The Effect of Active Learning in the form of Scientific Approach with the Use of Students Worksheet Based on Problem Based Learning (PBL) on Students’ Biological Knowledge

F Laili¹, L Lufri²

¹Student of Master Degree Program of Biology Education, Faculty of Mathematics and Sciences, Universitas Negeri Padang, Indonesia
²Department of Biology, Faculty of Mathematics and Science, Universitas Negeri Padang, Indonesia

Abstract. The effect of Active Learning in the form of Scientific approach with the use of students worksheet based on Problem Based Learning on Biological students knowledge. This kind of research is quasi-experimental by using research design; Randomized Control Posted only design. The population used here is students of X IPA Senior High School. The technique used is Purpose sampling and Class X IPA 4 act as experimental class whereas X IPA 3 as control class. Instrument that is conducted here is Objective and Essay. Data analysis by using T-Test. The result shows that there is significant differentiation between both class where experimental class knowledge is higher than another one. Average of experimental class students score is 86.74 and another class is 82.00. Based on the result of hypothesis test significant (0.008) < 0.05 so H1 was accepted. The conclusion of this research is Active Learning in the form of Scientific approach with the use of students worksheet based on Problem Based Learning on student enable them to improve their Biological knowledge.

Keywords: Active Learning; Student Worksheets; Scientific Approach; Problem Based Learning.

1. Introduction

Education is really important for human life. It can be achieved through learning-teaching process. That education quality can be seen through learning-teaching process [1]. Nowadays, Indonesian education quality is very low. One of the factors that affects it is the teacher is not creative enough in digging students potential. Basically, the teacher does not pay attention about what the students really need. In 2013 curriculum the student need to be active.

In order to implement the effective learning process, the teacher needs to have enough skills when teaching so they can use compatible method for their student so they will be more active in learning-teaching process. The approach that is used here is 2013 curriculum, also can be said as scientific approach consists of 5 activities that need to done by students; observation, asking question, gathering information, association and communication. Hosnan said that scientific approach role is to improve students’ knowledge, enable students to solve problems systematically, making atmosphere where the students feel that learning is a need for them, having a high score, train them to communicate their idea, and develop their character and behavior [2].

Teaching is a learning process, in other word can be said as every effort that enable someone to make other people learn, and to make learning phenomenon in people own mind [3]. Learning
teaching as an effort of sharing information teaching material from teacher to students [4]. Learning is individual process of changing behavior in filling their needs [5].

Biological learning teaching has purpose that is to develop students competency so that they will understand the nature through finding and direct experience [6–8]. Teachers’ role is needed for giving material and ease students to build and understand indepent study concept and also able to relate each concept together [1].

Based on researchers’ experience when interviewing SMAN 1 Pasaman teacher, researcher concludes that the teacher do not implement all aspects of scientific approach due to time and material problems. When conducting discussion session, many students ignore their team and also some of them only rely to certain students which active during all lesson. Most student also depend on note and teachers explanation, it causes them to be lack of knowledge. The lower students activity in classroom so their knowledge [9].

Students competency is still low based on the data that was achieved from biology teacher in SMAN 1 Pasaman, not even enough to reach KKM, it is 75. In order to solve those problem, an effective teaching model is needed to develop Active Learning and hopefully it gives students opportunity to develop and memorize their knowledge in long-term also understanding the lesson. One of the methods to make students active is by using Active Learning teaching model [10].

Active learning teaching model is a model that involves student in critical thinking so that is really important and need to be made as a culture [11]. Students active in class related to their knowledge [12]. Active learning model that can be used is Problem Based Learning (PBL).

Problem Based Learning is students centered model that enable students to do the findings, theory, action, and develop their skills that they can do problem-solving of certain problem [13]. PBL can be combined with various teaching, one of them is students’ worksheet PBL that is needed for learning teaching process and student centered hich focus on problem solving.

PBL has great effects on students knowledge [14] and also Depdiknas [15] the use of students’ worksheet as written learning teaching material which is give more benefits than printed book. Based on the backrounds that has been described, the purpose of writing this article is to know the effect of Active Learning in the form of scientific approach whi the use of students worksheet based on Problem Based Learning (PBL) on students’ Biological Knowledge”.

2. Method

This kind of research is experimental research with research plan Randomized Control Posted Only Design where population is Class X SMAN 1 Pasaman 2018/2019. X IPA 4 as experimental class and X IPA 3 as control class, the result is taking by using purpose sampling technique. The instrument that is used here is objective and essay written test.

2.1 Data Analizing

2.1.1 Normality Test

Normality Test used here is Kolmogrof Smirnov with hypothesis statistic as below:

H₀ : data follows certain normal distribution
H₁ : data does not follow certain normal distribution

Normality Test uses SPSS 16 software. Test criteria, input H₀ if Sig > real degree ((α = 0.05) and reject H₀ if the opposite.

2.1.2 Homogenity Test

It is conducted by using Levene with statistic hypothesis as below:

H₀ : σ₁² = σ₂²
H₁ : σ₁² ≠ σ₂²

In this research, variance of homogenity Test is conducted by using SPSS 16. The criteria is input H₀ if Sig > real degree (α = 0.05) and reject H₀ if the opposite.

2.1.3 Hypothesis Test

Test is conducted by t-test. Test criteria is if Sig value > 0.05 so H₀ is accepted and H₁ will be rejected so the opposite, if sig < 0.05 so H₁ will be accepted and H₀ will be rejected.
3. Result
The Data that as achieved from this research is experimental and control class.

3.1 Students knowledge data
Students knowledge data is showed as below in Table 1.

| No | Parameter         | Treatment | Explanation           |
|----|-------------------|-----------|-----------------------|
|    |                   | Experiment| Control               |
| 1  | Average           | 86.74     | 82.00                 | Experiment > Control |
| 2  | Total students    | 31        | 31                    | -                     |
| 3  | Normality Test    | 0.194     | 0.200                 | Normal                |
| 4  | Homogenity Test   | 0.303     |                       | Homogen               |

Diagram for Tabel 1. it can be seen Figure 1.

![Figure 1. Students Score](image)

Table 2. Result of students’ knowledge hypothesis test.

| Hypothesis | Class   | Sig  | A   | Result     |
|------------|---------|------|-----|------------|
| Hypothesis | Eksperimental Control | 0.008 | 0.05 | H₀ Got rejected |

4. Discussion
Based on Figure 1 and Table 1 shows that average level of experimental class students knowledge is higher than another one that are 86.74 : 82.00. On normality test, both class have normal distribution and for homogenity test both sample class is homogen.

The result of hypothesis test can be seen in Table 2 below. The purpose of this hypothesis test is to know students knowledge competency who follow lesson by using Active Learning in the form of scientific approach with the use of students worksheet based on Problem Based Learning (PBL) gives better result than Active Learning in the form of Scientific approach with LKPD integrated. Due to its data with normal and homogen distribution so T test will be done after it. The result of Table 2. Shows that students knowledge competency is Sig 0.008 with real degree (α = 0.05). It means that Sig value < 0.05 so H₀ got rejected. It can be concluded that there is significant effect of Active Learning in the
form of scientific approach with the use of students’ worksheet based on Problem Based Learning (PBL) on student’s knowledge competency.

The implementation of Active Learning in the form of scientific approach with the use of students worksheet based on Problem Based Learning (PBL) demand students to find and solve problems so that they able to develop their critical thinking to do problem-solving with ne knowledge make them have improvement in competency. Active learning in the form of scientific demand students to be active to build concept, law and principle which involve student’s critical thinking. Scientific approach is the peak of behaviour, attitude, skill, and knowledge of students development [16].

Active Learning in the form of scientific approach with the use of students worksheet based on Problem Based Learning (PBL) is kind of independent practice that was given to interest students to have critical thinking in understanding certain concept. On experimental class with the use of student’s worksheets is related with method use here that is Active Learning. When in control class it use conventional Student’s worksheet.

Active Learning in the form of scientific approach with the use of students worksheet based on Problem Based Learning (PBL) is able to make students to be active in observing, asking, finding and gather information, understanding and communicating it. Active Learning in the form of scientific approach with the use of students worksheet based on Problem Based Learning (PBL) the interaction between students self and also with teacher will be better [17]. In the stage of observation, students will gro their curiosity so they will have meaningful observation that class lesson and object that they observe are related. Students build their conceptual understanding based on hat they experience [18]. Direct observation and experience enable students to grow their meaningful hich involve their sense, physic and intelligence understanding as it called active learning.

PBL can improve students critical thinking in which students demand to develop it to do problem solving [19]. The core PBL take place on second, third and fourth phase that allow students to be more ambitious in constructing their knowledge to develop their critical thinking and make it as [20]

Skill of critical thinking need to be developed in direct problem solving experience [19]. The same thing also state by Orhan and Ruhan [21] that PBL has a postive impact on students achievement. Problem solving activity in PBL is a good technique to ease student understand the lesson. This activity make students experiencing what they will achieve their on knowledge so that the lesson will be meaningful and they got competency improvement [19]

When do finding in PBL students will be active and they will be able to develop their critical thinking [22]. Masek has the same way of thinking with [21] that PBL has great contribution on students competency.

5. Conclusion

Based on the research that has been conducted, it can be concluded that the implementation of Active Learning in the form of scientific approach with the use of students worksheet based on Problem Based Learning (PBL) has significant effect on student’s knowledge in Class X of SMAN 1 Pasaman.

Reference

[1] Karnela D L, Anhar A and Lufri L 2018 Validity of Biology Module Oriented Meaningful Learning for Student Class XI Int. J. Sci. High Technol. 731–39.
[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 13–9
[3] Lufri 2007 Strategi Pembelajaran Biologi, Teori, Praktek dan Penelitian (Padang: UNP Press)
[4] Yogica R, Lufri L and Sumarmin R 2014 Efektifitas Modul Bergambar Disertai LKS Berorientasi Konstruktivistik Terhadap Proses dan Aktivitas Belajar Siswa dalam Pembelajaran Biologi SMA Penelit. Pendidik. 5
[5] Zikra Z, Lufri L and Razak A 2013 Analisis Proses Pembelajaran Biologi Kelas X Madrasah Aliyah Negeri Sumpur Kolaboratif 1
Acknowledgments

Acknowledgements to Prof. Dr. Lufri, M.S as Advisor, Dr. Dwi Hilda Putri, M.Biomed., Dr. Moralita Chatri, M.Si., Frida Pardede, S.Pd as validator and big family of SMA Negeri 1 Pasaman which allows researcher to do the research.