



# Improving Student Activity and Learning Outcomes by Applying the Jigsaw Type Learning Model in PPHP Skills Study

Ade Fricticarani<sup>1</sup>, Hasan Maksum<sup>2</sup>

<sup>1,2</sup> Technology and Vocational Education, Padang State University, Padang, Indonesia

## ARTICLE INFO

### Article history:

Received 05 August 2020

Received in revised form 01 September 2020

Accepted 18 October 2020

Available online 01 November 2020

### Keywords:

Jigsaw, activity, learning outcomes

## ABSTRACT

Low student learning activities make teachers often find students confused, students do not do assignments according to systematic work steps so they are in a hurry to do practicum so as not to be late for further learning. This situation is supported by the number of students who score below the KKM, which is 20.53% and the number of students who score above the KKM is 79.45%. Limited space and tools cause students to learn practicum in groups, the teacher teaches with the lecture method so that researchers plan to change the teaching method by applying a jigsaw-type learning model. This study aims to analyze the effectiveness of the jigsaw cooperative model on increasing student activity and student learning outcomes. This type of research is a classroom action research with the model of Kemmis and Mc Taggart. The subjects of this study were 33 students in grade eleven. Data collection techniques through observation sheets, performance appraisal sheets, essay tests, and documentation. Data were analyzed descriptively. The results showed: The application of the jigsaw model can increase learning activities as evidenced by the average student learning activities in the first cycle reached a percentage of 57.6% in the second cycle increased to 90.9%; and student learning outcomes increased to reach the Minimum Completeness Criteria (KKM) in the pre-cycle by 83.3%, increased 20% to 90.9% in the first cycle and increased 10% to 100% in the second cycle. So, the Jigsaw model can improve the activity and learning outcomes of eleventh-grade students.

## 1. Introduction

Good learning is learning that can make students learn actively to find and explore their knowledge (Ariani, 2017; Kasdi & Wijayanti, 2017). Learning is a process of interaction that exists between students and learning components such as teachers, media teaching materials and others. Varied learning is expected to overcome student boredom and boredom because learning is more meaningful and optimal, so that students always show persistence, enthusiasm and full participation (Shophia & Retno Mulyaningrum, 2017). To realize good learning outcomes, teachers cannot help themselves in the learning process because teachers play an important role in realizing these goals (Jaya, 2017; Nurhasanah et al., 2016; Widiartha, 2018). Therefore, teachers are required to be able to create conditions for active learning, teachers must be able to encourage student learning activities. Learning activity is also called active learning because during the learning process it makes students more independent in finding knowledge (Dewi et al., 2019; Mohammad et al., 2017). The existence of good activities will make the learning atmosphere better and this will have an impact on student learning outcomes.

However, in reality, there are still many lessons that have not activated students. This is because many teachers still use learning models that are not following the character of the students or the material. Lack of motivation from students in participating in the teaching and learning process. they are less serious in focusing on following learning material. This is because in the implementation of teaching and learning teachers more often use books as a learning resource, where teachers only use the lecture method in delivering and explaining (Ayuwanti, 2017; Muttaqin et al., 2018; Sumiyati, 2017). This is supported by the results of the interviews conducted.

The results of interviews with students revealed that another obstacle faced by students was that the recipe was given during practice, so that there was no division of tasks in the group before practice, making students feel that the stages that had not been done were considered to have been done by their

group friends. Most students ask the teacher more during practice, making them do what they ask at that time, so students do not do assignments according to the systematic work steps make practical lesson time not according to schedule and students rush to do the practice so they are not late in the eyes of the lesson Furthermore, this condition makes student activity low. The problems mentioned above can be seen from the average results of the eleventh-grade students of SMAN 1 Bukittinggi in odd semesters with a total of 73 (seventy three) students and the minimum completeness criteria (KKM) standard used is 75 (seventy-five). This is illustrated in Table 1 below.

**Table 1.** The Average PPHP Skills Test Results of Eleventh grade students in 2014/2015 Academic Year at SMAN 1 Bukittinggi.

Score Category	The number of students	Percentage of Completeness
≤ 75	15	20,5%
≥ 76	58	79,5%
<b>Total</b>	<b>73</b>	<b>100,0%</b>

Source: PPHP Skills Teacher Agenda at SMAN 1 Bukittinggi

Based on Table 1 shows the number of eleventh grade students who scored below the KKM was 20.5% and the number of students who scored above the KKM was 79.5% with 73 (seventy-three) students. This indicates that students' mastery of learning competencies is problematic because the facts found in the field are not following expectations. In other words, the learning objectives have not been achieved so it is necessary to increase learning outcomes to be more optimal.

The results of the observations showed that PPHP Skills at Madrasah Aliyah had no learning model so that student learning outcomes were still low because eleventh grade students still needed more detailed guidance for the stages to be practiced. The low score of student test results and the choice of students to move to other skills in the eleventh grade is one evidence that PPHP Skills learning has not been effective so students find this subject difficult to implement. This is due to several factors, including Two general classes are combined into one skill class so that the number of students per group (study group) is generally less than 25 (twenty four) people in the tenth grade, approximately 18 (eighteen) people in the eleventh grade and approximately 16 (sixteen) people in the twelfth grade. Too many students cause the learning process not to go well because students will not get individual attention. This causes students to have difficulty practicing because if there is a problem in practice, students must queue to ask the teacher. Students not being served properly make students tend to be lazy in doing practical assignments. The three-hour study time is very short, not sufficient for theory and practice. Theory requires at least one hour of lessons and practice requires a minimum of four hours of lessons, not enough time is given three to four hours of lessons because before cooking, students have to prepare utensils and ingredients for cooking. If this problem is ignored, it will have an impact on the quality of learning and will have an impact on the quality of the output that will be produced.

Overcoming this requires teachers to change teaching methods/models to increase student activity and learning outcomes. The teacher needs to determine the appropriate learning method to apply. One of the learning models that can be used is the jigsaw cooperative model. The jigsaw learning model makes the learning process more interesting because students learn to find and build their knowledge (Shoffa & Suprapti, 2017). Jigsaw cooperative learning is a type of cooperative learning that encourages students to be active and help each other in mastering subject matter to achieve learning outcomes (Kurniawati et al., 2017; Sari, 2014; Thomas & Setiaji, 2014). With the student cooperative learning model, students will be more able to work together in solving problems or assignments given. Students not only learn the material provided, but they must also be ready to provide and teach the material to other group members (Charlier et al., 2016; Fadliyani et al., 2018). Based on this description, it can be said that the jigsaw cooperative learning model can increase student activity and learning outcomes.

Based on this description, several researchers have conducted previous research. The research, among others, research by Almukarram et al., (2017) shows that the results of the t-test show that  $t_{count} > t_{table}$  is for critical thinking  $6.633 > 2.68$ . The conclusion shows that there are differences in students' critical thinking abilities using the application of the jigsaw-type cooperative model with conventional learning on the concept of environmental pollution at SMA Negeri 12 Banda Aceh. Research conducted by Evcim & İpek, (2013) shows that there are significant differences between the jigsaw learning model and the conventional model.

The purpose of this study was to analyze the effectiveness of the jigsaw cooperative model on increasing student activity and student learning outcomes. With this learning model, it is hoped that it can increase student activity and learning outcomes

## 2. Methods

Research conducted by researchers is class action research (Classroom Action Research). The research design used was a research design according to Suharsimi Arikunto's opinion with the Kemmis and Mc Taggart model which included four research components, planning, action, observation, and reflection. The components contained in classroom action research according to [Suharsimi Arikunto \(2006: 17-22\)](#) who adopted from Kemmis and Mc Taggart can be described as follows: The first stage is to compile an action design known as planning. Planning describes what, why, when, where, by whom, and how the action is carried out, the second stage, the implementation of the action is the implementation or application of the contents of the design regarding class action, the third stage is observation or observation, the observation of the implementation and the fourth stage, reflection is an activity to restate what has happened.

The sampling technique following the objectives studied was purposive sampling. Purposive sampling is used when the target sample understudy has certain characteristics so that it is impossible to take another sample that does not meet the predetermined characteristics. The research subjects were students of SMAN 1 Bukittinggi class twelve PPHP Skills, totaling 33 students.

Data collection techniques are the most strategic step in research because the main purpose of research is to get data. Without knowing the data collection technique, the researcher will not get data that meets the established data standards. Data collection techniques that will be used are observation, performance assessment, tests and documentation. The performance grid can be described in table 2 below.

**Table 2.** Performance Assessment

Field	Performance criteria	Assessment aspect	Assessment				Score
			1	2	3	4	
Psychomotor and effective	Preparation	a. Prepare yourself					20
		1. Aprons					
		2. Kerpus / hijab neat					
		3. 2 pieces of napkins					
		4. Black short heels					
	b. Practice preparation	5. Clean and short nails					
		1. Material					
		2. Processing tools					
		3. Tooling					
		4. The room is neat and clean					
Process	Work systematically and effectively					40	
Product	Making products according to the results criteria:					20	
Work attitude	shape, color, taste, texture and attractive product presentation					10	
Time	Work according to work procedures, use work safety equipment appropriately and pay attention to the safety of the work environment					10	
<b>Total</b>						<b>100</b>	

Descriptive data analysis is used to describe the research data as it is and is not used to draw statistical conclusions. The results of descriptive data analysis are reported in the form of mean, median, mode, standard deviation, variance, minimum and maximum score, kurtosis (curve puncturing) and

skewness (curve slope). Presentation of the results of descriptive data analysis can be complemented by using tables, graphs and diagrams (lines, bars, circles).

### 3. Result and Discussion

This research is about increasing the activities and learning outcomes of class XI students by applying the type of jigsaw cooperative learning model in PPHP skills subjects at SMAN 1 Bukittinggi. It was conducted from July 2017 to early August 2017 with two cycles. Before the action is taken, the researcher first conducts a pre-cycle through observation and discussion with the teaching teacher. Based on the results of observations and discussions carried out, it was found that the problems that arose in the PPHP skills learning were that the learning that was carried out by the teacher was still teacher centered. The teacher explains the subject matter with the lecture method in front of the class. The research data was collected using learning activity sheets, performance assessment sheets and written tests.

#### Pre-cycle

When the pre-cycle teacher used the lecture method, there were 33 students (3 sick permits) so that in the pre-cycle the students who attended were 30 students, the recipe was not distributed but was explained by the teacher in front of the class using blackboard media and students took notes on their notebooks. respectively. There was no division of the teacher's group, explaining that the donuts to be made were in several forms such as regular donuts which were hollow in the middle were given ceres, satay was given powdered sugar and bomboloni filled with jam. Students who practice are students with very good activities, while others joke around and talk with friends while waiting for the dough to be ready. When the dough was ready, the students who joked and talked earlier were those who took part in the formation of those who continued the conversation. Besides, the students who were active from starting to make dough, forming, frying and giving toppings were the same person. When cleaning the tools and the room it is carried out by different students. The learning taught by the teacher is not carried out by students, so that many student grades are low because students enter the practice room only to chat with their friends without feeling the responsibility to complete practical assignments as student subject matter.

The details of student learning assessments will be described as follows: First, student learning activities in the pre-cycle are very good 7 students with a percentage of 23.3% and good student learning activities 22 students with a percentage of 73.3% and sufficient student activity 1 student with a percentage 3.3%, the average score of student learning activities is 80.5 with a mean score of 78 and a score that often appears 74. Second, the learning outcomes of students' cognitive tests in the pre-cycle are an average of 83.5 and the mean score is 81.3 with a score that often appears 75. 10 students do not complete this cognitive score. and Third, psychomotor and effective learning outcomes (performance assessment sheet). The practice scores or psychomotor learning outcomes and effectiveness in the pre-cycle were mean 83 and median 85 and mode 87.5. 9 students do not complete this practice. This shows that the activity and learning outcomes of some students are still low, seen in many students who have not met the minimum completeness criteria. The conditions of teaching and learning activities above reflect that the teaching and learning process has not been running optimally. Therefore, researchers collaborated with teachers trying to improve student activity and learning outcomes in PPHP skills subjects.

#### First Cycle

This first cycle research was conducted in one meeting, on Thursday, July 3 2017 for 4x45 minutes. All students attended, 33 students. The implementation stage of learning uses a jigsaw-type cooperative learning model syntax. Based on the observations made, this type of jigsaw cooperative learning can be carried out well but it is still visible from students who are not used to adapting, seem busy during group movements, there are still those who are not used to working with group members, when the teacher directs some students to get used to it. to work together in groups to get a complete score. Teachers and students seem to interact quite well, it can be seen from the presence of students who ask questions because they do not understand the PPHP skills being learned and the teacher also provides explanations to students. Some students were reluctant to ask questions during the discussion but asked questions when having difficulties during practice. Also, the teacher goes around monitoring students' practice in groups. The implementation of the jigsaw cooperative learning model can reduce teacher dominance in learning when compared to previous meetings (pre-cycle).

First, student learning activities in the first cycle were very good 19 students with a percentage of 57.6% and good 14 students with a percentage of 42.4%. The average score of student learning activities in cycle I was 89.6 with a mean score of 90 and a score that often appeared 100. Student learning activities in cycle I was still very good and good, but students who were in very good categories increased from pre-cycle. Second, cognitive learning outcomes (written tests) student learning outcomes in terms of written or cognitive tests, the average score of the first cycle is 85.9 and the middle score is 87.5 with a score that often appears 100 but there are still 9 students who did not complete students. Third, psychomotor and affective learning outcomes (performance assessment sheet). The results of student practice or psychomotor and affective learning in the first cycle, the average score of 81.9 with a mean score of 82.5 and a score that often appeared 82.5 students who did not complete 6 people.

There are several weaknesses or obstacles faced in this first cycle, including 1) Student noise that occurs when students are used to learning alone into group learning because students are still reluctant to apply the jigsaw type of cooperative learning model. 2) Students are still not optimal in the distribution of tasks, there are still those who speak for themselves and are not actively involved in practice, completing assignments is not following the systematic way of making. 3) Student learning activities are good, but there are still 5 students who have not completed the learning outcomes with a percentage of 15% and have not reached the KKM, so there is still something that needs to be improved and improved in the first cycle, so the research is continued in the second cycle

### Second Cycle

This second cycle research was conducted in one meeting, on Thursday, August 10, 2017, for 4x45 minutes. All students attend or 33 students. The implementation stage of the jigsaw cooperative learning model by fixing some of the weaknesses of the first cycle. Based on observations, students formed groups as in the first cycle without any noise. The teacher provides continuous assistance to ensure students practice well and correctly. Students appear to be responsible according to the distribution of tasks and work together to complete the practice properly according to the time given. This type of jigsaw cooperative learning can be done well. So that all students get a complete score or meet a score above the KKM.

First, student learning activities in cycle II are very good 30 students with a percentage of 90.9% and good 3 students with a percentage of 9.1%, with a class average score of 96.2 and a mean score of 98 and a score that often appears 100 Can also be seen in the table below. Second, the students' written test learning outcomes in the second cycle were the class average (mean) score of 88.3 with a middle score (median) of 90 and a score that often appeared (mode) 100, with 6 students incomplete. Third, psychomotor and affective learning outcomes (performance assessment sheet). Psychomotor and affective scores in this second cycle with an average score of 84.8 and a mean score of 78.8 with a score that often appears 100. In this performance, there are still 8 students who are incomplete when their scores are combined with the cognitive scores of learning outcomes the second cycle students are all complete.

### Discussion

Based on the results of the research conducted, several research findings can be obtained, among others. First, there is an increase in student activity after being taught using the Jigsaw cooperative model. This is inseparable from the learning process carried out, with the application of this model will make students express their opinions. The jigsaw cooperative model where the jigsaw cooperative model can help students dare to express their opinions, train students to be confident and responsible for the assignment that has been given (Nurdiansyah & Setuju, 2016; Yassir, 2017). With the student cooperative learning model, students will be better able to work together in solving problems or assignments given. Students not only learn the material provided, but they must also be ready to provide and teach the material to other group members (Charlier et al., 2016; Fadliyani et al., 2018). Students are more active in learning, this makes the learning atmosphere more enjoyable and students are more motivated to learn.

Second, the Jigsaw learning model can improve student learning outcomes. With the jigsaw learning model, active learning will be generated so that students will more easily interact with their peers, so that it has an impact on what students will accept. Jigsaw Type Cooperative learning model, students not only acquire knowledge in the form of cognitive knowledge, but students also have skills in interacting with classmates (Trisianawati et al., 2016). Good interaction in the learning process will have an impact on learning outcomes. Learning is a process of interaction between students and learning resources. Learning can be said to run well and effectively if the interaction can support each other (Abu, 2014; Rukajat, 2013; Sutiari, 2019). A good learning process should involve a lot of students so that students have an important role in teaching and learning activities (Ariani, 2017; Kasdi & Wijayanti, 2017). The role of the teacher is



very important in creating a pleasant learning atmosphere by using a variety of learning models, it is hoped that student learning outcomes can increase (Jaya, 2017; Nurhasanah et al., 2016; Widiartha, 2018). So, it can be said that to achieve quality learning objectives the role of teachers is needed in designing learning. The use of variations in teaching is aimed at overcoming student boredom and boredom due to monotonous learning, by making variations in learning activities it is hoped that learning will be more meaningful and optimal so that students always show persistence, enthusiasm and full participation (Shophia & Retno Mulyaningrum, 2017).

The results of this study are supported by Almukarram et al., (2017) showing the results of the t-test show that  $t_{count} > t_{table}$  is for critical thinking  $6.633 > 2.68$ . The conclusion shows that there are differences in students' critical thinking abilities using the application of the jigsaw-type cooperative model with conventional learning on the concept of environmental pollution at SMA Negeri 12 Banda Aceh. Research conducted by Evcim & İpek, (2013) shows that there are significant differences between the jigsaw II learning model and the conventional model. Research conducted by Alfari, (2014) shows that based on the calculation of the t-test used to determine whether or not the Jigsaw cooperative learning model affects student achievement, the following results are obtained: In the calculation of the t-test, it was found that the score of  $t = 1.466$ , the degree of significance of 5% with  $db = 60 - 2 = 58$ , and  $t_{table} = 2.002$ . From the above calculations, it shows that there is a difference between the class using the Jigsaw cooperative learning model and the class using the conventional learning model because  $t_{count} 1.466$  is smaller than  $t_{table} 2.002$ . Trisianawatia et al., (2016) show that there are differences in student learning outcomes taught by the Jigsaw Type cooperative learning with students taught by learning lectures on vector material. It is concluded that the application of the Jigsaw Type Cooperative learning model is quite influential on improving student learning outcomes on vector material in the tenth grade of SMA Negeri 1 Sanggau Ledo.

Based on these results, it can be said that with the jigsaw model, the learning process will be more active in learning which has an impact on learning outcomes. Students learn to work together and interact with their friends so that the learning process is comfortable and makes the learning process more meaningful.

#### 4. Conclusion

Based on the results of the discussion, it can be said that with the Jigsaw learning model students will be more active in learning. And students will be more courageous in expressing their opinions in the learning process and the learning process there is also a good interaction process between students and students, students and teachers. And of course, this has an impact on student learning outcomes which have also increased.

#### References

- Abu, S. N. (2014). Pembinaan Guru Oleh Kepala Sekolah dalam Pengelolaan Pembelajaran di Sekolah Dasar. *Jurnal Administrasi Pendidikan*, 2(1), 704–831. [e-jurnal.fip.unp.ac.id/index.php/bahan/article/viewFile/3816/3049](http://e-jurnal.fip.unp.ac.id/index.php/bahan/article/viewFile/3816/3049)
- Alfari, A. (2014). Pengaruh Model Pembelajaran Kooperatif Jigsaw Terhadap Prestasi Belajar Menggambar Bentuk di SMA Negeri 3 Tuban. *Jurnal Pendidikan Seni Rupa*, 2(3), 117–127. <https://ejournal.unesa.ac.id/index.php/va/article/view/9900/9694>
- Almukarram, Sarong, M. A., & Apriana, E. (2017). Penerapan Model Pembelajaran Kooperatif Tipe Jigsaw Terhadap Peningkatan Kemampuan Berpikir Kritis pada Konsep Pencemaran Lingkungan di SMA Negeri 12 Banda Aceh. *BIOTIK: Jurnal Ilmiah Biologi Teknologi Dan Kependidikan*, 4(1), 8. <https://doi.org/10.22373/biotik.v4i1.1066>
- Ariani, T. (2017). Pembelajaran Kooperatif Tipe Team Assisted Individualization (TAI): Dampak Terhadap Hasil Belajar Fisika Siswa. *Jurnal Ilmiah Pendidikan Fisika Al-Biruni*, 6(2), 169. <https://doi.org/10.24042/jipfalbiruni.v6i2.1802>
- Ayuwanti, I. (2017). Meningkatkan Aktivitas dan Hasil Belajar Matematika Menggunakan Model Pembelajaran Kooperatif Tipe Group Investigation di SMK Tuma'ninah Yasin Metro. *SAP (Susunan Artikel Pendidikan)*, 1(2), 105–114. <https://doi.org/10.30998/sap.v1i2.1017>
- Charlier, N., Van Der Stock, L., & Iserbyt, P. (2016). Peer-assisted Learning in Cardiopulmonary Resuscitation: The Jigsaw Model. *Journal of Emergency Medicine*, 50(1), 67–73.

<https://doi.org/10.1016/j.jemermed.2015.04.002>

- Dewi, L. V., Ahied, M., Rosidi, I., & Munawaroh, F. (2019). Pengaruh Aktivitas Belajar Terhadap Hasil Belajar Siswa Menggunakan Model Pembelajaran Discovery Learning Dengan Metode Scaffolding Lus. *Jurnal Pendidikan Matematika Dan Ipa*, 10(2), 299–213. <https://doi.org/10.26418/jpmipa.v10i2.27630>
- Evcim, H., & İpek, Ö. F. (2013). Effects of Jigsaw II on Academic Achievement in English Prep Classes. *Procedia - Social and Behavioral Sciences*, 70, 1651–1659. <https://doi.org/10.1016/j.sbspro.2013.01.236>
- Fadliyani, F., Muhibbuddin, M., & Sarong, M. A. (2018). Pembelajaran Kooperatif Tipe Jigsaw Pada Konsep Sistem Pencernaan Makanan Manusia Terhadap Hasil Belajar Siswa SMA Negeri 1 Sakti Kabupaten Pidie. *BIOTIK: Jurnal Ilmiah Biologi Teknologi Dan Kependidikan*, 2(1), 17. <https://doi.org/10.22373/biotik.v2i1.230>
- Jaya, H. N. (2017). Keterampilan Dasar Guru untuk Menciptakan Suasana Belajar yang Menyenangkan. *Jurnal Pendidikan Dan Ilmu Pengetahuan*, 17(1), 23–35. <http://103.114.35.30/index.php/didaktis/article/view/1555/1275>
- Kasdi, K., & Wijayanti, D. N. (2017). Pembelajaran Bahasa Inggris Efektif Melalui Lagu Anak-Anak Untuk Siswa Madrasah Ibtidaiyah. *Elementary*, 4(1). <https://doi.org/10.21043/elementary.v4i1.1931>
- Kurniawati, K. R. A., Budiyo, & Saputro, D. R. S. (2017). Penerapan Model Pembelajaran Kooperatif Tipe Jigsaw Dan Numbered Heads Together Ditinjau Dari Kecerdasan Interpersonal Siswa Pada Pokok Bahasan Bangun Ruang Sisi Datar. *Jurnal Pendidikan Matematika*, 11(1). <https://doi.org/10.22342/jpm.11.1.3948.15-28>
- Mohammad, F. H., Suwignyo, H., & Mudiono, A. (2017). Penerapan Model Inkuiri untuk Meningkatkan Aktivitas dan Hasil Belajar IPA pada Siswa KELAS V. *Jurnal Pendidikan - Teori, Penelitian, Dan Pengembangan*, 1, 20–29. <https://doi.org/http://dx.doi.org/10.17977/jptpp.v2i12.10315>
- Muttaqin, N. H., Yaminah, S., & Utomo, S. B. (2018). Penerapan Model Pembelajaran Langsung (Direct Instruction) Disertai Diskusi dan Media Hyperchem untuk Meningkatkan Aktivitas dan Prestasi Belajar pada Materi Ikatan Kimia Kelas X 1 SMA Islam 1 Surakarta Tahun Pelajaran 2016/2017. *Jurnal Pendidikan Kimia*, 7(1), 62. <https://doi.org/10.20961/jpkim.v7i1.24564>
- Nurdiansyah, A., & Setuju. (2016). Penerapan Model Pembelajaran Kooperatif Tipe Jigsaw. *E-Jurnal Mitra Sains*, 4(2), 54–61. <https://doi.org/http://dx.doi.org/10.30738/jtv.v4i1.373>
- Nurhasanah, I. A., Sujana, A., & Sudin, A. (2016). Penerapan Metode Role Playing Untuk Meningkatkan Hasil Belajar Siswa Pada Materi Hubungan Mahluk Hidup Dengan Lingkungannya. *Penerapan Metode Role Playing Untuk Meningkatkan Hasil Belajar Siswa Pada Materi Hubungan Mahluk Hidup Dengan Lingkungannya*, 1(1), 611–620. <https://doi.org/10.23819/pi.v1i1.2992>
- Rukajat, A. (2013). Pembelajaran Contextual Teaching and Learning Untuk Meningkatkan Mutu Hasil Pembelajaran. *Journal of Chemical Information and Modeling*, 53(9), 85–111.
- Sari, M. K. (2014). Pengaruh Metode Kooperatif Jigsaw Terhadap Prestasi Belajar Mata Pelajaran Ips Pada Siswa Kelas III Maya Kartika Sari\*. *Premiere Educandum*, 4(2), 133–147. <https://doi.org/http://doi.org/10.25273/pe.v4i02.313>
- Shoffa, S., & Suprpti, E. (2017). Peningkatan Hasil Belajar Mahasiswa pada Mata Kuliah Metode Numerik dengan Model Pembelajaran Kooperatif Jigsaw. *MUST: Journal of Mathematics Education, Science and Technology*, 2(2), 178–188. <http://journal.um-surabaya.ac.id/index.php/matematika/article/view/736>
- Shophia, A., & Retno Mulyaningrum, E. (2017). Pengaruh Model Pembelajaran Reciprocal Teaching Berbantu Media Pictorial Riddle Terhadap Kemampuan Berpikir Kritis Dan Hasil Belajar Kognitif Siswa. *BIOMA Jurnal Ilmiah Biologi*, 6(1). <https://doi.org/10.26877/bioma.v6i1.1486>
- Sumiyati, E. (2017). Penggunaan Model Pembelajaran Interaktif Berbasis Aktivitas Untuk Meningkatkan Prestasi Belajar Siswa Kelas Vi Pada Pelajaran Pkn Sd Negeri 09 Kabawetan. *Jurnal PGSD*, 10(2), 66–72. <https://doi.org/10.33369/pgsd.10.2.66-72>
- Sutiari, N. L. (2019). Penerapan Model Pembelajaran Kooperatif Tipe Tai (Team Assisted Individualization) Untuk Meningkatkan Aktivitas Dan Prestasi Belajar Pada Mata Pelajaran Tata

- Graha. *Jurnal Ilmiah Pendidikan Dan Pembelajaran*, 3(1), 32. <https://doi.org/10.23887/jipp.v3i1.17107>
- Thomas, P., & Setiaji, K. (2014). E-Learning Dengan Pendekatan Kooperatif Tipe Jigsaw Untuk Meningkatkan Aktivitas Dan Hasil Belajar Mahasiswa. *Dinamika Pendidikan Unnes*, 9(1), 21–40. <https://doi.org/10.15294/dp.v9i1.3353>
- Trisianawati, E., Djudin, T., & Setiawan, R. (2016). Pengaruh Model Pembelajaran Kooperatif Tipe Jigsaw Terhadap Hasil Belajar Siswa Pada Materi Vektor Di Kelas X Sma Negeri 1 Sanggau Ledo. *Jurnal Penelitian Fisika Dan Aplikasinya (JPFA)*, 6(2), 51. <https://doi.org/10.26740/jpfa.v6n2.p51-60>
- Trisianawatia, E., Djudinb, T., & Setiawanc, R. (2016). Pengaruh Model Pembelajaran Kooperatif Tipe Jigsaw Terhadap Hasil Belajar Siswa Pada Materi Vektor Di Kelas X Sma Negeri 1 Sanggau Ledo. *Jurnal Penelitian Fisika Dan Aplikasinya (JPFA)*, 06(02), 51–60. <https://doi.org/http://dx.doi.org/10.26740/jpfa.v6n2.p51-60>
- Widiartha, K. D. R. (2018). Pengaruh Model Pembelajaran Visualization Auditory Kinesthetic Berbantuan Multimedia Interaktif Terhadap Kompetensi Pengetahuan IPA. *Jurnal Penelitian Dan Pengembangan Pendidikan*, 2(2), 145. <https://doi.org/10.23887/jppp.v2i2.15396>
- Yassir, M. (2017). Model Kooperatif Jigsaw untuk Meningkatkan Aktivitas Belajar Siswa pada Materi Pencemaran dan Kerusakan Lingkungan. *BIOTIK: Jurnal Ilmiah Biologi Teknologi Dan Kependidikan*, 3(2), 138. <https://doi.org/10.22373/biotik.v3i2.1004>