

Implementing Jigsaw Type of Cooperative Learning Model to Improve Students' Cognitive, Affective and Psychomotor Domains in Learning Natural Science at Grade IX.1 Smp Negeri 7 Sawahlunto

A. Muharror Walad¹, Abdul Razak², Lufri², Dwi Hilda Putri²

¹A Student of Master Degree Program of Biology Education, Faculty of mathematics and Science, State University Padang, Indonesia.

²Biology Department, Faculty of mathematics and Science, State University, Padang, Indonesia



Abstract - The lower students' competencies in learning science are caused by less participation of students and they are not maximally involved in the learning process, and also the learning model used has not been able to optimize the students' potential. This study aims to determine the improvement of cognitive, affective and psychomotor domains of students in learning science by applying the jigsaw type of cooperative learning model at grade IX.1 of SMP Negeri 7 Sawahlunto. The type of this research is Classroom Action Research. The research subjects were 17 students on grade IX.1 of SMP Negeri 7 Sawahlunto in the academic year of 2018/2019. The research was conducted in two cycles, each cycle consisting of planning, action, observation, and reflection. The data were analyzed qualitatively and quantitatively. The results showed that jigsaw type of cooperative learning model could improve the cognitive domain as seen from the average learning outcomes in Cycle I was 74.41 and Cycle II was 77.65. Classical completeness in Cycle I was 70.59% and in Cycle II was 88.24%. The average affective domain observations were obtained, Cycle I was 67.65 and Cycle II was 75 with classical completeness in Cycle I 67.65% and in Cycle II 85.29% and the results of observation of the psychomotor domain Cycle I was 70.10 and Cycle II was 76.47 while the classical completeness of the psychomotor domain in Cycle I was 74.51% and Cycle II was 88.24%. The results of the study concluded that there was an increasing number in the cognitive, affective, and psychomotor domains of students on grade IX.1 SMP Negeri 7 Sawahlunto. The jigsaw type of cooperative learning model that is applied in classroom action research can improve students' competencies in cognitive, affective, and psychomotor domains.

Keywords - Competence, Classroom Action Research, Cooperatives, Jigsaw, Cognitive.

I. INTRODUCTION

Learning Biology requires the students' active participation and involvement as a whole in observing, estimating, using tools, and learning materials, applying concepts, planning research, delivering and proposing research (Lufri, 2006). The characteristics of this subject must be reflected in learning activities, and focus on practical activities to improve the students' competencies so they know and understand about their environment through the stages of searching and applying it. This will stimulate

students to get more understanding. It is expected that with the appropriate stages, students can develop behaviors and noble values which include; curiosity, diligence, honesty, meticulous, patient, open, disciplined critical, resilient, and can work together with others. Teacher as a facilitator must develop the students' competencies. Actually, there are three competencies that must be developed by a teacher, they are cognitive, affective or values, and psychomotor competencies.

As stated by Dimiyati and Muldjiono (2006) Learning should be experienced through direct action and activating students by solving problems they encountered, the process is guided and facilitated by the teacher. To solve a problem student must have thinking skills. Thinking skills must be trained continuously and developed in teaching and learning process, so they are able to solve various problems.

Learning with lecture method has negative effect, where the students are not interested to participate actively in learning process. This condition shows that the students curiosity and critical thinking skill are low toward learning materials. On group discussion which was observed by teacher found that most the students work individually. Most of them just waiting for smarter students' work and then cheating it. So, the result of discussion is not coming from the discussion purely but cheating from smarter students.

The solution to solve the problem above is by using the cooperative learning model in learning process. Actually, cooperative learning is a methodology that uses various learning activities to improve students' understanding toward the subject by using a structured approach, involving a series of steps that require students to make, analyze and apply concepts. Cooperative learning is based on the constructive view where students build their own knowledge, and teacher acts as a facilitator (Anas et al., 2018). This learning model emphasizes on working together and in groups so all of them can follow the learning process well. As stated by Solihatin and Raharjo (2008) learning outcomes will be better if it done together, in small structured groups. Slavin (2014) emphasizes that Cooperative Learning is a learning method for students to learn from one another, work together and help each other in small groups. By learning together, it is expected that smart students can help less smart friends in the learning process so all students succeed in learning. As stated by Rusman (2016) Every team member must help each other to achieve learning goals.

There is an expectation that using the cooperative learning can improve the competencies of students SMPN 7 Sawahlunto in learning science, especially in certain material about Biology. As stated by Satria (2015) "This Cooperative learning model are able to keep material longer in students' memory, to increase learning motivation, and increase the activity of learners in learning process."

There are many kinds of cooperative learning, one of them is jigsaw type. The researchers used this type because

they agreed with the statement of Slavin. Slavin (2009) said that "The Jigsaw cooperative learning model is the most flexible for beginners and teachers who just knowing in using the cooperative approach". According to Adams (2013) The main benefit of jigsaw learning is easy to learn because the teacher is not the only one providing knowledge of course he like to use it and it can be used with other teaching strategies. Jigsaw is used to train students' responsibility sense in learning process. Every student must be actively find and absorb information from fellow and expert groups, and then explain the material obtained from the expert group to the original group. So that each of them has responsibility to explain the materials from his group and then absorb materials from other expert groups. The adoption of this cooperative type jigsaw method makes students bound together and work together cooperatively with each other in the teaching and learning process (Lie, 2004).

The characteristic of the jigsaw cooperative learning is having the base group and the expert groups. After students learn and understand the material in the expert group, they back to their base group. This transferring or exchanging of group members makes active students walk from one group to another. It presses their boredom so they keep fresh and excited in learning.

Based on the problems faced in the teaching and learning process, the researchers used the jigsaw cooperative method to improve student competencies, so the authors conducted a classroom action research entitled Using of the Jigsaw Cooperative Learning Model to improve the cognitive, affective and psychomotor domains of students at grade IX.1 SMP Negeri 7 Sawahlunto.

II. REVIEW OF LITERATURE

2.1 The Nature of Learning Biology

Zambri and Mustapha (2007) say that biology is a life about science or scientific study of life. Biology learning can be divided into three: how to learn, scientific skills, and values. Knowledge of science concept is important but more important is teaching thinking skills. Achor, (2014) added that one of the goals of biology learning is to prepare students to obtain knowledge, attitudes and relevant skills so they can use it in their daily lives. Nnorom (2015) emphasized that science education which includes Biology have to focus on the individual preparation with skills and abilities that are appropriate for mental and physical competencies to live and contribute to the development of society. Biology is one of subject that is included in natural

science subject (IPA) at the level of junior high school. It aims to develop students' habitual critical thinking and act creatively and independently (Depdiknas, 2006).

2.2 Cooperative Learning Model Type Jigsaw

Cooperative learning is a model to help heterogeneous students learn together in small groups and various variables (Karacop, 2017). By learning with fellow students, cooperative learning can grow a sense of togetherness because they listen to each other's explanations, accept opinions and feel responsible for others. Cooperative learning is one of learning models based on the constructive view that students build their own knowledge, the teacher acts as a facilitator (Anas et. al., 2018). Besides, based on the constructivism point of view, the core of cooperative learning is based on the theory of social dependence, according to this theory cooperation is the most effective when students consciously have the same targets and group targets (Karacop, 2017). There are many types of cooperative learning, but the principles are same. Among the variations of cooperative learning models are (1) STAD (Student Teams Achievement Devisions) (2) Jigsaw (3) GI (Group Investigation). (4) Think-Pair-Share and (5) Numbered Head Together (Lufri, 2007). Rusman (2016) also added that (6) Make a Match (7) TGT (*Game Tournament Teams*) (8) structural models. Slavin (1985) also added another cooperative learning model, namely (9) TAI (*Teams Assisted Individualization*) (10) *Johnson methods* (11) *Weigel et.al methods*.

The jigsaw type of cooperative learning was discovered and tested by a psychology professor named Elliot Aronson at the University of Texas and later developed by Slavin et al. at Johns Hopkins University. Aronson saw many teachers who were unable to overcome racial turmoil and hostility among students in Austin Texas and to implement the inter-school competition which resulted in students learning too much that interfered with cooperative ideas. By organizing students in groups that are culturally and racially diverse, the researcher and students' teams can reduce divisions among them (Adams, 2013). The strategy of jigsaw cooperative learning is a learning strategy that promotes learning motivation, a positive attitude, and develops interpersonal skills and improves the ability of outstanding students (Juweto 2015). Furthermore, Bialangi et al. (2016) emphasized that learning by using the cooperative jigsaw method develops the students' social attitudes.

The implementation of *Jigsaw model* can be applied across classes and across subjects as presented by Karacop and Diken (2017) The jigsaw activities have become teaching activities that can be used by teachers from all classes. The jigsaw model can also be applied in laboratory activities, as conveyed by Karacop (2017) that the learning process using the *Jigsaw method* in practical activities shows a high success rate compared to the method of practicum in laboratory with traditional methods. Ndun (2016) said that cooperative learning *jigsaw* can improve the speaking skills and students' responsibilities in learning. According to Slavin (2009) the planning of *jigsaw* cooperative learning is arranged instructionally, namely: reading, expert group discussions, original group discussions, quizzes and group awards.

Achor (2014) further explained in this model the students were divided into small groups of five or six each group and the concept of learning was broken into several segments or sub-topics. Students in the *jigsaw group* were given a segment to specialize in the topic the same form an *expert group*, after the session, they regroup in the original group (*home group*) where each expert explains the topic to other members, after that the students take a quiz separately without help of group members. Scores of individual members are leveled to find the best group and be rewarded.

2.3 Cognitive Domain

The cognitive domain is a domain that includes mental activities (brain). cognitive domain directs thinking skills in accordance with the goals set by the teacher in the learning process. The thinking process describes the stages of thinking that must be mastered by students in order to be able to carry out the theory into everyday attitudes.

The cognitive domain is a combination of knowledge dimensions that classified into factual knowledge, conceptual knowledge and knowledge, procedural and meta cognitive. (Kemendikbud, 2016). Experts rank these stages of thinking into several levels known as Bloom's taxonomy, which was recently revised by Anderson. There are six levels in the cognitive domain, namely: Remembering, understanding, applying, analyzing, evaluating, and creating,

Whether or not a competency is achieved can be seen from the results of the learning carried out. Muhibbin Shah (2008) argues that learning is a business process carried out by educators to change new behavior as a whole, as a result of their own experiences in interaction with their environment.

2.4 Affective domains

Teachers have to develop the affective or attitude in learning process. Learning that contains affective learning relates to how students in the learning process are integrated in guiding their' attitudes, opinions and learning behavior (Olatunji, 2013). According to Kurinasih (2014) the attitude is something that is seen or expressed by the value of one's values. This attitude can be shaped, grown and developed in accordance with the desired behavior. In the learning process the attitudes that need to be developed are attitudes towards learning material, attitudes toward the teacher, and attitudes toward the learning process (Majid, 2014). With a positive attitude they will be easier to motivate, and absorb the learning material presented by the teacher. It is necessary to have a positive attitude towards the learning process.

According to Olatunji (2014) Kracthwohl et al. propose five levels of affective domain, namely; 1). Acceptance, at this level students know the topic, stimulation, event or issue and willing to learn or respond it. 2). Responding is ranging from compliance with voluntary responses to having satisfaction in doing what is needed. 3). Valuing is at this level the students manifest behavior that is consistent. 4). Organizations, namely students set the value of general values into the value system. 5). Characterization with value is students' behavior that has been adopted in their daily lifestyle.

2.5 Psychomotor Domain

Psychomotor domain, also known as skill domains, are domains that are related to skills or the ability to act after a person receives a particular learning experience. Psychomotor is related to learning outcomes which are achieved through skills as a result of cognitive competency. This skill competency is an implication of the achievement of students' cognitive competencies. This skill shows a person's level of expertise in a particular task or set of tasks.

This domain involves the skills that acquired by students in manipulating, following procedure certain body movements (Idowu and Essere, 2009). Baharom et. all. (2013) said that the domain of skills is usually developed in activities in the laboratory.

According to Rupami and Bhutto (2011) There are some levels of psychomotor domain, such as: imitation, manipulation, exclusion, articulation and naturalization. Sports activities, scientific experiments, individual presentations or groups, performances, and role playing are

examples of the psychomotor domain implementation. While Sonmez (2017) divides the psychomotor domain into several levels, namely 1) excitement. 2) making manual control. 3) skill. 4) fitting situation 5) creating. 6) evaluation.

III. RESEARCH METHODS

The type of this research is classroom action research (CAR). It conducted in the classroom through learning activities using the jigsaw learning model. Classroom Action Research aims to determine the improvement of students' learning out comes by using the Jigsaw Cooperative learning model.

The research subjects were students of SMP Negeri 7 Sawahlunto in grade IX.1. It held on second semester in the academic year of 2018/2019 in the system material excretion. This study was conducted in 2 cycles. Each cycle consisted of four stages, namely: planning, action, observation and reflection.

The research cycle with its stages can be seen in Figure 1

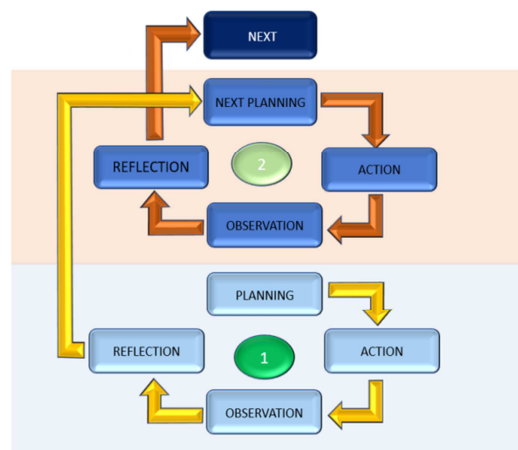


Figure 1. Research Cycle of Spiral Form Actions Source: Lufri and Ardi (2017)

The Data collection techniques used are giving tests and observations. Giving tests done to obtain cognitive domain data. Observations were made to obtain affective and psychomotor domain data.

IV. RESULTS AND DISCUSSION

4.1 Research Results

Based on the results of research on the using of the jigsaw type Cooperative learning model to improve the

cognitive, affective and psychomotor domains of students on grade IX.1.SMP N 7 Sawahlunto in learning natural science can be described as follows.

4.1.1 Cognitive Domain

The results of the cognitive domains can be seen in Table 1 and described in Figure 2.

Table 1. Cognitive Domains Value

No	Cycle	Average	% completeness
1	Pre Cycle	64.41	58.82%
2	Cycle I	74.21	70, 59%
3	Cycle II	77.65	88.24%

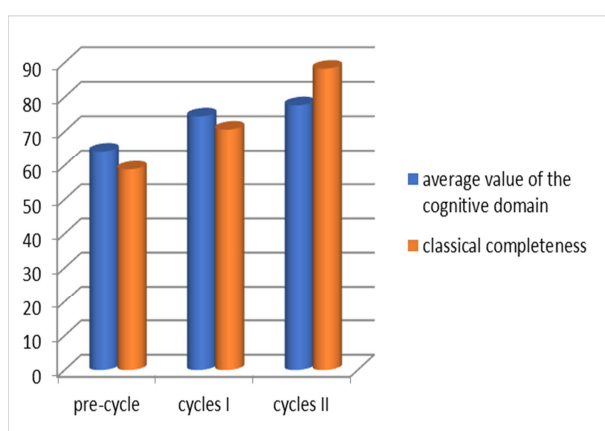


Figure 1. Increased Cognitive Domain

Based on table 2, the average value of the cognitive domain of students in each cycle has increased. In the pre-cycle the average number of cognitive domains obtained by students is 64.18, increasing in Cycle I which is 74.41 and in Cycle II students obtain an average value exceeding the minimum completeness criteria of 75 which is 77.65. the classical completeness of the students also increased. In the classical completeness cycle, it was 58.82%. In Cycle I classical completeness was 70.59% and in Cycle II the classical completeness percentage continued to increase reaching 88.24%, exceeding the classical completeness limit of 85%.

4.1.2 Affective Domains

The result of affective Domain shows that the competencies increased as seen in Table 2 and described in Figure 2.

Table 2. Affective Domains value

No	Cycle	Average	%completeness
1	Pre-cycle	55.88	41.18%
2	Cycles I	67.65	67.65%
3	Cycle II	75	85.29%

Based on table 2 the results of the affective domain of students starting from pre-cycle to Cycle II are as follows; On cycle, the average value of the affective domain is 55.88. Pre-classical classical completeness was 41.18%. In Cycle I the affective domain average value obtained by students increased to 67.65. While classical completeness also increased to 67.65%. In Cycle II the affective domain average value continued to increase to 75 and classical completeness reached 85.29%.

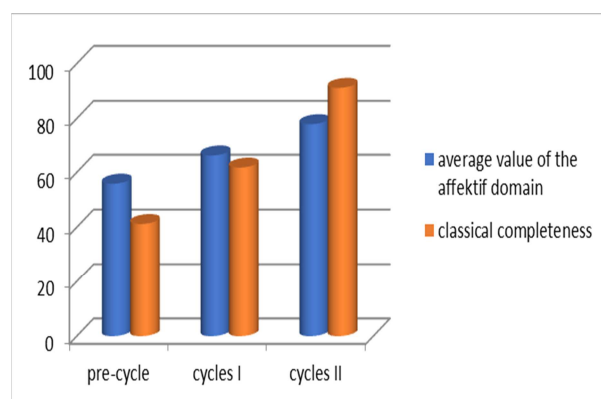


Figure 2. Affective Domain Improvement

Based on the affective domain observation of students starting from pre-cycle to the cycle of pre-cycle affective mean scores, it is 55.88%. And has completeness of 41.18%. In Cycle II the affective domain average value obtained by students increased to 67.65% with good categories. While the average student who has passed the limit of the minimum affective criteria for completeness is 67.65%. In Cycle II the affective domain average value continues to increase to 75% and the average student who has exceeded the minimum criteria for affective domain is 85.29%.

4.1.3 Psychomotor domain

The increasing of skills competency can be seen in Table 3 and described in Figure 4.

Table 3. Psychomotor Domains Value

No	Cycle	Average	% completeness
1	Pre Cycle	62.75	56.86%
2	Cycle I	70.10	74.51%
3	Cycle II	74,47	88.24%

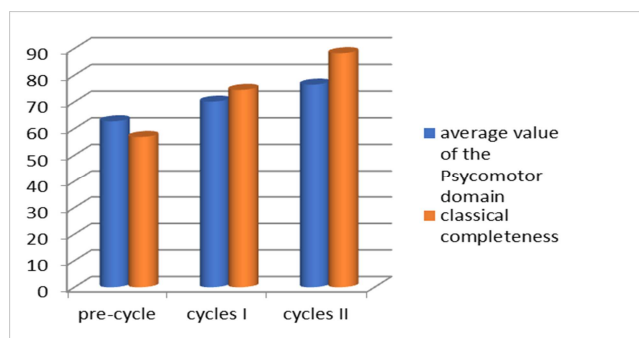


Figure 4. Psychomotor Competence Improvement

in the pre cycle psychomotor domain average value, is 62, 75 with sufficient category, average completeness is 56.86%. In Cycle I the psychomotor domain average scores obtained by students increased to 70.10. While the average completeness of the psychomotor domain is 74.51%. In Cycle II the average psychomotor domain value continued to increase to 76.47 and the average student who had passed the limit of the minimum effective criteria was 88.24%.

4.2 Discussion

The results of data analysis showed that the application of the jigsaw type cooperative learning model was able to improve the students' competencies in cognitive, affective and psychomotor domains. This is evidenced by the data obtained from pre-cycle to Cycle II during the research activities. The following is a discussion of each aspect that is enhanced by the application of a jigsaw type cooperative learning model.

4.2.1 Cognitive domain

The successful of jigsaw cooperative learning model in the cognitive domain is known from the acquisition of the average value and classical completeness of students at the end of the cycle. This increasing is not students' initial ability but the application of a cooperative model (Putri et. All., 2019). Muthi'ah et.all. (2018) also explained that the using jigsaw type of cooperative learning can train students to be able to collaborate with their group mates, positive interdependence and students take responsible for the tasks they get. Koc (2010) stated jigsaw type learning is more effective in academic achievement because students are directed and encouraged to appreciate ideas in a warm atmosphere and work together with their friends. In addition, the increasing of students' learning outcomes because in the jigsaw type cooperative learning model students learn in a relaxed environment and of course it can improve their understanding (McLeish, 2009 in Azmin 2015). By using the jigsaw type cooperative learning model,

the teacher can monitor and identify the students' activities in learning, and motivate less active students become active so it can improve student learning outcomes (Satria et al, 2015).

4.2.2 Affective Domain

The assessments of affective domain which was observed in this study including curiosity and critical thinking. The increasing of affective domain assessment is accordance with Kahar (2016). He stated that jigsaw type improves the students' affective learning outcomes. The increasing in this domain because of using jigsaw cooperative learning model especially when expert group discussions and home group discussions, psychologically the students have the opportunity and courage to argue, discuss and ask questions (Alsa, 2010). The using of jigsaw type cooperative learning model fosters students' critical thinking. This critical thinking attitude is very important because this parts cannot be separated from education (Rahmi et.all. 2018). The increasing of this affective domain according to Bialagi et.all (2016) Jigsaw made students more active both individually and in groups, whether they are in the home group or when they are in the expert group and when returning to the home group.

4.2.3 Psychomotor Domain

The assessment of psychomotor domains in this study includes products, creativity and presentations. Based on the observation of students' psychomotor domain from the beginning of the cycle to the second cycle found that there was a raising in the psychomotor domain. The increasing of this assessment is in accordance with Kahar (2016). He stated that jigsaw cooperative learning improves the learning outcomes of the students' psychomotor domain. The increase in the average rating of psychomotor domain assessment of students through the jigsaw cooperative learning model made them accustomed to work. Among the psychomotor domain that were observed by teacher was the ability in presenting learning material to his friends. It showed an increase in each cycle, this was in line with that delivered by Ndun (2016) that the using of jigsaw type cooperative learning improves speaking ability, because students have self-confidence to speak in front of public, which is delivering learning material in front of his friends. As stated (slavin 2010) The jigsaw cooperative learning model can improve students' self-esteem.

4.3 Limitations of Researchers

Some of the weaknesses and limitations that researchers have encountered in carrying out this research include:

limited time, so they were not able to facilitate students optimally in carrying out learning activities. Not all students were interested in conducting the learning process, some of them prioritize results over processes. It was seen during the learning process they only fill the LKPD without studying the learning material carefully.

Researchers also found problems in documenting the research process, because of the lack quality of camera and lack ability of video maker in making good videos. As a result, not all of research processes can be recorded in video.

Generally, there was an increase of students' competencies in the cognitive, affective and psychomotor domains if each stage in the jigsaw type cooperative learning model can be carried out well and structured, it will further enhance their learning motivation.

V. CONCLUSION

5.1 Using Jigsaw Cooperative model can improve the cognitive competencies of students at grade IX.1 of Sawahlunto Middle School 7 in learning science.

5.2 Using Jigsaw Cooperative model can improve the affective domain of students at grade IX.1 of Sawahlunto Middle School 7 in learning science.

5.3 Using Jigsaw Cooperative model can improve the psychomotor domain of students at grade IX.1 of Sawahlunto Middle School 7 in learning science.

ACKNOWLEDGMENTS

Thank you to Dr. Abdul Razak, M.Si, Prof. Dr. Lufri MS and Dr. Dwi Hilda Putri M.Biomed as a supervisor and provides motivation to the author in writing this journal.

REFERENCE

- [1] Achor, Emmanuel E and Wude, Musa Habu. 2014. Looking for a More Facilitative Cooperative Learning Strategy for Biology: Students' Team Achievement Division or Jigsaw?. *British Journal of Education, Society & Behavioural Science* (online) 4(12) : 1664-1675, (<https://papers.ssrn.com>).
- [2] Adams, Francis Hull. 2013. Using Jigsaw Technique As An Effective Learning Among Primary Six Pupils In Fijai. *International Journal of Education and Practice*. (Online) 1(6) 64-74 (<http://www.Pakinsight.com/Journal/Ijep>).
- [3] Alsa, Asmadi. 2010. Pengaruh ametode abelajar Jigsaw Terhadap Keterampilan Hubungan Interpersonal dan Kerjasama kelompok pada mahasiswa Fakultas Psikologi. *Jurnal Psikologi..* (online) Volume 37, No 2 165-175 (<https://jurnal.ugm.ac.id/jpsi>).
- [4] Anas, Yenni. Hardeli. Anhar, Azwir. Sumarmin, Ramadhan. 2018. Application of Type Cooperative Learning Models Group Investigation (GI) in Improving Competence Learning Biology Student School. *International Journal of Progressive and Technologies (IJPSAT)* (online) vol 6 no 2 pp 380-387 (<http://ijpsat.ijsh-journals.org>).
- [5] Azmin, Nur Hafizah. 2016. Effect of the Jigsaw-Based Cooperative Learning Method on Student Performance in the General Certificate of Education Advanced-Level Psychology : An Exploratory Brunei Case Study. *International Education Studies* (online) Vol 9 No 1 (<http://dx.doi.org/10.5539/ies.v9n1p91>),
- [6] Baharom, Sharrizan, dkk .2015. Assesment of Psychomotor Domain in A Problem-Based Concrete Laboratory. *Journal of Engineering Science and Technology* (online) (<http://www.Jestec.taylor.edu.my>).
- [7] Bialangi, Mursito S. Zubaidah, Siti. Amin, Mohamad . Gofur , Abdul .2016. Development of students' social attitudes in Biology classroom through jigsaw and guided inquiry. *International journal of Academic Research and Development*. (online) vol 1 issue 10 page 01-07 (<http://academicsjournal.com>)
- [8] Depdiknas. 2006. *Peraturan Menteri Pendidikan Nasional No 23 tahun 2006 tentang standar Kompetensi lulusan*. Jakarta : Depdiknas.
- [9] Dimiyati dan Muljono. 2006. *Belajar dam Pembelajaran*. Jakarta. Rineka Cipta.
- [10] Idowu, I.A dan .Esere O.M. 2009. Assesment in Nigerian Schools: An Counsellor's Viewpoint. *Edo Journal of Counselling*. (online) Vol 2 No 1 (<http://ajol.info/index.php/ejc/article/.../52650/41254>)
- [11] Kahar, Muhammad Syarul. 2016. Penerapan Model Pembelajaran Kooperatif Tipe Jigsaw pada materi ujud Zat dan perubahannya terhadap hasil belajar fisika peserta didik SMPN 21 Makasar. *Jurnal Scientific pinisi* (online) Volume 2 No 2 hal 110 :116 (<http://ojs.umn.ac.id/pinisi>).

- [12] Karacop, Ataman, 2017, The Effect of Using Jigsaw Method Based on Cooperative Learning Model in the Undergraduate Science Laboratory Practices. *Universal Journal of Education Research* (online) 5(3) : 420-434([http:// hrpub. org/journals /article_info.php?aid=5694](http://hrpub.org/journals/article_info.php?aid=5694)).
- [13] Karacop, Ataman dan Diken, Emine Hatun, 2017, The Effect of Jigsaw Tecnique Based on Cooperative Learning on Prospective Science Teachers' Science Proses Skill. *Journal of Education and Practice* (online) Vol.8 No.6 (<Http://files.eric.ed. gov/fulltext /EJ1133003.pdf>).
- [14] Kemendikbud, 2016. *Panduan Penilaian Oleh Pendidik dan Satuan Pendidikan untuk sekolah menengah pertama*. Jakarta : Kemedikbud
- [15] Koç, Yasemin. Doymuş, Kemal. Karaçöp, Ataman. şimşek, Ümit. 2010 .The Effects of Two Cooperative Learning Strategies on The Teaching and Learning of The Topics of Chemical Kinetics. *Journal of Turkish Science Education*, (online); 7(2):52-65. (<http://tused.org>).
- [16] Kurinasih, I. 2014. Implementasi Kurikulum 2013 Konsep dan Penerapannya. Surabaya : Kata Pena.
- [17] Lie, Anita. 2004. *Cooperative Learning*. Jakarta. Gramedia.
- [18] Lufri dan Ardi. 2017. *Metodologi Penelitian*. Padang: UNP Press.
- [19] Lufri .2006. *Strategi Pembelajaran Biologi*. Padang.FPMIPA UNP Padang.
- [20] Majid, A. 2014. Implementasi Kurikulum 2013 Kajian Teoritis dan Praktis. Bandung: Interes Media.
- [21] Muthi'ah, Amrina. Anwar, Yenny. Santoso, Lucia Maria. 2018. Pengaruh penerapan Model Pembelajaran Kooperatif Tipe Jigsaw Terhadap Kemampuan Kognitif dan Keterampilan Sosial di Sekolah Menengah Atas. *Edusains*. (online) 10(1) 2018.58-64 (<https://www.researchgate.net>).
- [22] Ndun, Anggalia Vina Evathia. 2016. The Implementation of Jigsaw Expert and Home Group Presentation to Increase speaking skill of grade 8 Students, *SEAMEO RECSAM*, (online) ([http:// recsam.edu.my](http://recsam.edu.my))
- [23] Nnorom, Nneka Rita. 2015. Effect of Cooperative Learning Instructional Strategy on Senior Secondary School Students Achievement in Biology in Anambra State, Nigeria. *International Journal for Cross-Disciplinary Subjects in Education (IJCDSE)* (online) vol.5 issue 1. (<http://infonomics-society.org/.../Effect-of-Cooperative-Learning-I>
- [24] Olatunji, Michael Olalekan. 2013. Teaching and Assessing of Affective characteristics: A Critical Mising Link in Online Education. *International Journal on News Thends in Education an Their Implications*. (online) Vol 4 Issue:1 Article 09. ([http:// www.ijonte.org](http://www.ijonte.org))
- [25] Olatunji, Michael Olalekan. 2014. The Affective Domain of Assesment in Collegers and Universities : Issues and Implications.(online) *International Journal of Progressive Education vol 10 Number 1* ([https:// dergipark.gov.tr.](https://dergipark.gov.tr))
- [26] Putri, Fadillah. Syamsurizal. Ahda, Yuni , Putri, Dwi Hilda. 2019. Comparison of Jigsaw Cooperative Learning Models and One, Stay and The Others Stray and the Beginning Ability Towards Biology Students Competency in Class XI of SMAN 3 Bukittinggi. *International Journal of Progressive Sciences and Technologies (IJPSAT)*. (Online). Vol. 13 No. 1, pp. 124-134.([http://ijpsat.ijst-journals.org.](http://ijpsat.ijst-journals.org))
- [27] Rahmi, Lailatul. Razak, Abdul. Violita. Sumarmin, Ramadhan .2018. Development of Student's Worksheet with Inquiry Learning Model on Ecological and Environmental Changes for Class X Senior High School . *International Journals of Sciences and High Technologies*. Vol. 6 No. 2 January 2018, pp. 448-453. <http://ijpsat.ijst-journals.org>
- [28] Rusman. 2016. *Model model Pembelajaran : Mengembangkan Profesionalisme Guru*. Jakarta : Rajawali Pers.
- [29] Rupami, Chaman Masha dan Bhutto, Muhamamad Ilyas, 2011, Evaluation of Existing Teaching Learning Proses On Bloom's Taxonomy. *International Journal of Academic Research in Business and Social Science* vol. 1 special issue, (online) ([http:// www. Hrmars. com/ Journal](http://www.Hrmars.com/Journal)).
- [30] Satria, Elli. Oktavia, RitaHera, Rufa. 2015. Penerapan Model pembelajaran Kooperatif Tipe Jigsaw untuk meningkatkan Hasil Belajar Siswa Kelas VII pada materi sistem Pencernaan Manusia di SMP Negeri 3 Meureubo. *Jurnal Bionatural*, Volume 2 No.2 September 2015 ISSN: 2355-3790 (<http://ejournal.stkipbbm.ac.id>) .
- [31] Slavin, Robert E 2009. *CooPerative Learning*. Bandung, Nusa Media.
- [32] [32] Slavin, Robert E. 2010. Cooperative Learning : Applying Contact Theory in Desegregated Schools. *Journal of Social*. 41(3) :45-62.

- [33] Slavin, Robert E. 2014. Cooperative Learning and Academic Achievement :Why Does Groupwork Work ?, *anales de psicologia* (online) vol.30 pp. 785-79 (<http://revistas.um.es/analesps/article/view/analesps.30.3.201201>).
- [34] Solihatin dan Raharjo.2008. *Koperatif Learning Analisis Model Pembelajaran IPS*. Jakarta :Bumi Aksara.
- [35] Sonmez, Veysel.2017.Associaton of Cognitive, Affektive, Psychomotor and Intuitive Domains in Education, Sonmez Model. *Universal Journal of Educational Research* (online)5(3):347-356 (<http://www.hrpub.org>. doi : 10.13189/ujer.2017.050307.
- [36] Zambri, Mahamod dan Mustapha. 2007. Strategi Pembelajaran Biologi di Kalangan Pelajar Sekolah Menengah. *Jurnal Pendidikan Malaysia*,(online),(32):152175(<http://journalarticle.ukm.my/198/1/1.pdf>).