

Effect of Active Learning in Form of Scientific Approach with Assistance of Student Worksheets Based Problem Based Learning (PBL) Towards Students' Biology Psychomotor Competence

F Laili¹, L Lufri²

¹ Student of Master Degree Program of Biology Education,
Faculty of Mathematics and Sciences,
State University of Padang, Indonesia

² Department of Biology, Faculty of Mathematics and Sciences,
State University of Padang, Indonesia



Abstract - Purpose of the research was to know effect of Active Learning in form of scientific approach with assistance of student worksheets based Problem Based Learning towards students' Biology competence. It was a quasi experimental research by using randomized control posted only design. The population was students in grade X MIPA of SMAN 1 Pasaman registered in academic year 2018/2019. Samples were taken by using Purposive Sampling technique. As a result, X MIPA 4 was as experimental class and X MIPA 3 as control class. Instrument used was psychomotor competence observation sheet. Data analysis was conducted by using Mann Whitney U test. The finding showed that there is a significant difference between students' biology competence in experimental class and control class, in which students' biology competence in experimental class is higher than in control class. Average score of students' biology competence in experimental class is 3.29 (B+) and in control class is 3.15 (B). So, it can be concluded that Active Learning in form of scientific approach with assistance of student worksheets based Problem Based Learning can improve students' Biology competence.

Keywords - Active Learning; Students Worksheet; Scientific; PBL.

I. INTRODUCTION

Education is really required by people and it can change their behaviors. It can be gotten from teaching and learning process. Lufri, Fitri and Yogica (2018) state that level of educational quality can be seen through learning process. Nowadays, educational quality in Indonesia is still very low. One factor that causes it is teacher is still less creative in exploring students' potencies. Generally, teacher often imposes his will without concerning about students' needs, interests and talents. In the 2013 curriculum, students are demanded to be active in learning process. To actualize it, teacher should have adequate ability and skills by implementing appropriate learning model in teaching so that students become active in learning process.

In the 2013 curriculum, it uses scientific approach. It consists of five activities that should be done by students, which are observing, asking questions, collecting information, associating it and communicating it. The scientific approach is a gold point of cognitive, affective and psychomotor development (Yulianti, 2017). According to Varelas, et al. (2008) in Rhosalia (2017) the purpose of scientific approach is to facilitate teacher to improve learning process. Next, the strength of scientific approach is it is a student-centered learning (Rhosalia, 2017; Shofwan, 2016; Susantini, et al., 2016; Wieman and Gilbert, 2015). Furthermore, Hosnan (2014) in Atnuri and Prastiyo (2016) states that functions of scientific approach are to improve intellectual ability, to create students' ability to solve a

problem systematically, to create learning environment in which students feel that learning is a need, to achieve high learning outcomes, to train students to communicate their ideas and to develop students characteristics. According to Marjan (2014), scientific approach can improve Biology learning outcome and science process skills.

According to Lufri (2007), learning is any effort to make an individual learn and produce in order to make it happen in him. Beside that, according to Yogica, Lufri and Sumarmin (2014), learning is an effort to deliver information as learning materials from a teacher to students. Biology learning aims at developing students' competences in order to understand natural environment through process of seeking and doing something based on direct experiences (Dipuja, Lufri and Ahda, 2018; Oktarina, Lufri and Chattri, 2018a,b). Teacher's role as facilitator is needed to give explanation of learning materials to facilitate students to develop and understand learning concepts by themselves and connect the concept to the other ones (Karnela, Anhar and Lufri, 2018).

Based on the observation and interview done to Biology teacher in SMAN 1 Pasaman, it is known that teacher has not fully implemented scientific approach in learning process because of incompatibility of time and learning materials. Beside that, while group discussion is going, some students do not care about task of their group, do not participate in discussion, and give responsibility to finish the task to another group member who is active and smart. Beside that, students still depend on teacher's explanation. If it is seen from assessment done by teacher in SMAN 1 Pasaman, it still focuses only on cognitive aspect' while psychomotor aspect has not been done by teacher yet. Consequently, students' learning competence is still low. Haviz, et al. (2016) say that the low of students' involvement in learning process will influence learning quality.

To overcome the problems above, it needs to implement a leaning model which involves active learning in order to give opportunity for students to participate in learning process and develop their knowledge. So, teacher needs to implement an appropriate learning model and suitable with scientific approach in order that students become more active in learning process and understand learning materials. It is in line with Yerimadesi, et al. (2018) who state that to make students active in learning process, it needs a learning

model which can be activate them in learning. The model is known as Active Learning model.

The active learning model is a learning model which involves students to think actively (Lufri, Sudirman, Rahmi, 2016). Fornari and Poznanski (2015); Karanikola et al., (2018); Baharun (2015); Hartono (2008) in Rosida and Suprihatin (2018); Konyushkova, Sznitman and Fua (2017) state that active learning is an instructional model which involves students in learning process to reach satisfactory achievements. One of active learning model that can be used is Problem Based Learning (PBL). It is a learning model which emphasizes on student-centered based learning, in which it can make students to do observation and develop their knowledge and skills in order to find a solution of a problem (Ayu, Lufri and Sumarmin, 2018; Nurqomariah, Gunawan and Sutrio, 2015).

In addition, Problem Based Learning (PBL) can be combined with various learning media. One of the is LKPD based PBL which can be used to orient students to a certain problem. According to Indonesian Ministry of Education in Gustinasari, Lufri and Ardi (2017), the use of LKPD as written learning materials is more useful than the use of books. Based on the explanation above, it is interesting to do a research entitled "Effect of Active Learning in form of scientific approach with assistance of LKPD based Problem Based Learning (PBL) towards students' Biology competence".

II. RESEARCH METHOD

It was a quasi experimental research by using randomized control posted only design. The population was students in grade X MIPA of SMAN 1 Pasaman registered in academic year 2018/2019. Samples were taken by using Purposive Sampling technique. As a result, X MIPA 4 was as experimental class and X MIPA 3 as control class. Instrument used was affective psychomotor competence observation sheet. Data analysis was conducted by using Mann Whitney U test.

III. FINDING AND DISCUSSION

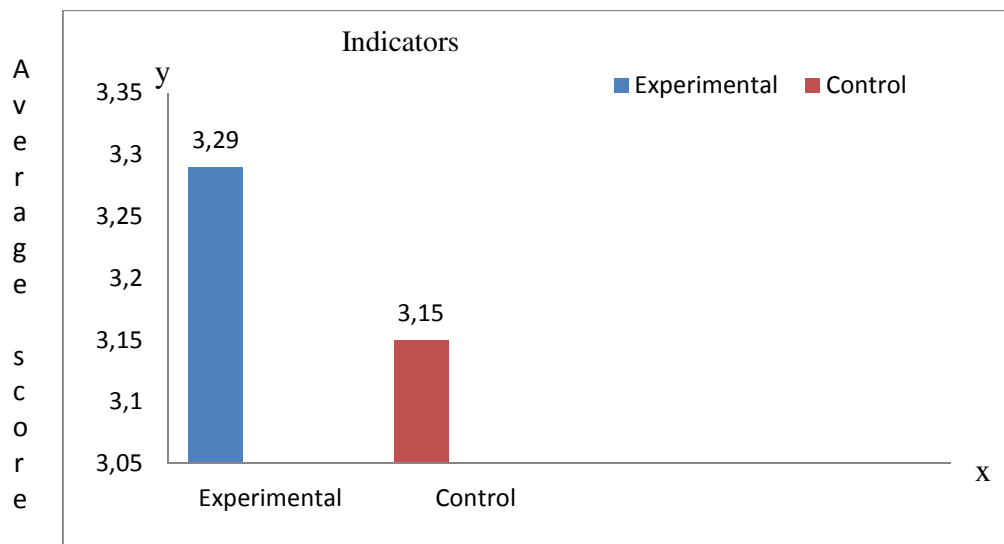
Data obtained in the research are students' psychomotor competence in both experimental and control classes.

3.1 Data of Students' Psychomotor Competence

Data of students' psychomotor competence are presented in Table 1 below.

Table 1.Data of Students' Psychomotor Competence

Class	Average Score	Predicate
Experimental	3,29	B ⁺
Control	3,15	B



Graphic 1. Average Score of Students' Psychomotor Competence

The assessment of students' psychomotor competence is done by using observation sheet. It was done by two observers during learning process in the classroom. The assessed aspects were communicating, discussing and presenting the report. Based on Table 1. and Graphic 1 above, it is obvious that the average score of students' psychomotor competence in experimental class is higher than in control class, which is 3.29 (B⁺) in experimental class and 3.22 (B) in control class. It is caused by there was problem-solving activities during learning process. In these activities, students were asked to develop and present their discussion result in front of the classroom; while, other students were asked to respond to discussion result of the presented group. It is in line with Dewi, Eka and Jatningsih (2015), who state that PBL has a special characteristic which is producing a product and presented it in front of the classroom. Problem-solving activity in PBL is a good technique for students to understand learning materials. It makes students find the knowledge by themselves so that learning process becomes more meaningful. (Aswan, Lufri and Sumarmin, 2018).

The implementing of Active Learning in form of scientific approach with assistance of LKPD based Problem Based Learning (PBL) gives positive impact for students' Biology competence because it can increase their Biology competence. It is caused by this can facilitate students in learning process. It is in line with Bayharti, Suryelita and Utari (2015), who propose that LKPD based PBL can make students think critically in solving a problem. Beside that, Active Learning in form of scientific approach demands students to be active in learning by constructing concepts, laws or principles and involves students' thinking process. Then, it is one of independent tasks that can be used to attract students' attention in order to think more critically in understand the learning concepts. Students in experimental class were provided by LKPD based PBL. It is suitable with Active Learning in form of scientific approach. Meanwhile, students in control class are provided by standard LKPD used by teacher in school.

Active Learning in form of scientific approach with assistance of LKPD based Problem Based Learning (PBL) can make students active in observing, asking questions, trying or collecting information, reasoning and

communicating activities. In the observing activity, students can develop their curiosity because it is about finding facts that there is a relationship between the observed objects and learning materials. Moreover, this activity is also a sensing process. It is in line with Rochintaniawati (2014), who states that students can develop their conceptual understanding from what they see and experience. By observing and experiencing directly, it enables them to construct their understanding meaningfully, learning process which involves senses, body and intellectual is an active learning process.

According to Aswan, Lufri and Sumarmin (2018), PBL can improve students' critical thinking skill because they are trained to develop it to overcome a problem through activities, which is core of PBL. The core of PBL, which is in second, third and forth phases, gives an opportunity for them to construct their knowledge actively through problem-solving activities which can develop their mindset so that they accustomed to think critically (Karim & Normaya, 2015). Next, Bachtiar (2018) says that PBL can help students find solution about problems of a learning topic in order to make learning process more meaningful.

PBL can improve students' psychomotor competence (Ayuningrum, 2015; Murnihati & Lufri, 2018; Yanto & Yerizon, 2018). It will be better if it is combined with the use of LKPD based Problem Based Learning. Ayuningrum (2015) states that in LKPD based PBL, there are some problems that should be solve by students so that they can involve actively, ask enthusiastically and communicating their opinions undoubtedly.

By using Active Learning in form of scientific approach with assistance of LKPD based Problem Based Learning (PBL), it can improve students' competence in learning. It is in line with Aswan, Lufri and Sumarmin (2018) , who state that critical thinking skill should be developed through students' direct experience process in solving a problem. Learning by using LKPD based Problem Based Learning can guide and lead students to do an observation so that they are easy to develop their skills. Students' high score in psychomotor competence is influenced by their interest to learning process. It is in line with Purnamasari, et al. (2018) and Trinanda, et al. (2018), who state that LKPD based Problem Based Learning by using scientific approach can improve students' psychomotor competence in learning process.

IV. CONCLUSION

Based on the research finding, it can be concluded that implementing Active Learning using scientific approach with assistance of LKPD based Problem Based Learning affects significantly towards students' competence because it can improve their Biology competence.

ACKNOWLEDGMENT

Thanks to Prof. Dr. Lufri, M.S as advisor, Dr. Dwi Hilda Putri, M.Biomed., Dr. Moralita Chatri, M.Si and Frida Pardede, S.Pd as validators and SMA Negeri 1 Pasaman as location of the research.

REFERENCES

- [1] Aswan, D. M., Lufri, L., & Sumarmin, R. 2018. Influence of Problem Based Learning on Critical Thinking Skills and Competence Class VIII SMPN 1 Gunuang Omeh, 2016/2017. In *IOP Conference Series: Materials Science and Engineering* (Vol. 335, No. 1, p. 012128). IOP Publishing.
- [2] Atnuri, A., & Prastyo, D. 2016. Pengaruh Pembelajaran Saintifik Model Problem Based Learning (PBL) dan Project Based Learning (PJBL) Terhadap Hasil Belajar Mahasiswa Jurusan PGSD UNIPA Surabaya Pada Pokok Bahasan HAM. *Wahana*, 67(2), 13-19.
- [3] Ayu, D. M., Lufri, L., Sumarmin, R. 2018. The Development Of Biology Modul With LKS Orientation Problem Based Learning (PBL) In Topic Environmental Pollution For Grade X. *Bioeducation Journal*, 2(1), 76-86.
- [4] Ayuningrum, D., & Susilowati, S. M. E. 2015. Pengaruh model problem based learning terhadap keterampilan berpikir kritis siswa SMA pada materi protista. *Journal of Biology Education*, 4(2).
- [5] Bachtiar, S., Zubaidah, S., Corebima, A. D., & Indriwati, S. E. 2018. The spiritual and social attitudes of students towards integrated problem based learning models. *Issues in Educational Research*, 28(2), 254-270.
- [6] Baharun, H. 2015. Penerapan Pembelajaran Active Learning untuk Meningkatkan Hasil Belajar Siswa di Madrasah. *PEDAGOGIK: Jurnal Pendidikan*, 1(1).
- [7] Bayharti, Suryelita, Utari, I.H. 2015. The Development Of Problem Based Learning Worksheet On Reaction

- Rate For Senior High School Students. In W. Rahadi, Yuhendra & Elizar (Eds.), *The International Conference On Mathematics, Science, Education and Technology* (pp. 177-182). Padang: UNP.
- [8] Dewi, E. K. and Jatiningsih, O. 2015. Pengaruh Penggunaan Model Pembelajaran *Problem Based Learning* terhadap Kemampuan Berpikir Kritis Siswa pada Mata Pelajaran PPKn Kelas X di SMAN 22 Surabaya. *Kajian Moral dan Kewarganegaraan*, 02(03), 936-950.
- [9] Dipuja, D. A., Lufri, L., & Ahda, Y. 2018. Development Biology Worksheet Oriented Accelerated Learning on Plantae and Ecosystems for 10th-Grade Senior High School Students. In *IOP Conference Series: Materials Science and Engineering* (Vol. 335, No. 1, p. 012092). IOP Publishing.
- [10] Fornari, A., & Poznanski, A. 2015. *How to guide for active learning*. Netherland: IAMSE.
- [11] Gustinasari, M., Lufri, L., & Ardi, A. 2017. Development of Module Learning Based on Concept with Exampel on Cell Material for Students SMA. *Bioeducation Journal*, 1(1), 61-74.
- [12] Haviz, M., Lufri, L., Fauzan, A., & Effendi, Z. M. 2016. Model Pembelajaran Integratif Pada Biologi Perkembangan Hewan: Analisis Kebutuhan Pengembangan. *Ta'dib*, 15(1).
- [13] Karanikola, A., Karlos, S., Kazllarof, V., Kateri, E., & Kotsiantis, S. 2018. Active fuzzy rule induction. In *2018 IEEE Conference on Evolving and Adaptive Intelligent Systems (EAIS)*. IEEE.
- [14] Karim, Normaya. 2015. Students Critical Thinking in Mathematics Learning by Using Model JUCAMA in Junior High School. *Journal of Mathematics Education*, 3 (1), 92- 104.
- [15] Karnela, D L., Anhar, A., Lufri, L. 2018. Validity of Biology Module Oriented Meaningful Learning for Student Class XI. *International Journal of Science and High Technologies*, (Vol. 7 No.1, pp 31-39). IJPSAT Publishing.
- [16] Konyushkova, K., Sznitman, R., & Fua, P. 2017. Learning active learning from data. In *Advances in Neural Information Processing Systems* (pp. 4225-4235).
- [17] Lufri, L., Fitri, R., & Yogica, R. 2018. Development of Learning Models Based on Problem Solving and Meaningful Learning Standards by Expert Validity for Animal Development Course. In *IOP Conference Series: Materials Science and Engineering* (Vol. 335, No. 1, p. 012094). IOP Publishing.
- [18] Lufri, L., Sudirman, S., & Rahmi, S. 2016. Mengembangkan Skill Mengajar (Teaching Skill) Mahasiswa Calon Guru Menggunakan Multy Strategies. *Ta'dib*, 15(1).
- [19] Lufri, 2007. *Strategi Pembelajaran Biologi, Teori, Praktek dan Penelitian*. Padang: UNP Press.
- [20] Marjan, J., Arnyana, I. B. P., Si, M., Setiawan, I. G. A. N., & Si, M. 2014. Pengaruh Pembelajaran Pendekatan Saintifik Terhadap Hasil Belajar Biologi Dan Keterampilan Proses Sains Siswa MA. Mu allimat NW Pancor Selong Kabupaten Lombok Timur Nusa Tenggara Barat. *Jurnal Pendidikan IPA Indonesia*, 4(1).
- [21] Murnihati, M., Lufri, L., 2018. Increasing the Activities and Competencies of Learning Science through Problem Based Learning Model to Class VIII Junior High School 1 Teluk Dalam. *International Journal of Science and High Technologies*, (Vol. 10 No.1, pp 49-59). IJPSAT Publishing.
- [22] Nurqomariah, N., Gunawan, G., & Sutrio, S. 2015. Pengaruh Model Problem Based Learning dengan Metode Eksperimen Terhadap Hasil Belajar IPA Fisika Siswa Kelas VII SMP Negeri 19 Mataram Tahun Pelajaran 2014/2015. *Jurnal Pendidikan Fisika dan Teknologi*, 1(3), 173-179.
- [23] Oktarina, K., Lufri, L., & Chatri, M. 2018a. Validity of Learning Module Natural Sciences Oriented Constructivism with the Contain of Character Education for Students of Class VIII at Yunior Hight School. In *IOP Conference Series: Materials Science and Engineering* (Vol. 335, No. 1, p. 012091). IOP Publishing.
- [24] Oktarina, K., Lufri, L., & Chatri, M. 2018b. Validity of Learning Module Natural Sciences Oriented Constructivism with the Contain of Character Education for Students of Class VIII at Yunior Hight School. *International Journal of Science and High Technologies*, (Vol. 6 No.2, pp 382-389). IJPSAT Publishing.

- [25] Purnamasari, E., Anhar, A., Advinda, L., Sumarmin, R. 2018. Effect of Learning Model Problem Based Learning Assisted LKPD of Competence to Learn Biology Students Class XI SMA State 12 Padang. *International Journal of Science and High Technologies*, (Vol. 6 No.2, pp 347-354). IJPSAT Publishing.
- [26] Rochintaniawati, D. 2014. Pembelajaran IPA dengan menggunakan Pendekatan Saintifik dalam Kurikulum 2013. *Jurnal Prosiding Seminar Nasional Pendidikan MIPA 2014 ISBN 978-602-19877-2-8*.
- [27] Rhosalia, L. A. 2017. Pendekatan Saintifik (Scientific Approach) Dalam Pembelajaran Tematik Terpadu Kurikulum 2013 Versi 2016. *JTIEE (Journal of Teaching in Elementary Education)*, 1(1), 59-77.
- [28] Rosida, P., & Suprihatin, T. (2018). Pengaruh pembelajaran aktif dalam meningkatkan prestasi belajar Fisika pada siswa kelas 2 SMU. *Proyeksi*, 6(2), 89-102.
- [29] Shofwan, M. I. 2016. The Use Of Scientific Approach In Teaching English As A Foreign Language In SMPN I Jakarta. In *UNNES International Conference on ELTLT (English Language Teaching, Literature, and Translation)* (pp. 424-428).
- [30] Susantini, E., Faizah, U., Prastiwi, M. S., & Suryanti. 2016. Developing Educational Video To Improve The Use Of Scientific Approach In Cooperative Learning. *Journal of Baltic Science Education*, 15(6).
- [31] Trinanda, L., Lufri, L., Zulyusri, Z., Sumarmin, R. 2018. Validity of Students Work Sheet Problem Based Learning Equipped With Crossword Puzzles on Ecosystem and Environmental Changes for Senior High School. *International Journal of Science and High Technologies*, (Vol. 6 No.2, pp 454-460). IJPSAT Publishing.
- [32] Wieman, C., & Gilbert, S. 2015. *Taking a scientific approach to science education, part II—changing teaching. Microbe*, 10(5), 203-207.
- [33] Yanto, E. A., Yerizon. 2018. Effect of Problem Based Learning Model Towards Students Critical Thinking and Learning Competences in Grade VIII in SMPN 21 Padang. *International Journal of Science and High Technologies*, (Vol. 9 No.2, pp 199-205). IJPSAT Publishing.
- [34] Yerimadesi, Bayharti, Jannah, S.M., Lufri, L., Festiyed, Kiram, Y. 2018. Validity and Practitality of Acid-Base Module Based on Guided Discovery Learning for Senior High School. In *IOP Conference Series: Materials Science and Engineering* (Vol. 335, No. 1, p. 012097). IOP Publishing.
- [35] Yogica, R., Lufri, L., & Sumarmin, R. 2014. Efektifitas Modul Bergambar Disertai LKS Berorientasi Konstruktivistik Terhadap Proses dan Aktivitas Belajar Siswa dalam Pembelajaran Biologi SMA. *Penelitian Pendidikan*, 5(1).
- [36] Yulianti, D. 2017. Problem-Based Learning Model Used to Scientific Approach Based Worksheet for Physics to Develop Senior High School Students Characters. In *Journal of Physics: Conference Series* (Vol. 824, No. 1, p. 012009). IOP Publishing.