

Influence of Problem Based Learning Model And Entry Behaviours on Student Biological Competency of Class X, Senior High School 4 Sungai Penuh

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Abstract - This study aims to determine the effect of Problem Based Learning and Entry Behavior on students' biological competencies. This research is a quasi experiment. The population of this study was the students of MIA SMA 4 Sungai Penuh, academic year 2018/2019. Sampling was done by Purposive sampling technique with students of class X MIA 5 as an experimental class treated with Problem Based Learning and class X MIA 3 as a control class treated with Direct Instruction model. The instruments used in this study were paper pencil test, and the attitude and skills by observation sheets. Data analyzed using the t-test for knowledge competencies, as well as the Mann Whitney U test for attitude and skill competencies.

The results showed that the value of the biological knowledge competency of the experimental class students 82.34 better than control class students 75.3. The competency of the attitude and skills of the experimental class students is also better than the competency of attitude and control class skills. It can be concluded that the Problem Based Learning and Entry Behavior models increased the student competencies.

Keywords - Problem Based Learning, Entry Behavior, Learning Competence.

I. INTRODUCTION

Education is one form of the realization of a dynamic and full of human culture. Therefore, changes or developments in education are things that are supposed to happen in line with changes in the culture of life. Changes in the meaning of improving education at all levels need to be continuously carried out in anticipation of future interests.

If we want to improve achievement, surely we will not be separated from efforts to improve the quality of learning in schools. The application of the Competency-Based Curriculum 2004 which has been revised through the Education Unit Level Curriculum (EULC), demands a paradigm shift in education and learning, especially in the types and levels of formal education. The change must also be followed by teachers who are responsible for organizing learning at school.

Such conditions are increasingly gaining the moment of Curriculum enactment in 2013. This is because the theme of the 2013 curriculum development is that it can produce productive, creative, innovative Indonesian people and attitudes through strengthening the 'know why' attitude, 'know how' skills, and 'know what' knowledge integrated. Recognized of life and science in the 21st century by student, known as improve the characteristics and learning models. This is what was anticipated at the end of 2013.

The 2013 curriculum focuses on the approach *scientific education* which emphasizes five steps in gaining knowledge. *First*, observations with two contents are expected through real phenomena, namely: 1) through observation students gain knowledge authentically. 2) Through observation, they have a critical soul facing every phenomenon that exists. *Second*, ask. This is the starting point of human thought as *man is curiosity*. *Third*, explore.

Fourth, associations. *Fifth*, the presentation is that students must be able to communicate what they see and get. In this communication, it is also necessary to behave politely and politely as student character values (Al-Tabani, *et al.*, 2014).

The recommended scientific approach is project-based learning model, discovery learning model, and problem-based learning model. 2013 Curriculum demands on student competencies are listed in graduate competency standards which cover aspects of attitudes, knowledge, and skills (Permendikbud, 2016: 3)

At the level of secondary school education, biology is one of the subjects of science. Every student majoring in MIA will study these subjects. In biology learning students are expected to have the skills to observe, ask questions, classify and interpret data, and communicate findings orally or in writing, explore, and sort out relevant factual information to test ideas or solve daily problems.

Based on observations on February 13, 2018 with 3 biology teachers at SMAN 4 Kota Sungai Penuh, it was found that teachers had not yet applied the learning model according to the 2013 curriculum recommendations. Teachers tended to apply the lecture and question and answer methods. Although this method is also facilitated by media such as LCD, this method causes students to be less active in the learning process. Learning that uses lecture and question and answer methods is less able to motivate all students to think and move. Sumarmin, *et al.*, (2018) presents several weaknesses of the lecture method, which cannot cover various types of student learning, boring students if they are too long, causing passive students, and making students dependent on their teacher.

The competency data of students 'knowledge obtained from Biology teachers at SMA 4 Sungai Penuh also shows that students' learning competencies in the knowledge aspect are still below the minimum completeness criteria (Table 1).

Table 1. Average Value of Daily Examination of Class X MIA School 4 Sungai Penuh of 2017/2018 Academic Year on Knowledge Aspects

No	Class	Number of Students	Average Value	Percentage of Student Completeness
1	X MIA 1	32	68.28	37.50%
2	X MIA 2	32	68.43	31.25%
3	X MIA 3	32	68.12	37.50%
4	X MIA 4	32	67.81	34.37%
5	X MIA 5	32	68.12	37.50%

Source: Biology Teacher at SMAN 4 Sungai Full

Entry behavior determines student learning outcomes. Entry behavior is the foundation in forming a new concept in students. Knowledge cannot be moved intact from the teacher's mind to the student, but is actively built by the student himself. Competency data Entry behavior of

students obtained from Biology subject teachers at SMA 4 Sungai Penuh also shows that students' learning competencies in the knowledge aspect are still below the minimum completeness criteria (Table 2).

Table 2. Average Value of Biological Entry behavior of Senior High School 4 Students Sungai Penuh of 2017/2018 Academic Year on Knowledge Aspects

No	Class	Number of Students	Value Entry behaviour
1	X MIA 1	32	65.15
2	X MIA 2	32	65.46
3	X MIA 3	32	64.68
4	X MIA 4	32	63.90
5	X MIA 5	32	64.84Model

Source: Teacher Biology SMAN 4 Sungai Penuh

Table 2 shows that the value of student entry behavior is low. Entry behavior is knowledge possessed by students before learning. The student's entry behavior is obtained from students' daily test scores on Biodiversity material. In the process of teaching and learning the teacher is faced with students with different abilities. The diversity of students' abilities will influence the mastery of the subject matter taught by the teacher in the classroom (Sumarmin, *et al.*, 2018).

The factors causing the above problems consist of external factors, namely factors that come from outside, which in this study highlights the methods applied by the teacher while teaching and the media used and internal factors that are reviewed from the Entry Behavior which will have an impact on students' ability to understand the relationship between concepts that is being studied. Learning models are needed to overcome student difficulties. One that can be applied is learning with the model Problem Based Learning (PBL).

Learning PBL can present real life situations for students. Entry Behavior can help or hinder new learning (Thompson and Zamboanga, 2004). Individuals with pre-existing knowledge of a topic understand and remember better than those who have low Entry behaviour. Students with high behaviors are more likely to receive lessons.

Based on this description, it can be seen that the low cause of student biology learning competency is that there are still weaknesses in the learning process that is carried out, such as the learning model used and student entry behavior that is neglected. Therefore, a study that combines internal and external factors is carried out by applying the model Problem Based Learning as supporting external

factors and observing student entry behavior as an internal factor that is considered in an effort to increase the effectiveness of learning and teaching biology lessons in 4 Sungai Penuh Senior High Schools.

II. RESEARCH METHODS

1. Type and Design of

This study was a study *quasi experimental*. The study used two classes namely the experimental class and the control class. The experimental class is students who are treated using the model *Problem Based Learning*, while the student control class is taught with the learning model, *Direct Instruction* which is regular discussion. The experimental design used in this study is in the form of factorial design (*Factorial Design*) 2 x 2 for knowledge competence and research *Posttest Only Control Design* for competency attitudes and skills (Arikunto, 2002).

2. Data Analysis Techniques Data

Analysis techniques used ANOVA test. To do a two-way ANOVA must fulfill certain conditions, which come from populations that are normally distributed and samples have homogeneous variances. While for attitude competency data analyzed descriptively and competency data skills were analyzed by t test.

III. RESULTS AND DISCUSSION

1. Research Results

a. Description of Knowledge Competence Data Knowledge

Domain competency data in this study were obtained through final tests with a multiple choice written test technique given to both sample classes.

Table 3 Average Values, Normality Tests, Homogeneity Tests for Experimental Classes and Controls in the Knowledge Sphere.

No.	Parameter	Treatment		Description
		Experiment	Control	
1	Average	82.34	75.31	
2	Normality Test	P = 0.007	P = 0.044	Normal
3	Homogeneity tests	0.710		Homogeneous

Based on Table 3 can be seen competence knowledge experimental class is higher than the control class. Each sample is divided into two groups, namely groups of

students who have high Entry behavior and groups of students who have low Entry behavior.

Table 4 Competence of Knowledge Areas Based on Student Entry behavior in Experimental Classes and Control Classes.

Class	Entry behavior	$\bar{X}$	X min	X max	Completeness Value
Experiment	High	87.97	85.00	95.00	75
	Low	76.72	67.50	82.50	75
Control	High	81.56	77.50	85.00	75
	Low	69.06	60.00	77.50	75

Based on Table 4, it is known that the knowledge competencies of the experimental class are higher than the control class based on their entry behavior.

six times. Observations were carried out by observers using the student attitude competency assessment format (Table 5).

b. Description of Competence Attitude

Data on attitudinal competency research obtained through observation during the learning process took place

Table 5 Average Values, Maximum Values, Minimum Values, from Experimental Classes and Attitude Competence Controls.

Class	N	$\bar{X}$	X min	X max
Experiment	32	83.92	75.00	91.67
Control	32	73.34	62.50	84.38

Table 5 showed that the average value of competence experimental class attitude 83.92 higher than the control class 73.34. Each sample class in the attitude domain is divided into two groups, namely groups of students who have high Entry behavior and groups of students who have low Entry behavior.

c. Description of Skills Competency Data Skills

Competency research data is obtained through the assessment of products made by students as in Table 6.

Table 6 Average Values, Maximum Values, Minimum Values of Experimental Classes and Skills Control Competence.

Class	N	$\bar{X}$	X min	X max
Experiment	32	88.48	79.99	100
Control	32	79.60	68.32	86.67

Based on Table 6 discovered that the average value of competence skills of students who use the model of *Problem Based Learning* is 88.48 higher than students using *Direct Instruction* that is equal to 76.60.

learning competency value of the experimental class students compared to the control class was caused by the treatment given to the experimental class, namely the learning model *Problem Based Learning*.

2. Discussion of

a. Knowledge Competence

Based on the description of the data presented earlier, it appears that the average value of biology learning competencies of experimental students who follow the model *Problem Based Learning* as a whole is significantly better than the control class that follows the learning model *Direct Instruction*. The high acquisition of the average

The learning process in the model is *Problem Based Learning* assisted by LKPD which is one form of independent training provided, which can be used to attract the attention of students to be more critical thinking and understand concepts (Aswan *et al.*, 2018). In the experimental class LKPD was given to each group, LKPD used in accordance with the learning model used was based on *Problem Based Learning*. In the teaching material

control class used is LKS provided by the school. LKPD used by the experimental class contains authentic problems and questions related to the learning material. This facilitates students in conducting group discussions and collaboration with each group, and make them more active in learning.

Learning models are *Problem Based Learning* believed to be able to improve student learning competencies because the model *Problem Based Learning* can train students to work together and exchange ideas in the learning process so that students more easily understand the material. This is because students undergo several stages in the learning process (Aswan *et al.*, 2018). At the stage *Clarify*, students identify concepts that are not yet understood. This activity trains students to analyze. In the stage *Define*, students formulate problems; this trains the ability of synthesis. In the Phase of *Analysis*, at this stage students analyze problems based on their entry behavior and reveal all of their ideas, they can practice analyzing skills. Next to the stage *Review*, students determine the hypothesis or answer while requiring students to think critically, so this can train the ability to evaluate.

In the stage *Identify Learning Objectives*, you can practice inference skills, where students determine concepts to be learned. The stage of *self study*, can train independence and deductive skills because students draw conclusions to solve problems. In other words, in the syntax of learning models *Problem Based Learning* to provide conditions to improve knowledge and analytical skills in solving complex problems.

Student biology learning competence in the realm of knowledge that has been given the final test can be seen that the use of the learning model *Problem Based Learning* has a positive effect on biology learning competencies in the knowledge realm of class X MIASMA Negeri 4 Sungai Penuh, this can be seen from the experimental class 82, 34 and control class 75.31. If the average value is observed, the biology learning competence of the students in the knowledge realm of the experimental class taught by the learning model *Problem Based Learning* is better than the biology learning competency in the control class knowledge field taught with the model *Direct Instruction*. This proves that there are differences in biology learning competencies of students taught with learning models *Problem Based Learning* and students taught with models *Direct Instruction*. This means that students taught using learning models *Problem Based Learning* can improve the

competency aspects of student knowledge (Sari *et al.*, 2018).

The low level of competency in the knowledge of control class students is also caused by students having difficulty understanding the material conveyed by the teacher, students are less involved in the learning process so biology learning is boring because the learning process is dominated by teachers explaining the subject matter and giving notes and participants not given the opportunity to try to make understanding and experience of self-learning from the concepts given by the teacher. Noviar and Hastuti (2015) explained that knowledge will be increasingly abstract if the message is only conveyed through verbal words. As a result, students will only understand knowledge in the form of words without understanding and understanding the meaning contained in that knowledge.

So the learning process in both sample classes, namely the experimental class and the control class there are significant differences. The experimental class using the application of the model *problem based learning* has an average value of competency aspects of knowledge better than the average value of the competency knowledge of the control class using the learning model *Direct Instruction*.

b. Competence Attitude

Assessment of attitudes is a supporter of the learning process used. Based on the observations of the students' competency in the realm of attitude conducted by the observer, it was obtained that the real-world competency data of students' attitudes in the experimental class was significantly better than the competencies of students' attitudes in the control class. The realm of students' attitude in the experimental class as a whole has good criteria. Students' curiosity about the discussion material makes students focus and active in the learning process, responses, and answering problems that arise in the learning process. According to Julianti and Sumarmin (2018) that the high level of collaborative discussion will motivate students to responsible to solve problems and answering questions that they have been given. Curiosity is seen in the stage *Self Study* where students individually collect information related to the concepts learned. Students look enthusiastic about reading sources through textbooks or looking for sources outside the textbook to answer the problems given.

In the learning process students solve the problems given by the teacher in the form of LKPD so that when the process of orientation of students on the problem is focused on the problem given, students confidently convey solutions to

problems encountered. Students sit quietly and carefully following the course of the discussion. In discussing students also look responsible and earnest in solving problems, students socialize with each other well and enthusiastically contribute their opinions to complete the LKPD in discussion. When discussions where the teacher guides group inquiry, the teacher only directs a little to solve the problem found, because students work together to convey the understanding that has been gained in the learning process. According to Novianti and Sumarmin (2018) cooperative learning requires students to cooperate optimally in accordance with the circumstances of the group, whereas according to Sari, *et al.*, (2018) cooperative learning encourages students to work together and learn in groups.

In the learning process, self-confidence is seen in the stages of *Report and Synthesis* when students report and present their work. Students are more confident in conveying problem solving contained in the LKPD through presentations in front of the class and other students are listening. It also shows students' curiosity about the problems obtained in the learning process. Students are active in asking questions that are appropriate to the problem (Sari *et al.*, 2018). When students don't understand the problem solving, other students add it. Learning *Problem Based Learning* can develop the ability to think in giving a more detailed and clear explanation according to the knowledge they have so that they can understand a meaning behind an event, especially in learning.

This shows that the application of learning models *Problem Based Learning* can maximize the realm of student competencies. This learning model provides a different atmosphere in the learning process, because each student has a responsibility so that it fosters confidence to ask questions or respond to friends' opinions.

Based on these explanations, it can be concluded that the realm of learning competencies in the attitudes of students who follow the learning model *Problem Based Learning* is significantly better than the learning competencies in the attitude of students who take learning *Direct Instruction*.

c. Skills Competence

Observation of student competency in the skills field conducted by the observers, obtained data that the realm competence of students in experimental class is better significantly than the realm competencies of students in the control class. Competency in the realm of students in the experimental class as a whole is good. Most students can

produce on product interactions between ecosystems that have good physical form, products produced in accordance with the original concept, easy to understand and students can properly present the results of the product images.

Skills competencies of students in the control class as a whole obtain scores with sufficient criteria. Students are not motivated to carry out activities. Students do not make product images, Students do not interact well. Students are not able to present the product results of the images they make. In the topic of inorganic waste recycling products, the products produced by control class students mostly lack economic value and artistic value.

The above shows that the application of the model *Problem Based Learning* can maximize the skills competencies of students in the learning process because the learning model *Problem Based Learning* can motivate students and the problems raised during the learning process provoke students' curiosity so students are interested in conducting investigations directly. This is in accordance with the results of Sari's research, *et al.*, (2018) that problem-based learning consists of presenting students authentic and meaningful problem situations that can provide convenience to them to carry out investigations and concept discovery.

Problem Based Learning can also stimulate students to be active and can produce a product or work, because the learning model *Problem Based Learning* provides experience directly to students to experiment, work together, and solve problems. This is in accordance with the results of Noviar and Hastuti's research (2015) *Problem Based Learning* can stimulate students to be active in learning and produce a product or work. The results of the study by Nopia, *et al.*, (2016) explained that learning using PBL learning models can provide experience directly to students, because PBL models facilitate students to experiment, cooperate, and solve problems.

The competency of this skill domain cannot be separated from the realm of competency of knowledge and attitudes that are possessed after the implementation of the learning model *Problem Based Learning*. Wahyuningsih, *et al.*, (2011), revealed that realm learning outcomes are skills related to skills or abilities to act after students receive certain learning experiences.

This shows that the application of the model *Problem Based Learning* can maximize the realm of student competencies as well as cooperative teaching in general (Sumarmin *et al.*, 2017). In the learning process, the teacher

asks all group members to come forward in front of the class to present their work. This method requires students to practice in order to be able to speak in front of the class with confidence and be responsible for all the results they get in the experiment, because each student in the group must be responsible. The LKPD provided by the teacher to students aims to help students be able to understand and remember the material they read in the long term so that when they present the results of group discussions in front of the class smoothly.

Based on this, it can be concluded that there are significant differences in the learning competencies of the experimental class students with the control class. The experimental class using *Problem Based Learning* has an average skill competency higher than the average score of the competency of the control class using the learning model *Direct Instruction*. According to Savery (2001) at *Problem Based Learning*, students are active in learning to construct knowledge and apply it to skills.

IV. CONCLUSION

Based on the results of the study it can be concluded that the learning model of *problem based learning* and *entry behavior* has a significant effect on biology learning competencies as knowledge, attitudes and skills of class X MIA SMA 4 Sungai Penuh student.

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