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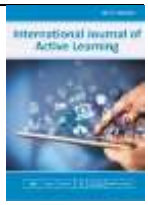

A Comparison of The Learning Outcomes Resulted from Jigsaw and TSTS Learning Models Viewed from The Students' Self Regulated Learning

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Abstract

This is a quasi experimental research aiming to compare the learning outcomes resulted from Jigsaw and Two Stay Two Stray learning models in the context of self regulated learning. The objectives of this research are to investigate (1) whether there is an influence of the learning model on the learning outcomes, (2) whether there is an influence of self regulated learning on the mathematics learning outcomes, and (3) whether there is an interaction between the learning models (Jigsaw and TSTS) and self regulated learning. The population of this research was the eleventh graders of SMA 1 Bringin having the mathematical induction lesson. By employing the cluster random sampling technique, two MIPA (math and science program) classes were selected to be the research subjects. The XI MIPA 2 class was set to be the experimental class, and XI MIPA 4 as the comparison. This research employed the Randomized Control Pretest-Posttest Design Group, the Kolmogorov-Smirnov method to test normality, Leven's method to test homogeneity, and Independent Sample T-Test to test the initial balance of ability. The statistical test program used in this research was SPSS version 24 with 5% significance level. The results of hypothesis testing concluded that (1) there were no differences in the learning outcomes resulted from the cooperative learning model implementation, (2) there were differences in the learning outcomes in the context of self regulated learning, and (3) there was no interaction between the learning models and self regulated learning.

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INTRODUCTION

The current curriculum, i.e. Kurikulum 2013, refers to Permendikbud No. 22 Tahun 2016 which proposes a learning principle establishing students as the learning center and a scientific approach as one way of learning. This is done as to encourage students to independently seek for information from various sources by using a scientific approach that helps them construct good understanding. The scientific approach as proposed by the government through *Permendikbud No. 81 A Tahun 2013* is a learning model consisting of 5 stages, well-known as 5 M, i.e. *mengamati* (observe), *menanya* (inquire), *mencoba* (experiment), *menalar* (deduce), *mengomunikasikan* (present). Each stage is implemented to develop the student's ability to learn independently and to think creatively.

Mathematics should have more attention. Based on the national exam data gathered by Pusat Penilaian Pendidikan Kementerian Pendidikan dan Kebudayaan, the student's average score of the national mathematics exam in 2017/2018 (in Central Java Province) was 43.54. The 2015 survey result of *Programme for International Student Assessment* (PISA) on 72 countries even showed that Indonesia was in the 63rd rank with the mathematics score of 386. Wahyudin (2008:338) states that mathematics is difficult to teach and learn as it needs suffifient knowledge and understanding in order to learn a new topic.

One effort to enhance learning outcomes is by implementing cooperative learning models. Slavin (2011:20) states that peer learning, in which students work together in small groups, is a cooperative learning. The cooperative learning models used in this research were the Elliot Aronson's jigsaw and the Spencer Kagan's *Two Stay Two Stray* (TSTS).

Aronson, et al (Slavin, 2011:24) explains that the characteristics of *Jigsaw* type are the use of small groups in class and the 'breakdown' of the learning topic. The members of the class are organized into small groups, each of whose members is responsible for one part of a topic. Having read or learned the assigned part, each member of different groups having the same part makes a new group, called an expert group. Members of the expert group, then, meet and discuss their assigned part. Having finished the discussion, each member of the expert group returns to their original group and starts teaching the rest of the groupmates about his or her part. Unlike *Jigsaw*, in TSTS (Lie, 2008:61) model, each group member learns the same parts. The topic is not broken down into sub topics. This model requires small groups of four. Two members of each group leaves for another group to teach the members of the new group.

Both learning models share one thing in common, that is, facilitating students to learn the topic and explaining to others. In addition, both models encourage peer learning. The major difference of both models lies in the group work system. TSTS model does not require expert groups as each student learns the same topic. Jigsaw, on the contrary, views all students as an expert, in terms of explaining to their peers.

Both models demand students to independently learn well both individually or in groups. The term *independent* here is defined as try first by oneself to think, to solve problems, and to disseminate information. This self awareness that enables oneself to learn to achieve a goal is the definition of *Self Regulated Learning* according to Brookfield (2000:130). Therefore, self regulated learning became one indicator of the success of a learning process investigated in this study.

There have been several studies on the implementation of cooperative learning models. The study done by Kurniadi et al dkk (2014) in several high schools in Kabupaten Kudus implemented *Jigsaw* learning model with NHT. The result showed that compared to NHT, *Jigsaw* model helped students achieved better. The research by Kusumaningrum et al (2015) in a public junior high school in Kabupaten Sukoharjo which applied TSTS, NHT dan TPS models concluded that TSTS contributed to better learning outcomes.

This research aimed to compare the students' learning outcomes resulted from two cooperative learning models: jigsaw and TSTS. The research participants were the eleventh graders of SMA Negeri 1 Bringin.

The objectives of this research were to investigate the effect of Jigsaw and TSTS learning models on the student's learning outcomes, the interaction between Jigsaw and TSTS learning models and the student's self regulated learning, and the effect of self regulated mathematics learning on the student's learning outcomes. The research problems are formulated as follows: 1) How did Jigsaw and TSTS cooperative learning models affect the learning outcomes of the eleventh graders of SMA Negeri 1 Bringin?; 2) Did self regulated learning affect the mathematics learning outcomes of the eleventh graders of SMA Negeri 1 Bringin?; 3) Was there an interaction between *Jigsaw* and TSTS learning models and the self regulated learning of the eleventh graders of SMA Negeri 1 Bringin?

The findings of this research are expected to give knowledge and insights in the education context, particularly in the area of learning models and self regulated mathematics learning. The findings are also expected to be a reference for future studies in a similar area.

Learning outcome

Dimyati dan Mudjiono (2006:3) explain that learning outcomes are test results in the form of scores and can be established as a benchmark for one student's success in learning school subjects. Learning outcomes are students' achievement in the form of scores obtained from a test administering to students in a certain period of time. The conclusion of learning outcomes is a student's ability through his or her learning experience tested within a certain period of time, the result of which can be used to measure the student's success in a learning process.

Jigsaw learning model

Lie in Rusman (2011:218) explains that *Jigsaw* is one cooperative learning model in which students are put into groups of four to six in order to positively work together and to be responsible for their group.

The steps of *Jigsaw* learning model used in this research were (1) teacher put the students into groups of four to five, (2) each group member received a different sub topic, (3) all group members having the same sub topic left their original group and formed a new group (the expert group) to discuss the sub topic, (4) Having finished discussing in the expert group, all members returned to their original group to teach the subtopic to their group mates, (5) After discussing, each group presented the work, (6) during presentation, teacher and the other groups gave comments and evaluation, and (7) teacher invited all students to conclude the topic having been learned.

Two Stay Two Stray (TSTS) learning model

TSTS is one type of coopearative learning that can make students more active. Students are directly engaged in the learning process, through discussions, questions and answers, and answer quest. Topics or learning materials obtained from the peers can be explained and listened to (Lie, 2008:61).

The steps of TSTS learning model used in this research were: (1) teacher put the students into groups of four, (2) teacher gave one sub topic to each group to be discussed (3) After discussion, two members of each group left their original group and joined another group to share information and work result, (4) two other members of each group stayed within their group to welcome the visitors as well as to share information and work result, (5) After visiting other groups, the 'stray' members returned to their home group to share any knowledge obtained from the other group members, (6) each group reviewed all information, (7) each group presented their work or findings, (8) during presentation, teacher and the other groups gave comments and evaluation, and (9) closing.

Self Regulated Learning

Brookfield (2000:130) states that awareness trigerred by oneself and a learning ability to achieve a goal compose a definition or self regulated learning. Sukarno (1989:64) points out that learners are is considered to be self regulated if they (1) plan and choose their own learning activities, (2) have initiative and encourage themselves to always learn, (3) are responsible for their learning, (4) think critically,

logically and are open minded, also (5) learn confidently. Therefore, self regulated learning comes from the learners themselves.

METHOD

This is a quasi experimental research aiming to obtain information which were the hypotheses of a real experiment conducted in a context where controlling and manipulating all relevant variables were not possible (Sugiyono, 2005:72). This research manipulated two independent variables, namely *Jigsaw* and *Two Stay Two Stray* (TSTS) learning models by considering a moderate variable, i.e., self regulated learning to investigate the effect of the independent variables on the dependent variable (learning outcomes).

The research was conducted at SMA Negeri 1 Bringin located at Jalan Wibisono Gang II No. 3, Bringin, Kabupaten Semarang from August until September 2018. A total of 238 eleventh graders doing their first semester in 2018/2019 were the research population. There were seven groups of eleventh graders; three groups in the social studies program and four in the science program. Through the *cluster random sampling*, two groups of samples were selected, i.e.: XI MIPA 2 and XI MIPA 4, each of which had 34 students. Group XI MIPA 2 was then set as the experimental group implementing *Jigsaw* learning model and group XI MIPA 4 as the control group implementing the TSTS learning model.

This research employed *randomized control group pretest-posttest design* (Budiyono, 2003:54). Three data collection instruments were used in this research. The first was the subject's tenth grade 2017/2018 report card which was used to collect the subject's scores. The scores then served as the *pretest* data. The second was a questionnaire designed to collect data on the subject's self regulated learning. The third was a post test administered to collect data on the subject's learning outcomes on mathematical induction after the treatment.

Table 1. *Posttest* blueprint

Indicators	Level of difficulty	Question number
To determine the mathematical induction into divisibility to prove if $P(k+1)$	easy	1
To prove the mathematical induction into sequences of known numbers	easy	2
To solve the mathematical induction into questions on divisibility	moderate	3
To solve the mathematical induction into questions on inequality	moderate	4
To prove sequences using the mathematical induction	moderate	5

There are two data analysis testing, i.e.: preliminary balance testing and hypothesis testing. Both testing involves testing two different mean scores obtained from two independent samples. In determining the testing type to use, parametric or non-parametric, the normality testing should be administered. *Independent Sample T-Test* should be used if the normality testing is fulfilled. *Mann-Whitney* will be used if the testing of different mean scores is not fulfilled. There are two *Independent Sample T-Test* namely *Equal Variances Assumed* and *Equal Variances not Assumed*. To determine which one to use, the homogeneity testing should be conducted. If the homogenity shows that the two samples have equal variances, *Equal Variances Assumed* will be employed. If the homogenity shows that the two samples do not have equal variances, *Equal Variances not Assumed* should be used.

RESULT AND DISCUSSIONS

The data collection was done from 2 July 2018 until 21 August 2018. The data obtained are described in the following sections.

Descriptive analysis on the sample data before the treatment

There were 34 students in each sample group. Table 2 below shows the data on the subjects' pretest scores.

Table 2. Data on the subjects' pretest scores

	N	Minimum	Maximum	Mean	Standard deviation
Experimental group	34	74,00	86,00	79,5588	2,86241
Control group	34	73,00	84,00	78,6765	3,17872
Valid N (listwise)	34				

Although Table 2 shows that the experimental group has higher scores than the control group, it does not suggest that the experimental group is better than the control group. Therefore, the inferential statistical testing was conducted to investigate whether the two sample groups were equal in the population.

Inferential analysis on the sample data before the treatment

The first testing was the normality testing using SPSS 24.0. As each sample group had more than 30 subjects (34), the *Kolmogorov-Smirnov* testing was used. The result is presented in Table 3.

Table 3. The Normalitas testing on the pretest scores

		Kolmogorov-Smirnov[a]		
	Code	Statistic	df	Sig.
Pretest scores	Experimental	.107	34	.200*
	Control	.150	34	.051

The significance value of the experimental group was 0.200* while that of the control group was 0.051. The significance value which is more than 0.05 for each group suggests that that the samples come from a normally distributed population. Therefore, the homogeneity testing and T-testing were then administered, the results of which are presented in Table 4.

Table 4. The homogeneity testing and *Independent Sample T-Testing*

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Nilai_Awal_Gab	Equal variances assumed	.891	.349	1.203	66	.233	.88235	.73360	-.58232	2.34703
	Equal Variances not assumed			1.203	65.288	.233	.88235	.73360	-.58262	2.34733

As the *Levene's Test for Equality of Variances* shows the significance value of 0.349 (which is more than 0.05), the pretest scores of the experimental and control groups are said to have equal variances. In addition, the *Independent Sample T-Test* (menggunakan *Equal variances assumed*) showing the signifincance value of 0.233

(which is more than 0.05) suggests that both groups have similar pretest scores.

Description of the learning models implementation

Both learning models, *Jigsaw* and TSTS, were applied for learning the mathematical induction topic. The basic competences of this topic are proving mathematical statements and using proving method of mathematical inductions such as sequences, inequalities, and divisibility. The teaching lasted for five meetings, each of which lasted for two hours. The data were obtained from groups MIPA 2 (the experimental group) and MIPA 4 (the control group). The worksheets used in the teaching learning process covered sequences, divisibility, and inequalities topics. The worksheets were validated by 1 lecturer and three mathematics teachers of SMA Negeri 1 Bringin.

The initial stages of the teaching learning procesess for both groups were identical, which refer to Permendikbud No 22 Tahun 2016. These includes greeting and checking the students' attendance, motivating (using Microsoft *powerpoint* as the media), introducing the topic, informing the basic competences, informing the indicator of competence achievement, informing the learning objectives, and starting the teaching learning process.The differences of the two learning models were evident in the main stage of each teaching learning process.

In the experimental group, where *Jigsaw* learning model was applied, the students were put into small heterogenous groups, each of whose members received different sub topics. All members having the same topics then left their home group to form a new group, known as the expert group, in order to discuss their sub topics. Once the discussion was over, each member of the expert group returned to the home or original group to explain the sub topic to the other groupmates.

In the control group, where TSTS learning model was employed, the students were put into small groups, but each group received different topics. Later, two members of each group left their home groups to join another group, a process usually called rotation. It was in this new group the members exchanged information about the topic. After gathering different information from different groups, the two members returned to their original group to discuss the information they had.

The post activity in both teaching learning processes was similar, i.e. drawing conclusions about the topic.

Descriptive analysis on the sample data after the treatment

The data on the post test scores from both sample groups after the treatment are present in Table 5.

Table 5. Data on post test scores

	N	Minimum	Maximum	Mean	Standard Deviation
the experimental group's post test score	34	26,00	100,00	78,6765	17,10524
the control group's post test score	34	50,00	100,00	81,0588	13,74650
Valid N (listwise)	34				

The above table shows that both classes have similar maximum scores. However, the control group has higher minimum and mean scores than the experimental group does. In addition, the control group has lower standard deviation than the experimental group does. This suggests that the data distribution of the control group is better than that of the experimental group.

The data on the self regulated learning of both groups are presented in Table 6.

Table 6. Data on self regulated learning scores

Scores	self regulated learning scores			Total average
	High	Medium	Low	
Experimental group	91.556	72.563	76.889	78.676
Control group	86.500	84.167	72.200	81.058
Total average	89.533	78.706	74.421	

Table 6 highlights the fact that the students with high self-regulated learning scores (91.566) and those with low self-regulated learning scores (76,889) have better average scores if they learn through *Jigsaw* learning model, compared to TSTS one. Meanwhile, the students with medium self-regulated learning scores (85,167) learning through TSTS learning model has higher average score than those with the same score level learning through *Jigsaw*.

However, the inferential statistical testing was still required to determine whether both samples were balanced in the population.

The inferential analysis on the post test scores

The hypothesis testing on the post test scores underwent the same stages as the preliminary balance testing. The result of the *Kolmogorov-Smirnov* normality testing for each learning model and self-regulated learning category is presented in Table 7.

Table 7. The normality testing on the post test scores

		Kolmogorov[a]		
	class	Statistic	df	Sig.
Scores	experimental	.123	34	.200*
	control	.147	34	.059
	high	.130	15	.200*
	Medium	.090	34	.200*
	low	.117	19	.200*

Table 7 shows that each group has the significance level of more than 0.05, which suggests that the data come from a normally-distributed population.

Table 8 presents the result of *Univariate Analysis of Variance,* which tests the homogeinity.

Table 8. The result of homogeinity testing on the post test scores

Levene Statistic	df1	df2	Sig.
1.475	1	66	.229

a. Between sample groups

Levene Statistic	df1	df2	Sig.
2.160	2	65	.123

b. Between self-regulated categories

Tables 8.a and 8.b point out that the significance values between sample groups (0.229) and self-regulated categories (0.123) are more than 0.05. This suggests that the post test scores come from a population of a homogenous variance.

Analysis of variances

Two prerequisites of Anova, the normality and homogeinity testing, had been conducted. The result of two-way Anova with different cells is presented in Table 9.

Table 9. The result of two-way Analysis of variances

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	3347.631[a]	5	669.526	3.313	.010
Intercept	385757.994	1	385757.994	1908.984	.000
Kelas	5.698	1	5.698	.028	.867
KB	1815.844	2	907.922	4.493	.015
Kelas * KB	1137.428	2	568.714	2.814	.068
Error	12528.649	62	202.075		
Total	449957.000	68			
Corrected Total	15876.279	67			

a. R Squared = .211 (Adjusted R Squared = .147)

The above table concludes three things. First, in terms of the effect of the learning models on the learning outcomes, the significance level of 0.867 (which is more than 0.05) suggests that H_0 was accepted. This means there was no significance difference in the learning outcomes resulting from the implementation of *Jigsaw* and TSTS learning models. This confirms the study by Larasati (2017) which stated that the implementation of TSTS and *Jigsaw* learning models did not produce any differences in the cognitive domain of the learning outcomes of both the control and experimental groups. The result of class observations revealed that the cooperative learning models demanded the students not only to be responsible for their learning topic but also to help others in understanding the mathematical induction topic. This is in line with the benefits of the two cooperative learning models, i.e.: foster self-awareness, promote inter-personal relationship that enables learners to value learning process, and enhance self-confidence through group discussions. In addition, the use of worksheets required the students to think further, which led them to achieve higher deduction or reasoning level.

Table 9 shows that the significance value of the students' self-regulated learning is 0.015 (which is lower than 0.05). This means there is a significant difference in the learning outcomes across the self-regulated learning categories. Consequently, a further testing on the inter-column data was required. The *Scheffe* method, a double comparison testing, was then used to trace the post test mean scores of the students of different self-regulated learning categories. Table 10 presents the result.

Table 10. Further testing post-Anova on self-regulated learning variables Scheffe

(I) Self-regulated learning	(J) Self-regulated learning	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
High	Medium	10.8275	4.40625	.056	-.2238	21.8787
	Low	15.1123*	4.90991	.012	2.7978	27.4268
Medium	High	-10.8275	4.40625	.056	-21.8787	.2238
	Low	4.2848	4,07172	.578	-5.9274	14.4971
Low	High	-15.1123*	4.90991	.012	-27.4268	-2.7978
	Medium	-4.2848	4.07172	.578	-14.4971	5.9274

Based on observed means.

The error term is Mean Square(Error) = 202.075.

*. The mean difference is significant at the .05 level.

The result of the double comparison testing on the learning outcomes of the students with high self-regulated learning against those with the medium one yields the significance value of 0.56 (which is more than 0.05). This suggests that there is no significant difference between the two sample groups. This is caused by the fact that the students with high and medium self-regulated learning were serious in learning the topic of mathematical induction. Those students did also not hesitate to learn from their peers. This highlights the characteristics of learners with high and medium self-regulated learning, i.e.: have initiative and motivation in learning and have willingness to learn as well as self-confidence.

The comparison between the learning outcomes of the students with medium self-regulated learning and those with the low one show the significance value of 0.56 (which is more than 0.05). This suggests that there is no significant difference between the two sample groups. However, the result of the class observations points out the difference in the attitude. The students in the category of medium self-regulated learning showed a willingness to understand the topic despite the learning difficulties they were experiencing. The students with low self-regulated learning, on the contrary, only focused on being in class and working on the worksheets. Less willingness in understanding the topic was shown. This confirms the explanation on the characteristics of learnrs with medium and low self-regulated learning, i.e.: consider problems as obstacles, and cannot yet adjust their learning pace.

A different result is shown in the comparison between the learning outcomes of the students with high self-regulated learning and those with the low one. The significance value of 0.012 (which is lower than 0.05) suggests that there is a significance difference between the two post test scores. The post test mean score of the students with high self-regulated learning is 89.533, which is higher that that of those with low self-regulated learning (74.42). The class observation result highlights the fact that while the students with high self-regulated learning were serious in learning and understanding the topic of mathematical induction, those with low self-regulated learning showed less effort. This agrees with the explanation of the characteristics: while learners with high self-regulated learning have initiatie and high motivation to learn as well as are responsible for their topic, those with the low self-regulated learning have less initiative and lower learning motivation. The latter are also less responsible in their learning and see problems as obstacles. This concludes that the students with high self-regulated learning were better than those with low self-regulated learning. In the context of interaction between the cooperative learning model implementation and the level of self-regulated learning, the result produces the significance value of 0.068 (which is more than 0.05). This concludes that there is no interaction of the cooperative learning model implementation variable and the level of self-regulated learning toward the students' learning outcomes.

This condition is caused by the fact that the students with high self-regulated learning are able to learn well regardless of the cooperative learning models. The students with medium self-regulated learning, upon learning through the cooperative learning models, may experience difficulties although they still try to learn and understand the given topic. Unlike the previous two groups, those with low self-regulated learning, upon learning through the cooperative learning models, will experience difficulties. They stay until the class ends with they don't learn or even value the whole learning process.

CONCLUSION

Although there was no significant difference between the learning outcomes of the groups learning through Jigsaw or TSTS model, both models contributed to better learning outcomes. This is shown from the post test scores which are higher than the pre test scores.

There were significant differences among the learning outcomes of the students with high, medium, and low self-regulated learning scores. The differences are explained as follows:

There was no difference in the learning outcomes of the students with high and medium

self-regulated learning scores. This was because the students of both categories were serious in learning and were not shy to seek help if they faced difficulties.

There was no difference in the learning outcomes of the students with medium and low self-regulated learning scores. This was because the students of both categories saw problems as obstacles and could not yet adjust their learning pace.

There was a digificant difference in the learning outcomes of the students with high and low self-regulated learning scores. This was because the students had very different self-regulation on learning. Those with high self-regulated learning are serious and responsible in their learning while those with the low one are not. The students with low self-regulated learning consider problems as obstacles. This explains why there was a significant difference in the post test mean scores.

There was no interaction between the cooperative learning model and the self-regulated learning. This was because the students' self-regulated learning was not affected by the models of the cooperative learning.

REFERENCES

Ahmadi, Abu., dan Nur Uhbiyati. 1990. *Ilmu Pendidikan*. Jakarta: Rineksa Cipta.

Budiyono. 2003. *Metodologi Penelitian Pendidikan*. Surakarta: UNS Press.

Brookfield, Stephen. 2000. *Understanding and Facilitating Adult Learning*. San Fransisco: Josey-bass Publisher.

Dimyati dan Mudjiono. 2006. *Belajar dan Pembelajaran*. Jakarta: Rineksa Cipta.

Kementerian Pendidikan dan Kebudayaan. 2016. *Peringkat dan Capaian PISA Indonesia Mengalami Peningkatan*. https://www.kemdikbud.go.id/main/blog/2016/12/peringkat-dan-capaian-pisa-indonesia-mengalami-peningkatan diakses 20 Maret 2019 pukul 12.42.

Kurniadi. Arsa'ad., dkk. 2014. " Eksperimentasi Pembelajaran Matematika dengan Menggunakan Model Pembelajaran Kooperatif Tipe *Numbered Heads Together* (NHT) dan Tipe *Jigsaw* pada Pokok Bahasan Trigonometri Kelas XI-IPA SMA Se-Kabupaten Kudus DItinjau dari Motivasi Belajar Peserta Didik Tahun Pelajaran 2013/2014. *Jurnal Elektronik Pembelajaran Matematika Vol. 2, No. 7 hal 680-690 September 2014*. Surakarta: UNS.

Kusumaningrum, Ratih., dkk. 2015. "Eksperimentasi Model Pembelajaran Kooperatif Tipe *Two Stay Two Stray* (TSTS), *Numbered Heads Together* (NHT), dan *Think Pair Share* (TPS) pada Materi Lingkaran Ditinjau dari Kreativitas Belajar Matematika Siswa SMP Negeri di Kabupaten Sukoharjo". *Jurnal Elektronik Pembelajaran Matematika Vol. 3, No. 7 hal 705-716 September 2015*. Surakarta: FKIP UNS.

Laporan Hasil Ujian Nasional. 2018. https://puspendik.kemdikbud.go.id/hasil-un/ Diakses pada tanggal 20 Maret 2019 pukul 12.31.

Larasati, Dinar Wahyu. 2017. "Perbandingan Hasil Belajar Menggunakan Model Pembelajaran Kooperatif Tipe *Two Stay Two Stray* dan *Jigsaw* Materi Unsur-Unsur Lingkaran Siswa Kelas VIII SMP N 1 Ampel". *Jurnal Pendidikan Unila Vol. 1, No. 10*. Lampung: Universitas Lampung.

Lie, Anita. 2008. *Cooperative Learning: Mempraktikkan Cooperative Learning di Ruang-Ruang Kelas*. Jakarta: Grasindo.

Muhsetyo, Gatot dkk. 2011. *Pembelajaran Matematika SD*. Jakarta: Universitas Terbuka

Permendikbud No. 22 Tahun 2016, *Tentang Standar Proses Pendidikan Dasar dan Menengah*.

Permendikbud No. 81A Tahun 2013, *Tentang Implementasi Kurikulum.*

Rusman. 2011. *Model-Model Pembelajaran Mengembangkan Profesionalisme Guru*. Jakarta: PT Raja Grafindo Persada.

Slavin, Robert E. 2011. *Psikologi Pendidikan Edisi Kesembilan Jilid 2*. Jakarta: PT Indeks.

Sugiyono. 2005. *Metode Penelitian Kuantitatif, Kualitatif dan R&D*. Bandung: Alfabeta.

Sukarno, Anton. 1989. "Perbedaaan Keefektifan Sistem Buku Pegangan Kuliah Ditinjau dari Bakat, Sikap Mandiri, Persepsi Kualitas Pengajaran pada Mahasiswa Jurusan Ilmu Pendidikan FKIP UNS". Jakarta: IKIP Jakarta.

Undang-Undang Republik Indonesia Nomor 20 Tahun 2003, *Tentang Sistem Pendidikan Nasional*.

Wahyudin. 2008. *Pembelajaran dan Model-Model Pembelajaran*. Bandung: Universitas Pendidikan Indonesia.