by the teacher (Booker, 2021; Sadeghi & Ghaderi, 2018; Santos et al., 2019). This type of jigsaw learning is formed in several small groups in each group, one will be responsible and the other will teach other groups (Chang & Benson, 2020; Kougiali, Z. G., Soar, K., Pytlik et al., 2020; Toril et al., 2018). With this model, students will be more able to work together, have positive interdependence and be responsible independently (Baken et al., 2020; Jaya Wibawa & Suarjana, 2019; Sri Astiti & Murda, 2017). In addition, this study uses a cooperative learning model, namely the Students Teams Achievement Division (STAD) type. This type of learning model is a model that can motivate students to work in groups and master the material that is invited to be explained back to other friends (Kusumawardani et al., 2018; Putra et al., 2018; Wulandari et al., 2017). The advantage of this model is that students can work together in groups to achieve maximum learning outcomes. This STAD model is more concerned with students' analytical thinking abilities and skills in order to develop cognitive and affective potential (Hazmiwati, 2018; Rohika, 2017; Rumapea, 2018). The main idea in this STAD-type learning model is to encourage students to help each other and encourage each other to be able to solve the given case (Rahmah et al., 2020; Rostia, 2017; Wijaya & Arismunandar, 2018).

From previous research on analytical thinking is in line with this research, there were differences in the measurement of variables. It measured the analytical thinking ability of junior high school students towards the learning process (Ilma et al., 2017; Kharisma, 2018; Nuryanti., 2018). From these results it was found that they have not been able to provide relevant explanations, have not been able to solve problems, have not been able to evaluate answers, and have not been able to apply concepts. Meanwhile, the other previous research process skill variable measured the process skills of students at the high school and junior high school levels. So that in previous studies it was not known the difference in student process skills between elementary schools to determine the extent to which elementary school students had good skill levels among other school levels (Stender et al., 2018; Vansteensel et al., 2017; Vartiainen & Kumpulainen, 2020). The model in previous studies is in line with this research, but in research the jigsaw learning model is used in an effort to improve learning outcomes in elementary school students (Booker, 2021; Sadeghi & Ghaderi, 2018; Santos et al., 2019). The STAD variable in previous studies only measured the effect of learning on understanding the concept of elementary school learning (Rahmah et al., 2020; Rostia, 2017; Wijaya & Arismunandar, 2018). Meanwhile, in this study, the focus is on students' thinking and process skills using the STAD model at SMP 35 Batang Hari and SMP 36 Batang Hari. This research is very important to do because students' still lack skills and thinking in mathematics subjects. This research was conducted with the aim to analyze the relationship between analytical thinking and process skills of SMP 35 and SMP 36 Batang Hari students using the jigsaw model. Beside of that this study is to analyze the relationship between analytical thinking and process skills for SMP 35 and SMP 36 Batang Hari students using the Students Teams Achievement Division (STAD) model.

## 2. METHODS

This study uses quantitative methods with associative and comparative types. Quantitative research is a field of inquiry using mathematical models and hypotheses that are scientific in nature and aim to understand social reality (Apuke, 2017; Ormston et al., 2014; Queirós et al., 2017). The data obtained using numerical data with a Likers scale of 4 and 5. This study gains an understanding of a phenomenon from basic logic, usually including the perspective of the research population. The instrument used in this study was an observation sheet distributed to the two schools, namely: SMP 35 Batanghari and SMP 36 Batanghari. This data was taken on June 1, 2021 with the scope of 8th grade mathematics at the junior high school (SMP) level. Instructive questionnaires were used to measure knowledge that had not been

systematically validated (Lee et al., 2020; Vansteensel et al., 2017). The grid used in the instrument of observing students' process skills in mathematics subjects shown on Table 1.

**Table 1.** Grid of Student Process Skills Observation Instruments in Mathematics Subjects

Variabel	Indicator	Number Statement Items
Process skills of students in mathematics	Observation	1,2,3
	Communication	4,5,6,7
	Classification	8,9,10,11,12
	Measure	13,14,15
	Conclusion	16,17,18,19
	Prediction	20,21,22,23,24
	Arrange Tables	25,26,27
	Obtain and process data	28,29,30,31
	Trial analysis	32,33,34,35
	Creating a hypothesis	36,37,38,39
	Designing experiments	40,41,42,43
	Doing Experiments	44,45,46,47
<b>Number of Statements</b>		<b>47</b>

Due to the observation of students' process skills in mathematics subjects using a linkers scale consisting of 4 categories and analytical thinking consisting of 5 Likerts. With the number of questions from the student's process skills variable as many as 47 questions. Grid in the forms of observational instrument of students' analytical thinking shown on Table 2.

**Table 2.** Grid of Students' Analytical Thinking Observation Instruments in Mathematics Subjects

Indicator	Description
Understanding the Concept	1. Reasoning the relationship between concepts directly
	2. Solve problems through reasoning connected with material concepts
	3. Reasoning the relationship between concepts directly
Identify	4. Make adjustments to answers with concepts that have been systematically understood
	5. Separating certain patterns
Distinguish	6. Make connections from existing patterns
	7. Applicable theoretical reasoning
Organize	8. Apply concepts and theories to problems
	9. Make a connection between what is given and what is asked for
Connect	10. Determine the main focus of the problem
	11. Understand the concept concretely
Applicable Ability	12. Give examples that are closely related to the surrounding life

The number of questions from the student's analytical thinking variable, as many as 20 questions. Then there is an interval in each category. The intervals in each category can be seen in the Table 3.

**Table 3.** Category of Student Process Skills

Categori	Interval Indicator	
	Basid	Integrasi
	Classification	Arrange Table
Very Not Good	5.0 -8.75	4.0-7.0
Not good	8.85 -12.5	8.0 -10.0
Good	12.6 -16.25	11.0 -13.0
Very good	16.35-20.0	14.0 - 16.0

The Likert scale used in this study were: 1 (very bad), 2 (not good), 3 (fairly good), 4 (good), 5 (very good) with 47 questions regarding student process skills. In this study, there were 3 samples, namely class VIII A, VIII B and VIII C with each class having 30 students. The total of eight classes in the respondents were 180 students. The population is the person who is the subject of research or the characteristics to be studied (Banks et al., 2018; Tegeh et al., 2020). The samples used in this study are listed in Table 4.

**Table 4.** Research Sample

School	Sample
SMP 35 Batanghari	90 Student
SMP 36 Batanghari	90 Students
<b>Total : 180 Students</b>	

The sampling technique used in this study used simple random sampling. The sampling technique was adopted because it provides unbiased parameter estimates and is better if the population is homogeneous (Alhassan & Chen, 2019; Bankole & Nasir, 2020; Ning & Tao, 2020). Using random sampling can reduce the potential for bias in the selection of cases to be included in the sample. With the condition that random sampling is done because of the homogeneous population, the sampling frame is clear and general in nature. The results of the students' observations regarding the students' analytical thinking and processing skills were analyzed using descriptive statistics. Descriptive statistics are often referred to as frequency distributions that provide accurate measurements from the smallest to the largest data (Al Mutairi, 2018; Khosharay et al., 2018). The descriptive statistics used in its presentation use estimated values and experimental values, from the two parameters such as mean, median, maximum and minimum (Haj-Kacem et al., 2017; Khalil & Najm, 2018; Lapinova & Saichev, 2017).

This type of associative research to determine the relationship or type of the variables used. Therefore, inferential statistics are used with assumption tests consisting of normality, linearity and hypothesis testing, namely T test and correlation test. The normality test aims to determine whether a data can be said to be normal or not, while the homogeneous test aims to determine whether the data of the two samples is homogeneous or not. The first step in this research is to determine the normality of a data using the normality test. Normality test if the result data in the population is normally distributed, the condition is that the sig value is greater than 0.05 (Dehadri & Dehdari, 2020; Kim et al., 2018). The data obtained in this research is qualitative data. Then this data will be analyzed using assumption tests starting from normality and linearity tests. If the data being tested is normal and linear data, it ends with a hypothesis test to see whether there is a significant relationship and comparison between classes in the same school using the T test and correlation test.

### 3. RESULT AND DISCUSSION

#### Results

##### Descriptive statistics

The following describes the results of descriptive statistics on analytical thinking variables and student process skills using the Jigsaw and STAD learning models in mathematics. With a question indicator on process skills: Classification and compiling Tables. Where the results obtained from the spread of observations to the two junior high schools (Sekeloh Junior High School) are: SMP 35 Batanghari and SMP 36 Batanghari. The description of students' process skills towards mathematics at SMP 35 Batanghari and SMP 36 Batanghari on the classification indicator are shown on Table 5.

**Table 5.** Description of Students' Process Skills Towards Mathematics on Classification Indicators

Student Response	Interval	F	Percentage	Categori	Mean	Median	Min	Max
SMP 35 Batanghari	5.0 -8.75	1	3.3%	Very Not Good	2.86	3.00	1.00	3.00
	8.85 -12.5	9	29.7%	Not good				
	12.6 -16.25	20	66%	Good				
	16.35-20.0	0	0%	Very good				
SMP 36 Batanghari	5.0 -8.75	3	9.9%	Very Not Good	2.69	3.00	1.00	4.00
	8.85 -12.5	3	9.9%	Not good				
	12.6 -16.25	20	66%	Good				
	16.35-20.0	4	13.2%	Very good				

Based on the results from Table 5, it can be seen that the most dominant category in the classification indicator with the variable student process skills is good with each percentage of 66% as many as 20 students in SMP 35 Batanghari and SMP 36 Batanghari So it can be said that from both SMP (Junior High School) has the same advantages in student process skills through classification indicators. The

description of students' process skills towards mathematics at SMP 35 Batanghari and SMP 36 Batanghari are shown on [Table 6](#).

**Table 6.** Description of Students' Process Skills Towards Mathematics on Indicators Compiling

Student Response	Interval	F	Percentage	Categori	Mean	Median	Min	Max
SMP 35 Batanghari	5.0 -8.75	0	0%	Very Not Good	2.86	3.00	2.00	4.00
	8.85 -12.5	6	19.8%	Not good				
	12.6 -16.25	18	59.4%	Good				
	16.35-20.0	6	19.8%	Very good				
SMP 36 Batanghari	5.0 -8.75	2	6.6%	Very Not Good	2.69	3.00	1.00	3.00
	8.85 -12.5	9	29.7%	Not good				
	12.6 -16.25	19	62.7%	Good				
	16.35-20.0	0	0%	Very good				

Based on the results from [Table 6](#), it can be seen that the most dominant category in the classification indicator with the variable student process skills is as good as 52.4% each with 18 students at SMP 35 Batanghari and 62.7% as many as 19 students at SMP 36 Batanghari. So it can be said that of the two SMP (Junior High School) the one that has more advantages is SMP 36 Batanghari in student process skills through indicators in compiling Tables. The description of students' analytical thinking towards mathematics in SMP 35 Batanghari and SMP 36 Batanghari are shown on [Table 7](#).

**Table 7.** Description of Students' Analytical Thinking at di. SMP 35 Batang Hari and SMP 36 Batang Hari

Student Response	Interval	F	Percentage	Categori	Mean	Median	Min	Max
SMP 35 Batang Hari	5.0 – 9.0	0	0%	Very Not Good	3.69	4.00	3.00	5.00
	10.0-13.0	0	0%	Not good				
	14.0 – 17.0	15	49.5 %	Enough				
	18.0 -21.0	11	36.3%	Good				
SMP 36 Batang Hari	22.0 – 25.0	4	13.2%	Very good	2.86	3.00	1.00	5.00
	5.0 – 9.0	2	6,6%	Very Not Good				
	10.0-13.0	1	3.3%	Not good				
	14.0 – 17.0	8	26.4%	Enough				
	18.0 -21.0	12	39.6%	Good				
22.0 – 25.0	7	23.1%	Very good					

Based on the results of [Table 7](#), it can be seen that the most dominant category in students' analytical thinking is sufficient and good with each percentage of 49.5% as many as 15 students at SMP 35 Batang Hari and 39.4% as many as 12 students at SMP 36 Batang Hari. So it can be said that of the two junior high schools (Junior High School) the one that has more advantages is SMP 36 Batang Hari in analytical thinking about mathematics. The description of the Jigsaw response model of students to mathematics in SMP 35 Batang Hari and SMP 36 Batang Hari are shown on [Table 8](#).

**Table 8.** Description of the Student's Jigsaw Response Model at di. SMP 35 and SMP 36 Batang Hari

Student Response	Interval	F	Percentage	Categori	Mean	Median	Min	Max
SMP 35 Batang Hari	26.0 – 46.8	7	23,1%	Very Not Good	3.69	4.00	1.00	5.00
	47.3 -67,6	2	6,6%	Not good				
	68.1 – 88.4	9	29,7 %	Enough				
	88.9 -109.2	10	33%	Good				
	109.7-130.0	2	6,6%	Very good				
SMP 36 Batang Hari	26.0 – 46.8	0	0%	Very Not Good	2.86	3.00	2.00	5.00
	47.3 -67,6	1	3,3%	Not good				
	68.1 – 88.4	16	52,8%	Enough				
	88.9 -109.2	11	36.3%	Good				
	109.7-130.0	2	6,6%	Very good				

Based on the results from Table 8, it can be seen that the most dominant category in the student's Jigsaw response model is good with each percentage of 33% as many as 10 students at SMP 35 Batang Hari and 36.3% as many as 11 students at SMP 36 Batang Hari. So it can be said that of the two junior high schools (Junior High School) the one that has more advantages is SMP 36 Batang Hari in the Jigsaw response model of students to mathematics. The description of the STAD response model of students to mathematics in SMP 35 Batang Hari and SMP 36 Batang Hari shown on Table 9.

**Table 9.** Description of the STAD Response Model of Students at di. SMP 35 and SMP 36 Batang Hari

Student Response	Interval	F	Percentage	Categori	Me an	Median	Min	Max
SMP 35 Batang Hari	26.0 – 46.8	8	26,4%	Very Not Good	3.69	3.00	1.00	4.00
	47.3 -67,6	2	6,6%	Not good				
	68.1 – 88.4	9	29,7 %	Enough				
	88.9 -109.2	11	36,3%	Good				
	109.7-130.0	0	0%	Very good				
SMP 36 Batang Hari	26.0 – 46.8	0	0%	Very Not Good	2.86	3.00	2.00	5.00
	47.3 -67,6	0	0%	Not good				
	68.1 – 88.4	17	56,1%	Enough				
	88.9 -109.2	11	36,3%	Good				
	109.7-130.0	2	6,6%	Very good				

Based on the results from Table 9, it can be seen that the most dominant category in the student STAD response model is good with each percentage of 36.3% as many as 11 students at SMP 35 Batang Hari and SMP 36 Batang Hari. So it can be said that the two SMP (Junior High School) have the same advantages in the STAD response model of students to mathematics.

### Analysis Prerequisite Test

#### Normality Test

The data is normally distributed as seen from the significance value, if the significance value is > 0.05. As for the normality test of analytical thinking and student process skills using the Jigsaw and STAD learning models in mathematics subjects at SMP 35 Batang Hari and SMP 36 Batang Hari. The following are the results of the normality test are shown in Table 10.

**Table 10.** Normality Test of Students' Analytical Thinking and Process Skills Using the Jigsaw and STAD

		Kolmogorov-Smirnov			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
Process Skills	SMP 35 Batang hari	0.058	90	0.200	0.984	90	0.871
	SMP 36 Batang hari	0.052	90	0.200	0.986	90	0.914
Analytical Thinking	SMP 35 Batang hari	0.061	90	0.200	0.976	90	0.621
	SMP 36 Batang hari	0.054	90	0.200	0.953	90	0.131
Jigsaw Model	SMP 35 Batang hari	0.069	90	0.200	0.979	90	0.722
	SMP 36 Batang hari	0.055	90	0.200	0.963	90	0.270
STAD Model	SMP 35 Batang hari	0.053	90	0.200	0.944	90	0.066
	SMP 36 Batang hari	0.051	90	0.200	0.975	90	0.575

Based on the results of Table 10, it can be concluded that the data of analytical thinking and process skills of students use the Jigsaw and STAD learning models in mathematics subjects at SMP 35 Batang Hari and SMP 36 Batang Hari. Normal distribution, with the normality test results obtained Kolmogorov-Sminov test significance value  $0.200 > 0.05$ .

#### Linearity Test

This test is carried out in order to see a linear relationship between two or more variables. The requirements for this test, if the significance value is > 0.05. The linearity test of students' analytical thinking and process skills using the Jigsaw and STAD learning models in mathematics subjects at SMP 35 Batang Hari and SMP 36 Batang Hari are shown in Table 11.

**Table 11.** The Linearity Test of Students' Analytical Thinking and Process Skills Using the Jigsaw and STAD

		Sum of Squares	df	Mean Square	F	Sig.
Analytical thinking*Process skills* Jigsaw model	Deviation from Linearity	459.906	47	17.034	.368	.996
Analytical thinking*Process skills* STAD model	Deviation from Linearity	2359.215	43	54.865	.794	.811

Based on [Table 11](#), it can be concluded that there is a linear relationship between students' process skills and analytical thinking with the STAD and Jigsaw learning models. This is evidenced by the obtained results from the linearity test which obtained a significance value of deviation from linearity of 0.996 and 0.811 which met the requirements  $> 0.05$ .

#### Homogeneity Test

This test is carried out in order to find out whether the x and y data are homogeneity or not. The requirement in this test is that if the significance value is  $> 0.05$ , it can be said that the x and y data are homogeneous (same). If the significance value is  $< 0.05$  then the data is not homogeneous (not the same). The results obtained are shown in [Table 12](#).

**Table 12.** Test the Homogeneity of Analytical Thinking and Student Process Skills Using the Jigsaw and STAD Learning Models in Mathematics Subjects

	Levene Statistic	df1	df2	Sig.
Based on Mean	2.658	1	720	0.091
Based on Median	2.676	1	720	0.092
Based on Median and with adjusted df	2.676	1	717.263	0.092
Based on trimmed mean	2.662	1	720	0.093

Based on [Table 12](#), it can be concluded that the variance of the two variables between analytical thinking and student process skills using the Jigsaw and STAD learning models in mathematics subjects at SMP 35 Batang Hari and SMP 36 Batang Hari is the same or homogeneous with the results obtained from the homogeneity obtained are the significance value based on the mean is 0.091 which has met the requirements  $> 0.05$ .

#### Hypothesis Testing

##### T-testing

In this test, it is carried out in order to be able to find out the differences in variables on mathematics subjects. The condition in this test is if the significance value is  $> 0.05$ , it can be said that the variable has no difference. If the significance value is  $< 0.05$ , then the variable has a significant difference. The T-test of analytical thinking and process skills of students using the Jigsaw and STAD learning models in mathematics subjects at SMP 35 Batang Hari and SMP 36 Batang Hari are shown in [Table 13](#).

**Table 13.** T-test of Students' Analytical Thinking and Process Skills Using the Jigsaw and STAD Learning Models in Mathematics Subjects

			Levene's Test for Equality of Variances				
			F	Sig.	t	df	Sig. (2-tailed)
SMP 36 Batang Hari	STAD	Process Skills	0.158	0.601	3.997	0.180	0.010
		Analytical Thinking	0.165	0.669	2.419	180	0.003
	Jigsaw	Process Skills	0.131	0.701	2.638	180	0.000
		Analytical Thinking	0.115	0.631	2.314	180	0.002
SMP 36 Batang Hari	STAD	Process Skills	127	0.689	3.142	0.180	0.015
		Analytical Thinking	136	0.673	2.456	180	0.017
	Jigsaw	Process Skills	123	0.624	2.543	180	0.000
		Analytical Thinking	155	0.642	2.578	180	0.009

From [Table 13](#), it is found that there is a difference between analytical thinking using the STAD model and using the Jigsaw model as well as on the process skills variable using the STAD model and the

Jigsaw model. This is evidenced by the resulting sig (2-tailed) value  $< 0.05$  which is in accordance with the established requirements.

### Correlation Test

In this test, it is carried out in order to determine the relationship of variables to mathematics subjects. Conditions in this test if the significance value  $> 0.05$  then it can be said that the variable has no relationship. If the significance value is  $< 0.05$ , then the variable has a significant relationship. The correlation test for analytical thinking and student process skills using the Jigsaw and STAD learning models in mathematics subjects at SMP 35 Batang Hari and SMP 36 Batang Hari is described in Table 14.

**Table 14.** Test the Correlation Between Analytical Thinking and Student Process Skills Using the Jigsaw and STAD Learning Models

Correlations		Hasil
Analytical thinking*Process skills* Jigsaw modelSMP 35	Pearson Correlation	0.690
	Sig. (2-tailed)	0.033
	N	270
Analytical thinking*Process skills* Jigsaw modelSMP 36	Pearson Correlation	0.884
	Sig. (2-tailed)	0.000
	N	270
Analytical thinking* Process skills * STADmodelSMP 35	Pearson Correlation	0.729
	Sig. (2-tailed)	0.023
	N	180
Analytical thinking* Process skills * STADmodelSMP 36	Pearson Correlation	0.789
	Sig. (2-tailed)	0.002
	<b>N</b>	<b>180</b>

From Table 14, it is found that there is a relationship between analytical thinking and student process skills using the Jigsaw learning model between SMP 35 Batang Hari and SMP 36 Batang Hari. And that there is a relationship between analytical thinking and student process skills using the STAD learning model. This is proven by the value of sig (2-tailed) in accordance with the conditions that have been set, namely  $< 0.05$ . Thus, with the Jigsaw model, the higher the student's analytical thinking, the higher the student's process skills. Similarly, using the STAD model, the higher the student's analytical thinking, the higher the student's process skills.

### Discussion

In descriptive statistical testing, the variable used is the variable of interest by paying attention to 3 question indicators. Descriptive statistics itself is the most basic data analysis process by focusing on the management, presentation and classification of data (Brix et al., 2018) From the results of the Table that has been presented, it is obtained that the classification indicators are equally superior between SMP 35 Batang Hari and SMP 36 Batang Hari. In addition, for indicators compose a Table with process skills variables that are superior to SMP 36 Batang Hari with a percentage of 36.3% in the good category. As for the analytical thinking variable, which is superior to SMP 36 Batang Hari with a good category and a percentage of 39.4%. When viewed from the 2 indicators of student process skills and analytical thinking, students from SMP 36 Batang Hari have process skills and analytical thinking that are superior to SMP 35 Rod Day. In descriptive statistical testing with Jigsaw and STAD model responses with overall indicators. That the Jigsaw learning model is superior to SMP 36 Batang Hari with a good category and a percentage of 36.11%. In addition, the STAD model is superior to the students of SMP 35 Batang Hari and SMP 36 Batang Hari in the sense that both schools have the same advantage over the STAD model used with a percentage of 36.11% in the good category. So from the data obtained that SMP 36 Batang Hari has the advantage of the learning model used, starting from the STAD model used to the Jigsaw model used in learning. Thus, SMP 36 Batang Hari has good analytical thinking and process skills in using the Jigsaw and STAD learning models. In this case, it can occur due to the influence of the surrounding environment and the student's own learning patterns.

In testing the data before performing the T test, this data is required to perform an assumption test which contains a normality test, linearity test and homogeneity test. In this test, the data used are normally distributed with a significant value of  $0.200 > 0.05$ . Using the linearity test, the data tested showed that there was a linear relationship between students' process skills and analytical thinking with the STAD and Jigsaw learning models. This is evidenced by the obtained results from the linearity test that the significance value



of deviation from linearity is 0.996 and 0.811 which has met the requirements  $> 0.05$ . With the homogeneity test, it is found that the data tested has the same or homogeneous variance with a significance based on mean of 0.091 who have met the requirements  $> 0.05$ . That way, after the data tested is normally distributed, linear and homogeneous, the data can be continued with hypothesis testing. After the prerequisite test has been met from the assumption test, the test can be continued with a hypothesis test consisting of a T test and a correlation test. From what has been done, there are differences in students' analytical thinking and process skills using the Jigsaw and STAD learning models. From SMP 35 Batang Hari and SMP 36 Batang Hari using analytical thinking and student process skills using the Jigsaw learning model, the significance value of the T test was  $0.000 < 0.05$ . Meanwhile, by using analytical thinking and student process skills using the STAD learning model, the significance value of the T test was  $0.000 < 0.05$  in class VII B, the significance value was  $0.000 < 0.05$ . From the T test, there are differences or comparisons of students' process skills and students' analytical thinking with the learning model used. In addition, for correlation testing, it can be said that there is a relationship between analytical thinking and student process skills using the Jigsaw and STAD learning models. This is evidenced by the value of sig (2-tailed)  $< 0.05$  which is in accordance with the conditions that have been set.

This research is in line with existing research on analytical thinking process skills. However, in previous studies there were differences in the measurement of variables. In previous studies measuring the analytical thinking ability of junior high school students on the learning process (Ilma et al., 2017; Kharisma, 2018; Nuryanti., 2018). From these results it was found that they have not been able to provide relevant explanations, have not been able to solve problems, have not been able to evaluate answers, and have not been able to apply concepts; Meanwhile, the variable process skills in previous research measured the process skills of students at the high school and junior high school levels. So that in previous studies it was not known the difference in student process skills between elementary schools to determine the extent to which elementary school students had a good skill level among other school levels (Stender et al., 2018; Vansteensel et al., 2017; Vartiainen & Kumpulainen, 2020). This research is also in line with previous research regarding the model used in learning. However, previous research has limitations in the variables tested. In previous research, the jigsaw learning model was used in an effort to improve learning outcomes for elementary school students. From the research, it was found that it can improve students' understanding so that it affects their learning outcomes. Then the STAD variable in previous studies only measured the effect of learning on understanding the concept of elementary school learning from the study it was found that the STAD learning model had an influence on students' understanding abilities (Azizah et al., 2019; Sukmaningtyas & Madang, 2018; Wati & Anggraini, 2019). In that case, previous researchers focused on the effect produced in learning at the elementary school level using STAD. While the Jigsaw learning model is used to measure student achievement.

Therefore, this study focuses more on students' analytical thinking and process skills using the STAD model at SMP 35 Batang Hari and students' thinking and process skills using the STAD model at SMP 36 Batang Hari. This research is very important to do because students still lack skills and thinking in mathematics at Batang Hari Junior High School. In this test, the researcher has analytical thinking and process skills which aim to understand the control, thought processes, motivational attitudes, and psychology faced by students in studying mathematics. By testing this, it can be seen that students' skills and analytical thinking have an influence on the psychology that students face when starting mathematics subjects. With good analytical thinking and process skills students can develop knowledge, skills regarding mathematics subjects. Skills and thinking can evaluate problems related to mathematics subjects. In this way, a good personality is formed from each student. Several previous studies have also succeeded in showing belief in related science process skills in influencing students' interest in learning mathematics. The essence of this study discusses the differences and relationships in students' analytical thinking and process skills using the Jigsaw and STAD learning models in mathematics subjects at SMP 35 Batang Hari and SMP 36 Batang Hari. In other words, these differences and relationships describe how students are skilled and think through the learning model used. It is known that there are differences and relationships of process skills and analytical thinking that have been tested starting from the Jigsaw model and the STAD model of SMP 35 Batang Hari and SMP 36 Batang Hari. The limitations of this research are only the process skills and analytical thinking of students from grade 8, have not been tested from grades 7 and 9. And the models used in this study are only Jigsaw and STAD, have not measured learning models from problem solving, PBL and others. So, it is recommended to read other articles that contain other variables to support references.

#### 4. CONCLUSION

In this test the data used are normally distributed, linear and homogeneous. From the results of hypothesis testing, it is known that there is a relationship between analytical thinking and student process skills using the Jigsaw and STAD learning models. While on the T test there are differences in students' analytical thinking abilities and process skills using the jigsaw model and the STAD model. In this case, the learning model has an influence on students' analytical thinking and process skills. Continued using the correlation test, it was found that there was a relationship between analytical thinking and student process skills using the Jigsaw learning model between junior high schools tested in Batang Hari. Thus, with the Jigsaw model, the higher the student's analytical thinking, the higher the student's process skills. Likewise, using the STAD model, the higher the student's analytical thinking, the higher the student's process skills. The limitations of this research are only the process skills and analytical thinking of grade 8 students, not yet testing grade VII and IX students. And the models used in this study were only Jigsaw and STAD, not yet measuring the learning model of problem solving, PBL and others. So it is recommended to read other articles containing other variables to support the reference

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