International Journal of Progressive Sciences and Technologies (IJPSAT)
ISSN: 2509-0119.

http://ijpsat.ijsht-journals.org
Vol. 29 No. 2 November 2021, pp.123-130

The Influence of Problem Based Learning Model by Paying Attention to Initial Ability to Biology Learning Competencies of Learners, Class VIII SMP At-Thayibbah Kerinci

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Abstract- The results of observations made in class VIII SMP At-Thayibbah Kerinci show that the competence of students in the realm of knowledge, attitudes and skills is still low. The low competence in learning biology of students is due to the fact that the learning process is still teacher-centered, the initial abilities of students are not considered and in the classroom the teacher is still applying conventional learning. Efforts that can be made to overcome these problems are by applying the Problem Based Learning (PBL) learning model. The purpose of this study was to determine the effect of the PBL learning model by taking into account the initial abilities of the biology learning competence of the eighth grade students of SMP At-Thayibbah Kerinci. This type of research is a quasi-experimental research (quasi-experimental). The population of this study were students of class VIIISMP At-Thayibbah Kerinci who were academically registered in the Year 2020/2021. While the samples were taken by cluster purposive sampling, then the VIIIc class was obtained as the experimental class and the VIIId class as the control class. Data analysis on the hypothesis test of knowledge, attitude and skill competence by using the t-test. The results showed that the value of students' biology learning competence on the respiratory and excretory system material in the experimental class was higher than that of the control class students. The average value of the knowledge competence of the experimental class students is 75.90 and the control class is 66.70. Based on the initial high ability value of the experimental class is 81.20 while the control class is 73.40 and the low initial ability of the experimental class is 70.60 while the control class is 60.00. The average value of the attitude competence of the experimental class is 80.69 and the control class is 72.64. While the average value of the competence of the experimental class is 80.28 and the control class is 73.33. The application of the Problem Based Learning (PBL) learning model by taking into account the initial abilities of students is better for the biology learning competence of class VIII students of SMP At-Thayibbah Kerinci.

Keywords- PBL; Initial Ability; Learning Competencies; Biology Learning

I. INTRODUCTION

Education is a process of influencing students to be able to adapt as best they can to their environment, thereby causing changes in themselves that allow them to have a function in social life (Hamalik, 2011). Education must help form critical individuals with high levels of creativity and skills (Rusman, 2014).

Considering the theme of developing the 2013 Curriculum is to be able to produce Indonesian people who are productive, creative, innovative, and have attitudes through observation of integrated attitudes (know why), skills (know how), and knowledge

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(know what). In the development of life and science in the 21st century, now there has been a shift in both characteristics and learning models to achieve this theme and learning that supports creativity is needed. The 2013 curriculum puts forward personal experiences through the process of observing, asking, reasoning and trying to increase the creativity of students.

The 2013 curriculum focuses on a scientific education approach, which is an approach that emphasizes five steps in acquiring knowledge, namely (1) observing, (2) asking questions, (3) gathering information, (4) reasoning (associating), (5) communicating (presentation) (Al-Tabani, 2014). With a scientific education approach, students must be able to take these steps to achieve better knowledge competence, especially in biology learning.

Biology is one of science learning that demands the thinking power of students to be more creative and independent. Biological material is related to nature extensively and systematically, so that biology is not only the mastery of a collection of knowledge in the form of facts, concepts, or principles but also a process of observation and discovery (Depdiknas, 2003).

Given the importance of learning biology, efforts are needed from various parties to improve the quality of biology learning in schools, including: improving the curriculum, conducting trainings for teachers, adding educational facilities and infrastructure, and also developing various methods, approaches and learning models.

Based on the results of interviews by researchers with eighth grade students of SMP At-Thayibbah Kerinci on November 24, 2019, it is known that students like biology because it is relevant to everyday life. Students still think that biology subjects memorize a lot, take notes and there are many foreign or scientific languages that might make biology subjects difficult to understand. As a result, students have not been able to think critically, logically and scientifically in solving problems that occur in everyday life related to biology. Therefore, an appropriate learning model is needed in motivating students to think critically, logically and scientifically so that the biological competence of students increases.

Based on the researcher's observations and interviews with biology teachers at At-Thayibbah Kerinci Middle School on November 24, 2019, it is known that the learning process is still teacher-centred, where teachers still use conventional learning, namely the delivery of material with discussion and lecture methods. Students generally tend to accept whatever is conveyed by the teacher, there are still many students who need guidance and direction in completing assignments or questions, as a result many students are not serious in learning. This has an impact on the lack of participation or good interaction between students and teachers or students and students in the implementation of biology learning.

The biology learning process in class VIII emphasizes more on the knowledge competence of students, while the attitude and skill competencies are not given much attention. The weak ability of these students is not only caused by the low desire of students to explore biological concepts through the thought process, but is also influenced by the weak initial abilities of students. If the initial ability of students is low, it will affect the process of forming new understandings in these students. This is because, the initial ability is the foundation in forming a new learning concept.

Based on the results of the daily test scores, it is known that there are still many students who get scores below the Minimum Completeness Criteria (KKM) set at school, presented in Table 1.

Table 1. Students' Daily Test Values in Biology Learning for the 2020/2021 Academic Year

No	Class	Average value	KKM
1	VIIIa	68,75	70
2	VIIIb	68,50	70
3	VIIIc	67,75	70
4	VIIId	68,00	70

Source: Biology teacher at At-Thayyibah Kerinci Middle School

Based on Table 1 above, it is known that the value of biology learning outcomes obtained by students is still low and the daily test scores also show that the average initial ability of students is still low.

Based on Table 1 above, it is known that the value of biology learning outcomes obtained by students is still low and the daily test scores also show that the average initial ability of students is still low. According to Mukhtar (2003), the initial ability of students is the ability that has been possessed by students before following the lessons to be given. This initial ability (entry behavior) describes the readiness of students to accept the lessons that will be delivered by the teacher.

In the learning process, the teacher is faced with the various initial abilities of students. Initial abilities can affect the learning process and competence and can describe the readiness of students to accept the lessons that will be delivered by the teacher. According to Slameto (2010), new materials can be studied well, depending on what is known. Thus, the initial ability of students is a prerequisite for students to be able to take lessons, so that they will achieve better learning competencies.

Initial abilities and learning models are two very important things to be considered by teachers before starting the learning process. According to Astuti (2015), initial ability is the result of learning obtained before getting higher abilities. The initial ability of students is a prerequisite for participating in learning so that they can carry out the learning process well.

Based on these problems, it is necessary to make efforts to improve the quality of biology learning, which can have a good impact on students' learning competencies which include knowledge, attitudes and skills competencies. One of the efforts that can be done by teachers is to apply a problem based learning (PBL) learning model. The application of the PBL model in biology learning is expected to make it easier for students to understand the learning material, because in learning the teacher considers the initial abilities of students, it is hoped that the competence of students can increase.

Through PBL, students can gain experience in dealing with problems that exist in real life and emphasize the use of communication, collaboration, and various existing sources to formulate ideas and develop reasoning abilities (Mountinho, 2015). The PBL learning model used must have supporting teaching materials, namely Student Worksheets (LKPD). LKPD in learning functions as a learning resource that can support students to think critically and construct understanding with the existence of learning activities that include the syntax of the PBL model.

Several studies have stated that the PBL learning model has an effect on student learning outcomes. Research conducted by Kurniasih (2015), shows that the PBL learning model can improve intellectual discipline and thinking skills by means of discussion, thus making students more active in the learning process. Fradisa's research (2015) states that the PBL model can improve learning competence and student motivation.

Based on the background that has been described, a research was conducted with the title "The Influence of Problem Based Learning Models and Initial Ability on Biology Learning Competencies of Class VIII Students of SMP At-Thayyibah Kerinci".

II. Research Method

This research is quasi-experimental research. The population is class VIII SMP At-Thayyibah Kerinci enrolled in the 2020/2021 Academic Year. The sample of this research was taken by cluster purposive sampling, so that class VIIIc was obtained as the experimental class and class VIIId as the control class. Data analysis was performed using the t-test.

III. Finding And Discussion

3.1 Description of Learning Competency Data

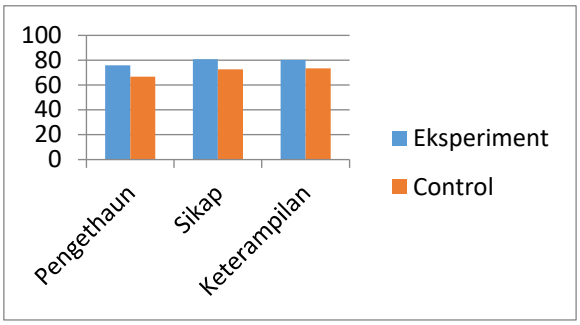
The data obtained in this study are the learning competencies of students which include knowledge, attitudes and skills towards the experimental class by applying the PBL learning model and control by applying the conventional learning model. The data on the value of students' learning competencies can be presented in Table 2.

Table 2. Data of Student Learning Competence Values

No	Learning Competence	Kelas	
		Experiment	Control
1	Knowledge	75,90	66,70
2	attitude	80,69	72,64
3	Skills	80,28	73,33

If presented in graphical form, the average value of the learning competencies of students in the experimental class and control class can be seen in Graph 1.

Based on Table 2 and the graph above, it can be seen that the knowledge competence, attitudes and skills of students who use the PBL learning model get higher scores than students who follow conventional learning.



3.2 Discussion

a. Knowledge Competence

Based on the description of the data presented earlier, it can be seen that the average value of the biology learning competence of experimental students who followed the PBL learning model was overall higher than the control class that followed the conventional learning model. The high acquisition of the average knowledge competence value of the experimental class students compared to the control class was caused by the treatment given to the experimental class, namely the PBL learning model. In line with the results of research by Fradisa (2015) and Rosdiana (2019), it shows that the PBL learning model has an influence on knowledge competence in improving student learning outcomes.

Knowledge competency learning outcomes are grouped into students who have high initial abilities and low initial abilities. The high initial ability of students obtained from knowledge competence in the experimental class, because the PBL learning model divides students into heterogeneous groups. In addition, it is supported by PBL syntax which accompanies discussion activities. In line with the results of Yuningsih's research (2019), it shows that the learning outcomes of the experimental class students based on high initial ability using the PBL model are better than the control class learning outcomes with high initial abilities using conventional learning and vice versa. According to Sadirman (2006), it is important for teachers to know the initial abilities of students in order to provide the right learning model.

Based on data analysis, experimental class students who were treated using the PBL model based on initial ability had better learning outcomes than the control class treated using the conventional model. This is because the PBL model is a learning model that presents contextual problems, so that it attracts the attention of students to study in classes that apply problem-based learning.

Problems that are faced contextually or problems that exist in the daily lives of students can make it easier for students to conduct investigations to solve problems. This is in accordance with the opinion of Trianto (2007) and Siswanto (2012), that the PBL model is to expose students to problems, students will try to find solutions to these problems with investigations so that students remember the material being studied better.

The learning process in the PBL model is assisted by LKPD which is a form of independent training provided, which can be used to attract the attention of students to think more critically and understand concepts. LKPD is given to each group, according to the learning model used. Yuningsih and Advinda (2019), said the problem-based learning process (PBL) assisted by LKPD is a form of independent training provided, which can be used to attract the attention of students to think more critically and understand concepts.

Learning activities with this PBL model have five main steps which include: (1) Orientation of students to problems.,(2) Organizing students to learn., (3) Guiding individual and group investigations., (4) Developing and presenting work., (5) Analyze and evaluate the problem solving process.

At the student orientation stage, the teacher gives problems to students in the form of discourse, then students are asked to understand the problems that have been provided on the problem discourse sheet. The activity carried out by students is to find the problems contained in the problem sheet. Then students solve problems together and express opinions that are in accordance with their experiences so far through the explanations given by the teacher. Students dare to give a complete explanation for answers that are not quite right. Giving real problems will stimulate curiosity, the desire to observe, and the desire to be involved in a problem will be even greater.

At the stage of guiding individual and group investigations, this stage can improve students' critical thinking skills, this is because the teacher invites students to discuss the most appropriate strategy to solve the given problem, then look for information about the causes and consequences of existing problems.

After students find alternative solutions that are used to solve problems, students conduct group investigations to find the right solution for the problem. Students are also asked to make conclusions from the problem solving activities carried out.

The next stage is that students are asked to develop and present their work. When the selected group discussion (presenter) will read the questions or problems found, then read the solution to the problem. One group of presenters conveys the answers to the questions from the discussion in front of the class while students from other groups listen to the answers to each question (listening activities).

After the presenter conveys the results of solving the problem, at the end of the lesson the teacher guides students to conclude the subject matter by asking for student participation. Thus the PBL model is directed to find problems and find solutions to problems that are found together and learning is more centered on students and teachers only as facilitators and moderators. Sumarji (2009) states that PBL learning has a number of characteristics, namely: (1) learning is student centered, (2) learning in small groups, (3) teachers act as facilitators and moderators, (4) problems become the focus and are a means of to develop problem solving skills, (5) new information is obtained from self-directed learning.

Based on the steps of the PBL learning model, it appears that the involvement of students in the learning process is to actively participate in every learning process, collaborative, and student-centered. This shows that the PBL model can spur students to think in solving problems. This is in accordance with the opinion of Masek and Yamin (2011) which states that the steps contained in the PBL model are able to support the development of students' thinking skills.

In the control class, the knowledge aspect competence is lower than the experimental class because the control class uses a direct instruction learning model and initial abilities. This can be seen from the results of student tests, students find it difficult to solve problems because the teacher does not give homework, only asks students to read the material that the school will learn later. But not all students have the will to read the material, so that the learning capital of students is low.

This results in students taking a long time in solving the problems given by the teacher, students must first open the book, read the material first according to the problem at hand. Then understand the problem, and note if the problem has been found the answer, so that a lot of time is spent in problem orientation and investigation of the problem, while the development and presentation of the work and evaluating the problem solving process is not achieved optimally.

The teacher overcomes this problem by giving time limits to students in problem orientation and investigation of the problem, but the time given is not enough to solve the problems given by the teacher. There are some groups who are finished in problem solving, some other groups are not finished in problem solving, so that in the process of developing and presenting the work and

evaluating the problem solving process the teacher is more extra to direct students in the problem solving process. This results in not all students being active in the discussion, only smart students dominate the learning process. According to Johnson (1984) in the discussion process that occurs, increasing the ability to find and develop higher cognitive strategies than learning individually.

In other words, the learning process in the two sample classes, namely the experimental class and the control class, has a significant difference. The experimental class using the application of the PBL model has an average value of knowledge aspect competence that is better than the average value of the knowledge competence of the control class using the conventional learning model.

b. Attitude Competence

Based on the observations of the attitude competence of students conducted by the observer. Wildan (2017), states that assessment through observation aims to record the development of students' attitudes through observations, both students' attitudes towards subjects or attitudes towards general things. For example, observing the attitude of students regarding discipline, perseverance, honesty, cooperation and so on.

The high learning outcomes of attitude competence cannot be separated from the high activity and involvement of students in problem solving activities in learning in the experimental class using the PBL model. This is in accordance with the opinion of Zahida and Zarvianti (2019), PBL is a learning model to encourage students to be actively and creatively involved with real-world problems.

During the learning process, it appears that students have a high responsibility in solving problems in PBL learning, students share information with each other by conducting investigations during discussions. The curiosity of students is higher for the material being studied, this can be seen from the problems given so that students find solutions to each problem. Discipline attitudes of students are also higher, it can be seen from students attending on time when learning biology, students paying attention to the teacher when explaining the material and collecting assignments on time. So, it is very clear that PBL learning has an effect on attitude assessment, especially on indicators of curiosity and responsibility assessment in the discussion process. According to Taylor and Hamdy (2013), the involvement of students in PBL is very important to achieve learning goals.

Students in PBL learning provide a different atmosphere than conventional learning. This is because, in the control class, which applies conventional learning with the lecture and discussion method, students seem less active in the learning process. Students when participating in group discussions only rely on friends who have more competence in solving discussion problems. So that curiosity and responsibility as well as a disciplined attitude towards learning activities are still low in the control class. Huang (2008), states that the results of the learning process will be influenced by the learning model, curriculum, and teaching used.

Based on this explanation, it can be concluded that the learning competence of the attitude domain of students who follow the PBL learning model is better than the learning competence of the attitude domain of students who follow conventional learning.

c. Skill Competence

The high acquisition of student competency skills in the experimental class is a positive influence of learning using the PBL model. In line with the results of Yulia's research (2014), namely the PBL learning model can improve the learning competence of students' skills.

The learning process in the two sample classes, namely the experimental class and the control class, has a significant difference. The experimental class using the PBL model has an average skill competency higher than the average skill competency score for the control class using the conventional learning model.

Based on the observations of the researchers, it was found that the skills of students that occurred each time learning took place were getting better. The high acquisition of the average skill competency score in the experimental class was due to the influence of the PBL learning model. PBL learning can improve skill competency caused by syntax at the stage of problem solving, investigation, and evaluation. So that students are able to communicate by conveying ideas / / solutions to problems, solving problems in discussions and writing reports on group discussion activities well. The enthusiasm of students in the learning process through the PBL model has a positive impact on student-centered learning.

This result is reinforced by Barron and Darling-Hammon (2008), a PBL learning model that involves students in small groups to explore meaningful problems, identify them in order to solve problems for solutions. In group learning, it will facilitate the achievement of the expected learning mastery (Masholekhatin, 2013).

In the control class using the conventional learning model, the students' skills were lower than the experimental class using the PBL learning model. This can be seen in the process of student discussion activities and when working on writing reports given by researchers, the results are written based on what is in the package book and LKPD. Students also do not understand the concepts of the material in discussion, it is clearly seen when discussing and communicating. At the time of group discussion only a few asked, responded and tended to only competent students who actively participated.

Based on this explanation, it can be concluded that the learning competence of the skills domain of students who follow the PBL learning model is better than the competence of learning the skills of students who follow conventional learning.

IV. CONCLUSION

Based on the results of the study, it can be concluded that the learning outcomes of students who follow the problem based learning (PBL) learning model by taking into account the initial ability to learn biology competence are better than the learning outcomes of students who follow the conventional learning model.

ACKNOWLEDGMENT

Thanks to Mrs. Dr. Linda Advinda, M.Kes., as the supervisor, Prof. Dr. Lufri, M.P., and Mr. Dr. Syamsurizal, M. Biomed., as a contributor, in writing this article

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