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

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### ABSTRACT

In the 2013 curriculum, students are demanded to be active in learning process. To actualize it, teacher should has adequate ability and skills by implementing appropriate learning model in teaching. 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 to wards students' Biology competence in Bacterial material. The research method used 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. 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 3.34 (B+) and in control class is 3.17 (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.

## 1. Introduction

Education is really required by people and it can change their behaviors. It can be gotten from teaching and learning process. Lufri et al. (2018) state that level of

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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 (Laili et al., 2019).

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 et al., 2015). Furthermore, Hosnan (2014) in Atnuri et al. (2016) states that functions of scientific approach are to improve intellectual ability, to create ability to solve a students' 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 et al. (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 et al., 2018; Oktarina et al., 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 et al., 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

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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. With the problems in learning it will improve students' thinking skills (Pratiwi, 2019). 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 et al., 2016). Fornari et al. (2015); Karanikola et al. (2018); Baharun (2015); Hartono (2008) in Rosida et al. (2018); Konyuskhova et al. (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 et al., 2018; Nurqomariah et al., 2015).

In addition, Problem Based Learning (PBL) can be combined with various learning media. The media functions to empower and support teaching and learning activities (Mustafa et al., 2019). The media can help in increasing student understanding (Edwana et al., 2017). The media means in this context is Students Worksheet (LKPD). Student worksheets function to facilitate the learning process (Rahmatya et al., 2019). Other than that work sheet function of students can increase the ability to think high level of students (Yennita et al., 2018). With the LKPD, students can gather information according to the problem in the learning material (Syafaren et al., 2019). Students worksheets can increase the activeness of students in learning (Rahmatya et al., 2019). One of the is Students Worksheet based PBL which can be used to orient students to a certain problem. According to Indonesian Ministry of Education in Gustinasari et al. (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 students worksheet based Problem Based Learning (PBL) towards students' *Biology Psychomotor Competence in Bacterial Material*".

## 2. Methodology

This research has been carried out at SMAN 1 Pasaman class X in October - November odd semester 2018/2019. This type of research is quasi-experimental research. Experimental research is to treat the research variables and then observe the effects experienced by the research object. Lufri et al. (2017) state that "quasi-experiment" is not possible to manipulate or control variables and experimental conditions in an orderly manner, because it is very difficult to do.

The design model used is Randomized Control-Group Postest Only Design, according to Lufri (2007) the design of this study can be seen in Table 1.

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Table 1. Research Design

Group	Treatment	Final Tes
Experiment	X	T
Control	-	T

Information:

X: Scientific Active Learning assisted by LKPD based on Problem Based Learning (PBL)

- : Scientific Active Learning without being given a Problem Based Learning (PBL) based LKPD

T: Final test in the experimental class and the control class

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 because the data is included in the nominal data which has the characteristic of the result of the calculation which is not found in fractions and the numbers listed are only labels. The criteria for testing this hypothesis is that if the significance value obtained is greater than 0.05 then  $H_0$  is accepted and if the significance value obtained is less than 0.05 then  $H_1$  is accepted.

### 3. Results and Discussion

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.



Figure 1. Cover of the Student Worksheets Based Problem Based Learning

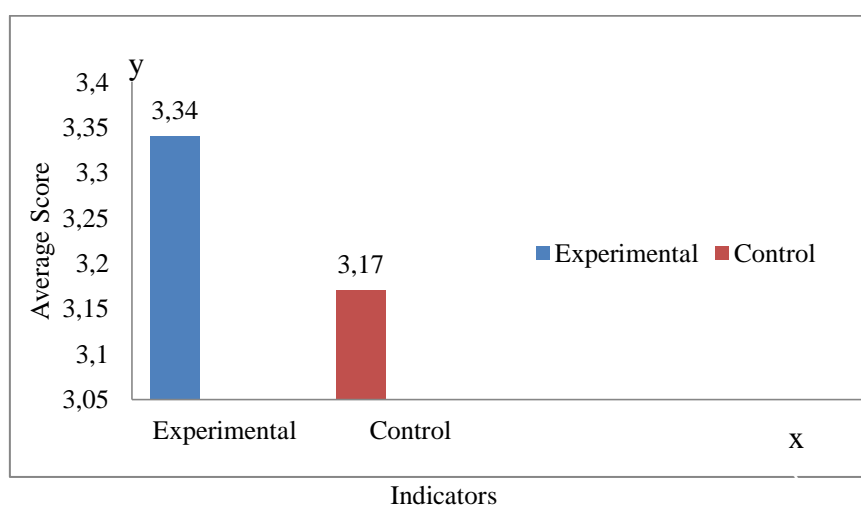
Data obtained in the research are students' psychomotor competence in both experimental and control classes.

### *Data of Students Psychomotor Competence*

Data of students' psychomotor competence are presented in Table 2.

Table 2. Data of Students' Psychomotor Competence

Class	Average Score	Predicate
Experimental	3,34	B <sup>+</sup>
Control	3,17	B



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. It is obvious that the average score of students' psychomotor competence in experimental class is higher than in control class, which is 3.34 (B+) in experimental class and 3,17 (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 et al. (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 et al., 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

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line with Bayharti et al. (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 et al. (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 et al., 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 et al., 2018; Yanto et al., 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 et al. (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.

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#### 4. 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' Biology Psychomotor Competence in Bacterial Material. 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, state that critical thinking skill should be developed through students' direct experience process in solving a problem. 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. 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. 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. Students' high score in psychomotor competence is influenced by their interest to learning process.

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