

## Description of Student Response on The Implementation of Cooperative Learning Models of Jigsaw and Role Playing on The Physics Learning

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### Abstract

Education is a conscious effort through planning that is prepared by considering various aspects that are important for developing student potential. One of the efforts can be made is implementing a cooperative learning model. This study aims to determine the differences in the results of the application of the Jigsaw cooperative learning model and role playing in physics as well as student responses to the application of the two learning models. This research procedure uses mixed methods using quantitative data obtained by questionnaires, qualitative data is obtained by conducting interviews. The results showed that there were still many students who responded well to the application of the jigsaw cooperative learning model in learning physics but in contrast to student responses to role playing learning. This study aims to determine student responses to the implementation of the Jigsaw cooperative learning model and role playing in physics subjects and to determine the differences in the application of those two models in physics subjects. The novelty of this study is to describe student learning outcomes with the physics learning process and student responses when using the jigsaw cooperative learning model and the role-playing model in physics to make it easier for students to learn and understand concepts and formulas in physics learning. The results showed that many students responded to the application of the jigsaw cooperative learning model and the role-playing learning model in physics learning well. The novelty of this research is that it can improve students' attitudes towards physics by using the jigsaw cooperative learning model and the role playing model.

**Keywords:** a model of learning, role-playing, cooperative, jigsaw

### INTRODUCTION

Education is the basis for developing the potential resources of students' thinking power (Astalini, Kurniawan, & Sumaryanti, 2018). Education is an effort create resources human quality and very important for increase mindset of education in Indonesia (Asrial, Syahrial, Kurniawan & Septiasari, 2019). According to Astalini, Kurniawan, Melsayanti & Destianti, (2018), education is also an effort made to create an atmosphere of learning and learning process so that students are active. it needs to be supported by appropriate teaching processes so that students' abilities can develop (Utama, Maison & Syarkowi, 2018). This is in line with the research of Astalini, Kurniawan, Sulistiyo & Perdana (2019) that education the present requires very much the use of technology to

improve the competence of increasing human resources

The education level of high school, students are required to study various sciences, such as science. One part of science is physics at school, physics teaching is generally carried out by the lecture method (Hardiyanti, Astalini & Kurniasari (2018). This is because the use of the lecture method is considered to be able to complete learning with the time provided. In other hand, education is a goal done by someone to get knowledge, skills, and habits in life (Asrial, Syahrial, Kurniawan & Perdana, 2019). So the learning process is should be pursued through learning strategies, learning models, etc (Pransiska, Asyharhar & Asrial, 2016). The reason is that at this level students already have the ability to think as a scientific development with a student mindset related to physics subjects.

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Physics is a branch of science that has its uniqueness and characteristics. The uniqueness of physics lies in the existence of concepts that are abstract and require idealization through mathematical modeling (Maison, Syahrial, Syamsurizal, & Tanti, 2019). In learning physics, it is important to consider the learning model used. Because every student has a different view of the subject of physics. Some students view physics as a difficult subject and those who view physics as a pleasant subject (Astuti, 2015: 68).

Physics learning is very important to learn because learning physics is the most basic learning (Darmaji, Kurniawan, Astalini & Nasih, 2019). In the learning process, the attitude of students is very important. To make it easier for students to understand the concept and be interested in learning physics, the teacher must prepare methods that can help students by acting as learning facilitators that bring students to excel in learning objectives. Therefore teachers need to know motivational techniques that will generate interest in physics lessons for students (Manizar, 2015).

In teaching physics, using a learning model that makes students active will provide positive support for students. Since the learning model is a plan that is used as a guide in planning classroom learning (Kusnadi, 2018), the learning process can be carried out using innovative learning models (Sururoh, Setyosari, & Subanji, 2018).

Based on the results of preliminary research in two schools, information was obtained that the form of intervention used in SMA 1 Muaro Jambi was a role playing learning model and at SMA 3 Muaro Jambi used the jigsaw cooperative model. This application received a positive response from students. This positive response is important in the learning process, especially in physics learning which involves formulas in explaining the concept and becomes an obstacle for students to understand the concept.

The initial research that has been done was followed up by conducting an interview with a physics teacher at SMA Negeri Muaro Jambi and information was obtained that in the physics learning process teachers tend to use the lecture

model. This choice has an impact on the teacher-centered learning process. It is known that choosing the right learning model can attract students' interest (Ismawati, 2017). The two learning models separately show the potential to increase students' activeness and interest in physics.

The advantages and disadvantages of the jigsaw learning model and *role-playing* are explained simply by Abdullah (2017). According to him, the advantages of both learning model are in terms of increasing students' motivation, mutual respect between fellow student, provides opportunities to express ideas openly because of the limited number of students in each group, as well as train students to be able to communicate effectively.

Otherwise, there are some weaknesses of the jigsaw type cooperative learning model according to Abdullah (2017). He said that the principle of the main learning model is learning from one's own friends, this would be a constraint due to differences in perception in the understanding of the concepts that will be on discussing together with students other. In this case, teacher supervision is absolutely necessary so that there are no errors in learning. It is difficult to convince students to be able to discuss the material presented to friends, if students do not have self-confidence from an early age. the use of learning models is difficult to control and usually takes a long time.

Based on the background described, the objectives of this study are:

1. To find out the description of the responses that students have on the application of the Jigsaw cooperative learning model and role-playing in physics subjects.
2. To find out the differences in applying the Jigsaw cooperative learning model and role-playing towards students learning results.

## METHOD

The research uses the Mix-type parallel-convergent method. According to Ashari, Lestari & Hidayah (2016: 11) Mixed Method Research, namely, by combining qualitative and quantitative research types. Quantitative data is obtained by collecting data in the form of a questionnaire.

Qualitative data were obtained using an interview instrument sheet.

For the data qualitative model of learning cooperative type of jigsaw and role-playing, the techniques used were interviews with an interview sheet instruments. Whereas for quantitative data the type of jigsaw cooperative learning model and role-playing data were collected using a questionnaire instrument. The questionnaire is a list of questions used as a researcher to obtain data (Istijanto, 2005). The questionnaire instrument for the cooperative learning model type jigsaw and role playing that the researcher used was an instrument adapted from Diyas Sari Devi's research conducted in 2012 by changing the name of the model used. The questionnaire uses a Likert scale.

This research was conducted in SMA Negeri 3 Muaro for models of learning cooperative type of jigsaw and in SMA Negeri 1 Muara Jambi to models of learning role-playing. Samples from this study were taken by looking at and considering the average mid semester scores in physics learning. The number of samples in this study was 20 people for the type of jigsaw cooperative learning model, and 29 people for the role-playing learning model. The analysis technique used for quantitative data is a descriptive statistical analysis using the SPSS 25 application. Quantitative data is obtained by collecting data in the form of a questionnaire.

In this study, the research sample was taken in class XI IPA 1 as the experimental class 1 which applied a role-playing learning model. While the cooperative learning model type jigsaw samples taken are in class X IPA 2. The sampling technique in this study using purposive sampling.

## RESULT AND DISCUSSION

The novelty of this research is description learning outcome of student with look learning process and response of student when the use of a jigsaw cooperative learning model and a role playing model in physics to make it easier for students to learn and understand concepts and formulas in physics. This jigsaw cooperative models is one of the flexible learning models. Because in learning, students are

divided into heterogeneous groups. Mustamiin (2016: 67-67), says that the type of jigsaw cooperative learning has the characteristics of the teacher showing a student who represents the group, without first telling who will be appointed later. This method is felt to be able to involve all students and be able to increase the sense of responsibility of group members. According to Slavin (2008), in practice, the jigsaw-type cooperative learning model requires the following preparations:

1. Material  
Before lessons begin, the teacher selects one or two chapters, stories, or other units then makes an expert sheet for each unit and creates a quiz, essay test, or another form of assessment for each unit. To help guide the discussion in expert groups use discussion schemes.
2. Divide students into initial groups  
Divide students into heterogeneous groups of four to five members.
3. Divide students into expert groups  
Students can be assigned to random groups of experts or decide for themselves which students will belong to which expert group.
4. Determination of the first score  
The initial score represents the average score of the student on the previous quiz or if a quiz has never been held, then you can use the results of the student's last score from the previous year.

The steps of implementing the jigsaw cooperative learning model according to Rachmawan, Suyitno & Agoestanto (2013).

**Table 1.** Phases of the Jigsaw Type Cooperative Learning Model

Phase	Teacher activities
Phase 1	Students are divided into several groups (each group consists of 5-6 students)
Phase 2	The subject matter is given to students in the form of text which has been divided into several subchapters
Phase 3	Each member of the group read the sub-chapters are assigned and responsible for the study.
Phase 4	Members of a group of others who have studied the sub-chapters which together meet in groups of experts to

Phase	Teacher activities	Phases	Information activities
	discuss.		such.
Phase 5	Each member of the expert group after returning to his group is in charge of teaching his friends .	Selecting Players (Participants)	At step are students and teachers to discuss the character of the players and determine who is going to play a role.
Phase 6	At meetings and group discussions, students are charged in the form of individual quizzes.	Setting the Stage	In this step, the teacher discusses with students where and how that role will be played.
		Preparing Observer (Observer) Role-Playing/Stage	In this step students who do not play the role are asked to be game observers. In this step, students who have got a role-play their role.
		Discussion and Evaluation	In this step, the teacher guides students to evaluate the results of the role play.
		Playing the role	In this step, if there are still students who do not understand or there are still many mistakes, then the role-play is repeated.
		Discussion and Evaluation to Two	In this step, evaluate the 2nd student's game

According to Tarigan (2014), role playing learning model is a social learning model. In its application, the role-playing learning model assigns students to play a character in the material or events that are revealed in a simple story. Baroroh (2011), proposed the steps of role-playing based learning namely: 1) Provide an explanation of the competencies to be achieved. 2) Calling students who have been appointed to carry out the prepared scenario. 3) Each student their respective groups, while paying attention and observing the scenario being modeled. 4) After completing the performance, each student is given a paper as a worksheet to discuss. 5) Each group presents its conclusions. 6) The teacher provides general conclusions. 7) Evaluation.

Sari (2018: 64) stated that the role-playing learning model consists of several syntaxes (activity steps) which are detailed in in Table 2.

**Table 2.** Phases of the Role-playing Learning Model

Phases	Information activities
preliminary	At step is the teacher introduces students in a problem with reading a story or asking questions inducement that makes students think about issues

In this research, the Jigsaw cooperative learning model was applied with in circular motion material and role-playing learning models in temperature and heat material. The statistical results obtained about students' responses to the application of the jigsaw cooperative model in physics were displayed in Table 3 and role playing model in Table 4.

**Table 3.** Students' responses to Jigsaw

Characteristics				Mean	Median	Min	Max
Interval	Category	freq	Percentage %				
20.0-36.0	Not good	0	0	67.05	66	60	79
36.1-52.0	Not good	0	0				
52.1-68.0	Very good	13	65				
68.1-84.0	Good	7	35				
84.1-100	Very good	0	0				
Total		20	100				

**Table 4.** Students' responses to and role-playing models

Characteristics				Mean	Median	Min	Max
Interval	Category	Freq	Percentage %				
20.0-36.0	Not good	0	0	63.24	63	57	80
36.1-52.0	Not good	0	0				
52.1-68.0	Pretty good	28	96.6				
68.1-84.0	Good	1	3.4				
84.1-100	Very good	0	0				
Total		29	100				

Based on the data displayed, it shown that the response given by students can be affected by the learning process and on the learning outcomes of the student. According to Rahman, Ahmar & Rusli (2016: 425), in essence, the cooperative learning model puts students into a team or group. The group formed consisted of four to six heterogeneous learners (Majid, 2014). Each group member is expected to be able to work together. Because cooperation in learning is a positive attitude and can improve learning outcomes (Putri, Maison & Darmaji 2018). The application of cooperative learning models is done by optimizing teaching and learning activities using cooperation and contribution in each group member (Pujiasri, 2018). One type of cooperative learning is the jigsaw type. According to Rusman (2013), in the Jigsaw type cooperative learning model, students are required to cooperate and positive interdependence among group members and be able to take responsibility independently.

The subject of Class X science II subjects in SMA Negeri 3 Muaro Jambi reach quite good result with an average consideration of 66. The most dominant response of students is quite good which is equal to 65% (13 out of 20 students). The following results are supported by the following interview results:

Question : Is the Jigsaw type cooperative learning model more useful and makes you skilled in learning physics?

Answer : This learning model is quite

useful and makes me skilled, but I don't like it when moving groups

Question : Does learning physics using a jigsaw cooperative learning model make you sleepy during the learning process?

Answer : No. Because if I'm sleepy, I will be confused when the group has changed positions.

Question : Does learning physics using a cooperative learning model make you more motivated?

Answer : Yes. But once in a while, I feel lazy because I have to move seats.

Furthermore, there are 35% (7 out of 20 students) responded to the application of the Jigsaw cooperative learning model in physics subjects well. This result is supported by the following interview results:

Question : Is the Jigsaw type cooperative learning model more useful and makes you skilled in learning physics?

Answer : Of course, because the implementation of this type of jigsaw cooperative learning model makes the classroom atmosphere come alive. That made me feel that learning physics was fun.

Question : Does learning physics using a jigsaw cooperative learning

model make you sleepy during the learning process?

Answer : No. Because I like the way to learn using a jigsaw cooperative learning model.

Question : Does learning physics using a jigsaw cooperative learning model make you more motivated?

Answer : I want to understand more about learning material so that I can discuss it with friends.

Based on the results of descriptive statistics and answers provided by students when interviewed, it appears that there are still many students who respond to the application of the Jigsaw type cooperative learning model in physics learning quite well. And there are no students who respond poorly or even poorly to the application of the Jigsaw cooperative learning model in physics.

A variety of students' responses to the application of the Jigsaw cooperative learning model. According to Sobur (2003), broadly speaking factors influence individual learning, namely, endogenous factors or also called internal factors, namely all factors that are within the individual, exogenous factors or often also called external factors, namely all factors that are outside the individual, such as parents or environmental conditions around the individual.

One indicator of the success of physics learning goals at the high school level is determined by the accuracy of the learning model used by the teacher when learning physics. This can be seen when students give positive responses to their teacher. According to Suwondo, Astalini & Darmaji (2019), the success or failure of learning achievement cannot be separated from the teacher in applying models and methods that can encourage students to learn. The use of a learning model will be effective if the application is carried out following the learning objectives (Lidiana, Gunawan & Taufik, 2018). The model chosen must be adapted to the subject matter, each material should be delivered in a variety of ways so that students are not bored. However, the use of learning models also needs to pay attention to the characteristics of students, because high school students tend to have a high enough level of thinking ability and some are low and the mindset is still simple so it needs systematic guidance to be able to improve their thinking ability (Paradina, Connie & Medriati, 2019).

The implementation of good learning can occur if the teacher and students work together in implementing the learning process so that the learning that is carried out can be successful. The success of learning activity can be seen

from the increased student learning outcomes. While the use of learning models can increase student learning activities so that students feel responsible for solving problems in the learning process (Nur, Haeruddin & Tewa, 2019). Based on the principles in the 2013 curriculum, which is encouraging students to play an active role starting with students observing certain phenomena, where teachers can arouse students' curiosity about the phenomenon. So that in this curriculum the teacher only acts as a motivator and facilitator. However, at the end of the learning activity, the teacher explains to be better the material from the learning activity. So that the material is delivered correctly and correctly (Parasamya & Wahyuni, 2017).

Therefore, learning by discovery is one technique that can be done to help students create and organize knowledge that involves conscious participation and active inquiry, usually occurring during problem-solving situations (Mirnawati & Rusdiana, 2016). The strategy taken is that students are required to actively build knowledge, no longer just receive knowledge passively from the teacher. The role of students must be further enhanced in the learning process, ideas that are owned by each student should be raised by the teacher.

Student responses to this role-playing learning model have been said effective enough because students When learning physics using a role-playing learning model, it looks very happy and enthusiastic in learning. When the physics lesson is taking place and the teacher applies the learning model by distributing groups to play a role (role-playing) students are very enthusiastic in learning. Group work can provide students with a more accurate picture of how others see themselves and get a better understanding of themselves so that they can help evaluate students' interpersonal behavior (Kurniawan, Astalini & Anggraini, 2018). The physics material is distributed to each group then plays a role according to the physics material provided. Student responses when learning takes place, namely students tend to be bored when using the lecture method, students will play and tell stories during learning. By looking at the data with 28 students who have a positive response to the learning model provided. The positive and negative attitudes students have when learning physics are also diverse. Positive attitudes that arise, for example, enthusiasm during teaching and learning activities, feeling happy and curious about the subject matter of physics (Maison, Astalini, Kurniawan & Sholihah, 2018). In this learning process improving the quality of this mindset, it needs to be supported by appropriate teaching processes so that students' abilities can develop well (Utama, Maison & Syarkowi, 2018).

The average percentage of students' positive responses is 96.6%, students have followed the lesson well. Learning using the role-playing method increases student activity. The physics concept that is difficult to play will be quickly understood by students, students are not easily bored by using this learning model, students are very active during lessons. Students prefer learning with a little game but it still involves the concept of subject matter, rather than just learning to listen to the teacher in front of it will make students focus less on the subject, including physics lessons that have many formulas. The concepts in physics can be understood by students because they involve examples from everyday life. With the help of this type of jigsaw cooperative learning model, students will easily understand formulas and concepts in physics.

This role-playing learning model does not make students tense in learning. Student responses to this learning model have given a positive response. Students' understanding of the concepts of physics has its factors, some have extensive knowledge so it will be easier to understand the concepts or physical formulas. This finding is in line with Maison, Safitri & Wardana (2019) finding that "the breadth and depth of students' understanding of physical concepts can illustrate the conceptual knowledge that the student has". The factors of liking and disliking the lesson can also affect the learning process, excessive anxiety will cause interference and become a barrier to one's function in his life ( Nofrialdi, Maison & Muslim, 2018). Students' understanding of physics will be easier if the concepts of physics are applied in everyday life. This is in accordance to Astalini, Kurniawan & Putri (2018) that students are still unable to apply knowledge and understand it to be useful in everyday life.

### CONCLUSION

The conclusion of the research conducted is seen from the responses of students using jigsaw type cooperative learning models and role playing to physics subjects. Based on the results of descriptive statistics and answers given by students, it appears that there are still many students who respond to the application of jigsaw type cooperative learning models. In physics learning is quite good. And there are no students who respond poorly or even poorly to the application of the jigsaw cooperative learning model in physics. In contrast to respon students to the learning model of role playing is already said to be sufficient for students when studying physics using this model looks very happy and enthusiastic in learning.

With the help of this learning model students will easily understand the formulas and concepts in physics. This type of jigsaw cooperative learning model is very useful for improving physics lessons, student responses are very important in using the learning model. Choosing a good learning model will affect students' learning attitudes.

### REFERENCES

- Abdullah, R. (2017). Pengaruh Penerapan Model Pembelajaran Kooperatif Tipe Jigsaw Pada Mata Pelajaran Kimia Di Madrasah Aliyah. *Lantanida Journal*, 5(1), 13-28.
- Asrial, Syahrial, Kurniawan, D.A., & Septiasari, R. (2019). Hubungan Kompetensi Pedagogik Dengan Kompetensi IPA Mahasiswa Pendidikan Guru Sekolah Dasar [Relationship of Pedagogical Competence and Science Competency of Elementary School Teacher Education]. *Pedagogia: jurnal pendidikan*, 8(2). 149-156.
- Astalini, A., Darmaji D., Kurniawan, D. A., & Destianti, A. (2019). Description of the dimensions of attitudes towards science in junior high school at Muaro Jambi. *International Journal of Sciences: Basic and Applied Research (IJSBAR)*, 47(1), 1-11.
- Astalini, Kurniawan, D. A & Sumaryanti. (2018). Sikap siswa terhadap pelajaran fisika di sman kabupaten batanghari. *Jurnal Ilmu Pendidikan Fisika*, 3 (2). 59-64.
- Astalini., Kurniawan, D. A., Sulistiyo, U., & Perdana, R. (2019). E-Assessment Motivation in Physics Subjects for Senior High School. *International Journal of Online & Biomedical Engineering*, 15(11), 4-15.
- Astuti, S. P. (2015). Pengaruh kemampuan awal dan minat belajar terhadap prestasi belajar fisika. *Formatif: Jurnal Ilmiah Pendidikan MIPA*, 5(1).68-75
- Axinn, W.G. & Pearce, L.D. (2006). *Mixed-Method Data Collection Strategie. United States of America*: Cambridge University Press
- Baroroh, K. (2011). Upaya Meningkatkan Nilai-Nilai Karakter Peserta Didik Melalui Penerapan Metode Role Playing. *Jurnal Ekonomi & Pendidikan*, 8(2), 151-152
- Danial,M., Gani, T., & Husnaeni. (2017). Pengaruh model pembelajaran dan kemampuan awal terhadap kemampuan berpikir kritis dan pemahaman konsep peserta didik. *Journal of Educational Science and Technology*, 3 (1), 18- 32.
- Darmaji, Kurniawan, D. A., Astalini, & Nasih, N.R. (2019). Persepsi Mahasiswa pada

- Penuntun Praktikum Fisika Dasar II Berbasis Mobile Learning. *Jurnal Pendidikan: Teori, Penelitian, dan Pengembangan*, 4, 516-523
- Devi, D. S. (2012). Penerapan Model Problem Based Learning (PBL) Untuk Meningkatkan Kemampuan Berpikir Kritis Peserta Didik Pada Pembelajaran IPA Kelas VIII SMP Negeri 5 Sleman. Laporan Penelitian. UNY.
- Hardiyanti, K., Astalini, A., & Kurniawan, D. A. (2018). Sikap siswa terhadap mata pelajaran fisika di sma negeri 5 muaro jambi. *EduFisika: Jurnal Pendidikan Fisika*, 3(2), 1-12.
- Ismawati, R. (2017). Strategi React dalam Pembelajaran Kimia SMA. *Indonesian Journal of Science and Education*, 1(1), 1-7.
- Istijanto. (2005). *Riset Sumber Daya Manusia, Cara Praktis Mendeteksi Dimensi- Dimensi Kerja karyawan*. PT. Gramedia Pustaka Utama. Jakarta
- Kurniawan, D. A., Perdana, R., & Kurniasari, D. (2018). Identification of Student Attitudes toward Physics Learning at Batanghari District High School. *The Educational Review, USA*, 2(9), 475-484.
- Kurniawan, D. A., Astalini & Anggraini, L. (2018). Evaluasi sikap siswa smp terhadap ipa di kabupaten muaro jambi. *Jurnal Ilmiah DIDAKTIKA*, 19(1), 124-139.
- Kusnadi. (2018). *Metode Pembelajaran Kolaboratif: Penggunaan Tools SPSS dan Video Scribe*. Jawa Barat: Edu Publisher
- Lidiana, H., Gunawan., & Taufik, M. (2018). Pengaruh Model Discovery Learning Berbantuan Media Phet Terhadap Hasil Belajar Fisika Peserta Didik Kelas XI SMAN 1 Kediri Tahun Ajaran 2017/2018. *Jurnal Pendidikan Fisika dan Teknologi*, 4 (1), 33-39.
- Maison, Astalini, Kurniawan, D.A & Sholihah, L.R. (2018). Deskripsi sikap siswa sma negeri pada mata pelajaran fisika. *EDUSAINS*, 10(1), 161-167.
- Maison, Safitri, I., C. & Wardana, R.W.(2019). Identification of misconceptions of high school students on temperature and color topics using a four-tier diagnostic instrument. *EDUSAINS*, 11(2), 195-202.
- Maison, Syahrial, Syamsurizal, Tanti. (2019). The learning environment, students' beliefs, and self-regulation in learning physics: structural equation modeling. *Journal of Baltic Science Education*, 18(3). 389-403
- Majid, A. (2014). *Strategi Pembelajaran*. Bandung: Remaja Rosdakarya.
- Manizar, Elly. (2015). Peran guru sebagai motivator dalam belajar. *Jurnal Tadrib*, 1 (2).204-222
- Mirawati. & Rusdiana, D. (2016). Implementasi Model Pembelajaran Discovery Untuk Mengembangkan Keterampilan Dasar Bekerja Ilmiah Pada Materi Indera Penglihatan Dan Alat Optik. *EDUSAINS*, 8 (2), 136-144.
- Much, I., Subroto, I., Farisa, S., & Haviana, C. (2016). Sistem Informasi Angket Pengukuran Skala Kebutuhan Materi Pembelajaran Tambahan Sebagai Pendukung Pengambilan Keputusan Di Sekolah Menengah Atas Menggunakan Skala Likert. *TRANSISTOR Elektro dan Informatika*, 1(2), 1-12.
- Nofrialdi, I., Maison & Muslim. (2018). Tingkat Kecemasan Matematika Siswa SMA NEgeri 2 Kerinci Kelas X MIA Sebelum Menghadapi Tes Matematika Berdasarkan Gender Dan Hubungannya Dengan Hasil Belajar. *Edumatika: Jurnal Riset Pendidikan Matematika*, 1(2).11-20.
- Nur, R.A., Haeruddin., & Tewa, Y. (2019). Penerapan Model Pembelajaran Berbasis Masalah Untuk Meningkatkan Hasil Belajar Siswa Kelas XI IPA 1 SMAN 10 Kendari Pada Materi Asam Basa. *Jurnal Pendidikan Kimia Universitas Halu Oleo*, 4(2), 138-144.
- Paradina, D., Connie., & Medriati, R. (2019). Pengaruh Model Pembelajaran Problem Based Learning Terhadap Hasil Belajar Siswa di Kelas X. *Jurnal Kumparan Fisika*, 2(3), 169-176.
- Parasamya, C.E. & Wahyuni, A. (2017). *Upaya Peningkatan Hasil Belajar Fisika Siswa Melalui Penerapan Model Pembelajaran Problem Based Learning (PBL)*. *Jurnal Ilmiah Mahasiswa (JIM) Pendidikan Fisika*, 2(1), 42-49.
- Pransiska, S., Asyhar, R., & Asrial, A. (2016). Pengaruh Penerapan Model Pembelajaran Group Investigation dan Motivasi Terhadap Hasil Belajar Siswa Kela VII SMP Dalam Pembelajaran IPA Terpadu Pada Materi Asam, Basa dan Garam. *Edu-Sains: Jurnal Pendidikan Matematika dan Ilmu Pengetahuan Alam Universitas Jember*, 5(2), 27-31
- Pujiasri, D. (2018). Tanggapan Peserta Didik Terhadap Model Pembelajaran Kooperatif Teknik Jigsaw Pada Permainan Bola Besar. *Pendidikan Jasmani Kesehatan dan Rekreasi*, 7(5).13-26
- Mustamiin, M. Z. (2016). Pengaruh Penggunaan Model Kooperatif Learning Tipe Jigsaw Terhadap Hasil Belajar IPS Di Tinjau Dari Motivasi Berpretasi. *Jurnal Teknologi*



- Pendidikan: Jurnal Penelitian dan Pengembangan Pembelajaran*, 1(2), 65-76.
- Putri, A. R., Maison, M., & Darmaji, D. (2018). Kerjasama Dan Kekompakan Siswa Dalam Pembelajaran Fisika Di Kelas Xi Mipa Sma Negeri 3 Kota Jambi. *EduFisika: Jurnal Pendidikan Fisika*, 3(2), 32-40.
- Rachmawan, S., Suyitno, H., & Agoestanto, A. (2013). Penerapan Jigsaw II dan Student Teams Achievement Divisions Berbantuan Alat Peraga. Kreano, *Jurnal Matematika Kreatif-Inovatif*, 4(1), 26-33.
- Rahman, A., Ahmar, A., & Rusli, R. (2016). The influence of cooperative learning models on learning outcomes based on students' learning styles. *World Transactions on Engineering and Technology Education*, 14(3).425-430
- Rusman. 2010. *Model-model Pembelajaran*. Bandung: Media Mandiri Pers.
- Sari, kencana F. F. (2018). Peningkatan Hasil Belajar Siswa SD pada Pembelajaran Tematik melalui Penerapan Model Pembelajaran Role Playing. *Satya Widya*, 34(1), 62–76.
- Sobur, Alex. (2003). *Psikologi Umum*. Bandung: Pustaka Setia.
- Sururoh, M., Setyosari, P & Subanji. (2018). Pengaruh Model Pembelajaran Think Pair Share terhadap Pemahaman Konsep dan Motivasi Belajar. *Jurnal Pendidikan: Teori, Penelitian, dan Pengembangan*, 3(11). 1499-1506
- Suwondo., Astalini., & Darmaji. (2019). Penerapan Model Pembelajaran Kooperatif Tipe Time Token Untuk Meningkatkan Hasil Belajar Fisika Siswa. *Edufisika: Jurnal Pendidikan Fisika*, 4 (2), 39-47.
- Trisianawatia, 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), 51-60
- Utama, Z., P, Maison & Syarkowi, A. (2018). Analisis Kemampuan Bernalar Siswa SMA Kota Jambi. *Jurnal Penelitian Pembelajaran Fisika* 9 (1 ), 1-5
- Yanto, Ari. (2015). Metode Bermain Peran (Role Playing) Untuk Meningkatkan Hasil Belajar Siswa pada Mata Pelajaran Ips. *Jurnal Cakrawala Pendas*, 1(1), 53-57