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Critical Thinking Skill in Science on Junior High School by Problem Based Learning Models

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ABSTRACT

The purpose of this study was to determine the effectiveness of PBL learning model development effectiveness and results of critical thinking ability to learn science in a small-scale test (10 students) and large-scale test of class VII C totaling 34 students of SMP Negeri 1 Lumajang semester of the 2016-2017 academic year even. Data collection techniques used include Model validation, questionnaire, Observation, and Test.Analisis data used in this study using descriptive quantitative. The results showed that the application of PBL learning model with Takrir can improve the ability of critical thinking and science learning outcomes of students SMP Negeri 1 Lumajang. The average percentage of validation models and learning tools from experts (lecturers) and users 88.9% (Valid). Results increased students' critical thinking skills from questionnaire results and 85% observation and 82% student learning outcomes.

INTRODUCTION

The problems of education in Indonesia are the low quality of education. Teacher-centered learning results in students not accustomed to self-study. Learners are just waiting for material from the teacher without any effort to find their own material. This learning model resulted in the activity of learners in reading less and did not have the creativity to solve the problems in learning materials (Rahayu, 2010). Student learning outcomes are strongly influenced by the quality of learning that is implemented in schools. The use of the right learning model with the taught material is one of the determinants of the quality of learning. There are still many schools that do not pay attention to the use of learning models in every teaching performance. Learning is usually only delivered conventionally, teachers who play an active role, while learners

tend to be passive (Sutarno et al., 2010). The main priority of an educational system is to educate learners about how to learn to think critically. According to Johnson (2007) critical thinking is an organized process that allows learners to evaluate evidence, assumptions, logic and language that underlie other people's thinking. According Muhfaroyin (2008) to face the changing world is to form a culture of critical thinking in the community. By thinking critically learners analyze what they think, inform and conclude. Critical thinking becomes the determinant of the ability to answer the problem when participating in learning activities. Based on the description above, researchers are eager to improve students' critical thinking skills in science lessons in junior high school through PBL (Problem Based Learning)

BasicTheory

Education in schools is basically a teaching and learning activity, namely the interaction between students and teachers. Success in schooling depends on the learning process. Education as a teaching and learning process aims to develop all the potential that is in students optimally. Potential students can be more visible if balanced with the quality of teaching and learning process better. The process of teaching and learning in the classroom should be tailored to the learning objectives and conditions of students in the classroom, so that there will be more optimal interaction between teachers and students. Variable learning models can be used by teachers to optimize the potential of students, especially on subjects considered difficult by some students. For example in science class class VII even semester on the material system of the classification of living things, where in this material other than students are expected to be able to distinguish between living things from each other based on the characteristics possessed in which there are many rote Latin names that require repetition and memorization, Students are also expected to be able to classify living creatures around based on observed characteristics, therefore it is necessary to develop a model of learning that can improve the ability of critical thinking and student learning outcomes MTs.

1. Learning Model

The learning model is a plan or a pattern that is used as a guide in planning the learning in the classroom and for determining the learning devices including in it and directing the teacher in designing the learning (Joyce et al, 2000). Learning model is a design or pattern in learning that describes the process of details (learning steps) and the creation of an environmental situation that allows students to interact so that changes occur or developments in students in accordance with the established goals (Amri, 2013: 4 and Akbar, 2013 :). Things that need to be known in every model of learning that each learning model will depart from the goals and assumptions. Purpose is the direction, the direction, or the purpose of the learning model will be used. Assumptions are the basis for thinking because they are deemed right or the truth does not need to be proven. In addition to objectives and assumptions, it should be noted that in each learning model contains the key elements that determine the type or name of the learning model (Sutarto and Indrawati, 2013: 22).

Characteristics of Learning Model

The learning model has characteristics that are based on educational theory and learning theory from certain experts, have certain mission or educational purpose, have part of model called syntax, reaction principle, social system, support system , As well

as having an impact as a result of applying the learning model. These impacts include the impact of learning (measurable learning outcomes) and the impact of accompaniment (long-term learning outcomes) (Rusman, 2013: 136). A. Sintakmatik, which shows the steps undertaken by teachers and learners to achieve the learning objectives that have been formulated. B. The social system, ie the interaction or situations that apply to the learning model. C. Principle of reaction, the pattern of activities of teachers to respond to learners. D. The supporting system, which describes the supporting conditions needed to implement the learning model in the form of means, tools and materials needed in implementing the learning model. E. Instructional impact, which is the learning outcomes that are achieved directly by directing the student to the expected goal. F. Impact accompanist, is the result of other learning produced by a learning process as a result ofLearning model in the form of means, tools and materials needed in implementing the learning model. E. The impact of instructional, ie learning outcomes achieved directly by directing students to the expected goals. F. Impact accompanist, is the result of other learning produced by a learning process as a result of the creation of learning atmosphere experienced directly by students without direct direction from the teacher.

2. Understanding Problem Based Learning Learning Model (PBL)

According to Arends, PBL is one of the learning models used to improve problem-oriented high thinking level, including learning how to learn. The process of thinking in PBL learning is needed to solve problems faced by students during the learning process takes place. Problems faced by students in the form of the concept of learning materials, so with the existence of these problems it can stimulate the higher thinking process students in solving problems. According to Nurhadi (2004: 109), PBL is a learning model that uses real-world problems as a context for students to learn about critical thinking and problem-solving skills and to acquire essential knowledge and concepts from the subject matter. This is in accordance with the opinion of Hong (2007: 4) which states that in learning PBL teachers provide problems from the real world to students to be solved together. When discussing and answering problems, students must engage in concrete activities such as observing, collecting data and analyzing with other students in groups or in the classroom. As long as students study in school, students will be faced with problems to solve and overcome. The student's job is to find the solution of the problem with the school's experiences designed by the teacher. After graduating school, students will still be faced with various problems that must be addressed, it is expected that the experience at school will help in finding a solution.

Furthermore Nurhadi (2004: 109) states that PBL is also known by other names such as project learning, education based on experience, authentic learning and learning that is rooted in real life. The description is in accordance with the statement of Arends (1997: 156), ie The model has also been referred to by other names, such as project-based teaching, experience-based education, authentic learning, and anchored instruction. Nurhadi further (2004: 109) states that the role of teachers in problem-based teaching is to present problems, ask questions, facilitate inquiry and dialogue. Problem-based teaching can not be implemented if the teacher does not develop a classroom environment that allows for open exchange of ideas. In essence, students are faced with an authentic and meaningful problem situation that can challenge students to solve it. PBL directs students to have a desire to understand, learn the needs of good learning so

as to109) states that the role of teachers in problem-based teaching is to present problems, ask questions, facilitate inquiry and dialogue. Problem-based teaching can not be implemented if the teacher does not develop a classroom environment that allows for open exchange of ideas. In essence, students are faced with an authentic and meaningful problem situation that can challenge students to solve it. PBL directs students to have a desire to understand, learn the needs of good learning so as to use and find the best learning resources in order to solve the problems encountered. PBL is a simulation problem that can be used to activate the curiosity of students before starting to study an object, so that students are able to think critically and able to get and use learning resources appropriately. Broadly speaking, PBL is a learning that requires students to learn independently individually or in groups in solving problems presented by teachers. The teacher plays a role in presenting the problem and asking questions that lead the students to solve a problem in the learning activities.

Objectives of Problem Based Learning Learning Model (PBL)

Nurhadi (2004: 110) proposes three objectives of the PBL learning model: 1) Problem-based teaching encourages cooperation in the completion of tasks; 2) Problem-based teaching has elements of apprenticeship learning that can encourage observation and dialogue with others, so that students can gradually understand the important role of mental and learning activities that occur outside of school; 3) Problem-based teaching involves students in their own inquiry, enabling students to interpret and explain real-world phenomena and build on their understanding of the phenomenon. PBLs make students self-reliant and creative in their teaching-learning process, have a desire to understand, learn the needs of learning and use learning resources. According to Arends (2001: 350), states that the first goal of PBL is for thinking skills and problem solving. In thinking skills there are various ideas used to describe the way people think, explain the process of thinking and thinking high level. The second goal is adult modeling. The purpose of this goal is that PBLs can help perform in real-life situations and learn about the importance of adult roles. The third goal is to make students become autonomous and independent learners. Students are required to be more active in completing tasks in the learning process. Teachers only play a role in guiding, directing and encouraging students to seek answers to real problems by students themselves so that students can learn to solve problems and tasks independently in everyday life. PBL learning model requires students to be responsible for the problems faced, and directed to not rely solely on the teacher so that will form students who are independent and creative. In learning PBL, students are faced with problems and try to be solved by knowing the knowledge of the students and can work together in groups to solve the problem.

Characteristics of Problem Based Learning Learning Model (PBL)

According to Arends (1997: 157), the characteristics of Problem Based Learning there are 5 things, namely: 1) Driving question or problems; 2) Interdisciplinary focus; 3) Authentic investigation; 4) Producting of artifacts and exhibit; And 5) Collaboration. Driving question or problems in PBL organize lessons around questions or issues that are socially important and meaningful in person rather than organizing on certain academic principles. PBL is addressed to real situations, avoiding simple answers, in which there are various solutions with different interests. Interdisciplinary focus, PBL is selected on issues involving multiple disciplines. Examples of pollution problems due to the use of fertilizer by farmers will involve biological, economic, social, tourism and

government. Authentic investigation, PBL requires following authentic investigations, looking for real solutions to real problems. Students should analyze and formulate problems, develop hypotheses and make predictions, collect and analyze information, conduct experiments (if necessary), make conclusions. Producting of artifacts and exhibits, in PBL students are required to construct a product in an artifact and exhibit explaining or demonstrating the solution. The product can be a report, a physical model, a computer program. This product is prepared by students to be demonstrated to other students. Collaboration, PBL is characterized by working with others who are mostly in couples or small groups, and there is the development of thinking skills and social skills.

Stages of Problem Based Learning Learning Model (PBL)

According to Nurhadi (2004: 111) problem-based learning consists of five main stages starting with the teacher introducing students to the problem situation and ending with the presentation and analysis of student work. These steps can be seen in Table 2.1

Table 1. Stages of PBL Learning Implementation

Stage	PBL Learning Implementation
1	Student orientation to the problem The teacher explains the learning objectives, explains what is needed, explains the material briefly, motivates the student to engage in the selected troubleshooting activity.
2	Organize students to learn Teachers help students define and organize learning tasks related to the problem
3	Guiding individual and group investigations Teachers encourage students to gather appropriate information, carry out experiments, to gain explanations and solve problems.
4	Develop and present the work Teachers help students plan and prepare appropriate work such as reports, videos and models, and help them share their work with friends.
5	Analyze and evaluate the problem-solving process Teachers help students reflect on or evaluate the investigations and processes they use.

Table 1 shows that PBL learning requires students to actively learn independently with groups in solving problems presented by teachers. Teacher activity no longer dominates lessons, but in this case the teacher is more of a role as a motivator, organizer, facilitator and evaluator. So that teachers, students and problems are in a learning environment and have their respective roles in the PBL. Teachers in learning have a relationship with students as partners, while students play an active role and directly involved in learning to solve problems related to the subject matter. Sudjana (1996: 93) explains that the problem-based learning model will increase learning activities both individually and in groups. Almost every step guides students' learning activities, while the role of the teacher is more as a stimulator, guiding student activities and determining the direction of what the students do. The success of this learning model relies heavily on learning resources for students, requires sufficient time, as well as the ability of teachers in lifting and formulating problems. Therefore, before this

model is used it must be well prepared by the teacher, either problem preparation, learning resources for students, the time required, and grouping of students.

Advantages of Problem Based Learning model

The advantages of PBL learning model are:

a. Troubleshooting is a pretty good technique for understanding the content of a lesson
b. Problem solving can challenge students' abilities and provide satisfaction to discover new knowledge for students.
c. Problem solving can improve student learning activities
d. Problem solving can help students how to stimulate their knowledge to understand real-life problems.
e. Problem solving can help students to develop new knowledge and be responsible in their learning.
f. Through problem solving can show students that every subject (mathematics, science, history, etc.), is basically a way of thinking, and something that must be understood by students, not just learning from teachers or from books alone.
g. Problem solving is considered more fun and liked by students
h. Problem solving can develop students' ability to think critically and develop their ability to adapt to new knowledge
i. Problem solving can give students an opportunity to apply the knowledge they have in the real world.
j. Problem solving can develop students' interest to continually learn even when learning in formal education has ended.

Lack of Problem Based Learning model

Lack of PBL learning model include:

a. When students have no interest or no belief that the problems learned are difficult to solve, they will be reluctant to try
b. The success of learning strategies through Problem Based Learning requires time to prepare
c. Without understanding why they are trying to solve the problem being studied, then they will not learn what they want to learn.

From the description above, it can be concluded that in the learning strategy with Problem Based Learning (PBL), the more important is in terms of process and not just the results obtained learning. If the learning process can take place optimally, then most likely the results obtained will also be optimal learning. The form of its application, included in the presentation part of the whole learning activity consisting of preliminary, presentation, and closing activities, can be described as follows:

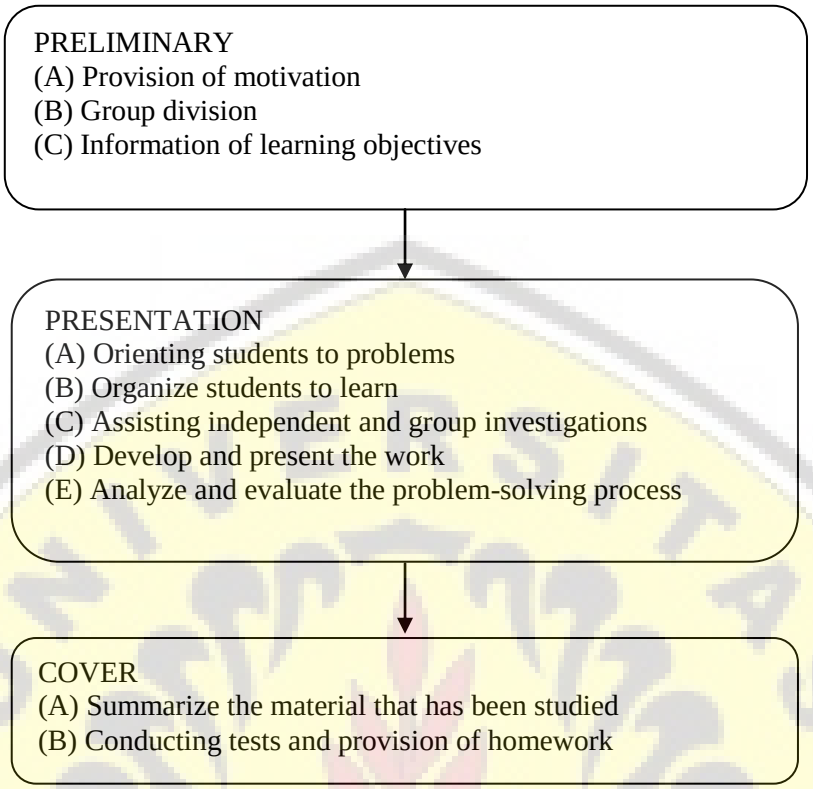

Figure 1. Procedure learning strategy with Problem Based learning (Adapted from MohamadNur, 2006, p 62)

3. Critical Thinking Skill

Critical thinking is a reflective thinking ability that focuses on decision-making patterns of what to believe and what to do (Ennis 2011). The critical thinking ability measured in this study refers to the indicator of Ennis's critical thinking ability (1985) in Muhfahroyin (2009), which mentions five aspects as an indicator in critical thinking, which provides a simple explanation, including: focusing questions, analyzing questions, asking questions and Answering an explanation, building basic skills, including: considering whether the source is trustworthy or not, observing and considering an observed report, concluding, including: deducting or considering the results of deduction, inducing or considering induced results, making and determining the value of consideration, Further explanations include defining terms and definition considerations in three dimensions, identifying assumptions, and setting strategies and tactics, including: determining actions, and interacting with others.

In addition Critical thinking is an intellectual process that actively and conceptually conceptualizes, implements, analyzes, synthesizes, and evaluates information gathered or generated from observation, experience, reflection, reasoning, or communication, to guide beliefs and actions (Scriven& Paul 1987) . According to Ennis (2011), critical thinking is reasoned and reflective thinking with an emphasis on making decisions about what to believe or do. According to Muhfahroyin (2009), critical thinking is a process involving mental operations such as induction deduction, classification, evaluation, and reasoning.

Based on some opinions of experts on the definition of critical thinking above, it can be formulated that critical thinking is a mental process to analyze or evaluate

information. Such information can be obtained from observation, experience, induction deduction process, or communication.According to Ennis (1985) in Muhfahroyin (2009) there are twelve critical thinking indicators grouped in five aspects, as in Table 2 below.

Table 2.Aspects and Indicators of critical thinking

No	Aspects and Indicators
1	Giving a simple explanation - Focusing the question - Analyzing questions - Asked and answered questions about an explanation
2	Building basic skills - Consider whether the source is reliable or not -Observing and considering an observation report
3	Summing up -Conducting and considering the results of deduction -induce and consider induction
4	Provide further explanation -Define terms and consider a definition in three dimensions -Identify assumptions
5	Setting strategies and tactics - Define an action - Interact with others

The ability to think critically can be measured using instruments developed through aspects and indicators of critical thinking. Critical thinking instruments can aim to measure one or more aspects of one aspect of critical thinking (Ennis 1993). Schools should teach the right way of thinking in children. Thinking at a higher level targets both critical thinking and creative thinking. One form of thinking is critical thinking (critical thinking). In this study emphasizes the ability in terms of critical thinking. Elaine Johnson (2002: 183) critical thinking is a well-directed and clear process used in mental activities such as problem solving, decision making, persuading, analyzing assumptions, and conducting scientific research.

Critical thinking is the ability to argue in an organized way. Critical thinking is the ability to systematically evaluate the weight of personal opinions and the opinions of others. Furthermore critical thinking is the activity of analyzing ideas or ideas in a more specific direction, distinguish it sharply, choose, identify, study and develop it to a more perfect (CeceWijaya, 1996: 72).

CeceWijaya (1996:) argues that critical thinking is an activity or a process of analyzing, explaining, developing or selecting ideas, including categorizing, contrasting, testing arguments and assumptions, completing and evaluating inductive and deduction conclusions, And make a choice. DedeRosyada (2004: 170), critical thinking ability is no other ability of students in collecting various information and make an evaluative conclusion from various information. Next Alec Fisher (2009: 10) defines critical thinking as a skilled and active interpretation and evaluation of observation and communication,informationand,argumentation.

Sapriya (2011: 87) argued that the purpose of critical thinking is to test an opinion or idea, including in this process is to consider or thought based on the opinion proposed. The purpose of critical thinking is to judge a thought, interpret values and even evaluate the implementation or practice of such thoughts and values. Even critical thinking involves considering activities based on known opinions. According to Lipman in Elaine Johnson (2002: 144) states that like these considerations should be supported

by criteria that can be accounted for. Elaine Johnson (2002: 185) also states that the tujan of critical thinking is to achieve a deep understanding.

Johnson (2009: 183) states critical thinking is a well-directed and clear process used in mental activities such as solving problems, making decisions, persuading, analyzing opinions or assumptions, and doing scientific. More specifically, Williams (2011) defines that critical thinking ability in science is the ability to gain relevant and reliable knowledge about the universe. Such knowledge is obtained through a series of hypothetical test of the sisematis, so that critical thinking is required in order for the series of processes to end in the correct conclusion. William (2011) argues that science is identified as a good place to develop critical thinking skills. This is because of the relationship between scientific thinking and critical thinking skills.

Cottrell (2005: 1) argues that "Critical thinking is a cognitive activity, associated with using the mind" which means critical thinking is a cognitive activity, that is related to the use of the mind. Based on Bloom's cognitive dimensions, critical thinking skills occupy the dimensions of analysis (C4), synthesis (C5), and evaluation (C6). It appears that these dimensions are derived from Bloom's old taxonomic system. If matched with Bloom's Bloomfield taxonomy revised by Anderson &Krathwohl (2010), then critical thinking skills occupy parts of analysis (C4), and evaluation (C5), because in the revised version, the synthesis dimension is integrated into the analytical dimension.

Anderson &Krathwohl (2010) explains that the dimension of analysis is the dimension in which the breaking of a material becomes small parts in a relationship between the parts. Dimensional analyzes include cognitive processes of differentiating, organizing, and attributing. Furthermore, Anderson &Krathwohl (2010) define the evaluation dimension as the dimension in which decision-making occurs based on certain criteria and standards. Commonly used criteria are quality, effectiveness, efficiency, and consistency. Anderson &Krathwohl further explained that in the category of evaluating includes the cognitive process of examining decisions that have been taken based on internal criteria and criticize the decision taken based on external criteria.

Nitko&Brookhart (2011: 236) argue that critical thinking skills are best measured and assessed in a particular learning context, not in general. To that end, interested teachers measuring critical thinking skills need to embody indicators of critical thinking skills into the context of the learning materials concerned. In addition, it is also important to connect these learning materials with daily living conditions in measuring the ability to think critically.

METHODS

This research is conducted using classroom action research design which is a reflection on the learning activities in the form of an action, which is deliberately raised and occurs in a class together (Arikunto, 2010). The stages of each cycle consist of Planning (planning), Acting (action execution), Observing (observation), Reflecting (reflection). This research is done 2 cycle (repetitive cycle). This research was conducted in 2 cycles, cycle I was held in 3 meetings and cycle II was done 1 meeting. This research was conducted on 12-16 April 2017 classroom action research was conducted in class VII C SMP Negeri 1 Lumajang. The number of students 30 people consisting of 22 women and 8 men with the level of ability and absorption of students vary. Data collection techniques used in this study are test techniques include material

understanding (objective matter) and critical thinking skills test (esay matter) and non-test techniques include observation, this technique is used to obtain data about student activities in learning by using model Problem Based Learning. The test instrument was first validated. Three validators declare valid instrument. The development of teacher and student activity was monitored by 3 observers.

The scoring criteria based on the scores obtained can be seen in Table 1.

Table 1 Criteria for teacher and student activity

Scores range 1-5 (%)	**Criteria**
81-100	Very good
61-80	Good
41-60	Enough
21-40	Less
0-20	Very less

To describe students' success in cognitive understanding divided into several levels as in Table 2.

Table 2 Outline of learning outcomes

Level of learning	**outcomes**
100%	Special / max
76% - 99%	Very good / optimal B
60% - 75%	Good / minimal
<60%	Less

The students' critical thinking skills are classified according to the absolute scale score conversion of 5 in Table 3.

Table 3 Criteria for students' critical thinking skills

Scores for range 1 - 5 (%)	**Criteria**
95 - 100	Very good
85 - 94	Good
75 - 84	Average
62 - 74	Less
<62	Very less

Theindicators of success in this study are as follows:

1) Activity of teachers is said to succeed when classified as good and very good category.
2) Activity students are said to succeed if categorized in good category and very good.
3) Based on Minimum Exhaustiveness Criteria (KKM) which has been determined by SMP Negeri 1 Lumajang, individually that is said to be complete student if get score 75.
4) If classical learning completeness is 75% or more than the total number of students has reached the level of mastery greater than or equal to 75% of the material taught.
5) Critical thinking skills are said to increase if the total percentage of students in categories is very good or good.

RESULTS AND DISCUSSION

Learning outcomes in cycle I

1) Teacher activity through observation

Scores of observations of teacher activity at meeting 1 are presented in Table 4.

Table 4 Results of teacher activity observation at meeting 1

No	Observe	Percentage	Score (%)
1	Observer I	68	85
2	Observer II	64	80
3	Observer III	67	83.75
	Average	66.33	82.92

Table 5 Results of observation of teacher activity at meeting 2

No	Observe	Percentage	Score (%)
1	Observer I	69	86.25
2	Observer II	66	82.5
3	Observer III	66	82.5
	Average	66.33	83.75

Table 6 Observations of teacher activity at meeting 3

No	Observe	Percentage	Score (%)
1	Observer I	76	86.25
2	Observer II	66	82
3	Observer III	65	81.25
	Average	69	86.25

Overall, through the observational data obtained at meetings 1, 2, and 3 meetings, the teacher activity in the learning activities went well and increased every meeting with an average score of 84.31% was in good criteria.

2. Student activity through observation

The result of observation of student activity when learning cycle I activity can be seen in Table 7.

Table 7 Results of observation of student activity at meeting 1

No	Observe	Percentage	Score (%)
1	Observer I	51	72.86
2	Observer II	55	78.57
3	Observer III	55	78.57
	Average	53.3	76.67

Table 8 Observation result of student activity at meeting 2

No	Observe	Percentage	Score (%)
1	Observer I	53	75.71
2	Observer II	55	78.57
3	Observer III	54	77.14
	Average	54	77.14

Table 9 Observations of student activity at meeting 3

No	Observe	Percentage	Score (%)
1	Observer I	61	87.14
2	Observer II	58	82.86
3	Observer III	55	78.57
	Average	58	82.86

Overall, through observation data obtained at the 1st meeting, 2nd and 3rd meeting, the student activity in the learning activity went well with the mean score of 69.03% was in good criteria.

3. Student's critical thinking ability

Table 10 Test results of critical thinking skills in learning cycle I

No	Indikator	Percentage of Success	Criteria
1	Summing up the universal knowledge toward concrete particular knowledge. (Deductive).	66,67	Cukup
2	Making conclusions from two or more premises into a more general inference when compared to one of the premises or both premises.	63,00	Less
	Average	64,84	Less

Learning outcomes in cycle II

Activity of teacher through observation Score of observation result of teacher activity in cycle II presented in Table 12.

No	Observer	Score	Percentage(%)
1	Observer I	72	90
2	Observer II	68	85
3	Observer III	68	85
	Average	69,33	86,67

3. Student's critical thinking ability

Table 11 Test results of critical thinking skills in learning cycle I

No	Observer	Score	Percentage(%)
1	Observer I	57	81,43
2	Observer II	55	78,57
3	Observer III	56	80
	Average	56	80

No	Indicators	Percentage of Success (%)	Criteria
1	Summing up the universal knowledge toward concrete particular knowledge. (Deductive)	84,83	Good
2	Making conclusions from two or more	82,50	Good

premises into a more general inference when compared to one of the premises or both premises.		
Average	83,67	Good

DiscussionofResearchResults

Learning with Problem Based Learning model in cycle I to cycle II gives a good influence in improving students' critical thinking ability. Student motivation is good enough, students can adjust to the model of Problem Based Learning learning. Problem-Based Learning model has a syntax that is (1) students are faced with actual and authentic problems (2) students are organized in study groups, (3) students do investigations to solve problems and propose solutions (4) students develop and present the results of activities and discuss them in in class. Overall from the results of observation, the learning in cycle I was running well but not yet optimal. In the first cycle of learning, teachers are still unable to guide passive students, manage the class well because there are some students who are busy themselves at the time of learning activities. Interaction between students during the discussion has not been going well and takes a long time so it is not optimal. Less optimal learning implementation in cycle I gives results that are still less satisfactory, so the teacher must make improvements in cycle II.

Student activity as a whole in cycle I has been going pretty well. At the time of learning activities cycle I while learning the concept of living classification system with Problem Based Learning model of some students' attention is still not focused and students are still not accustomed to follow the learning with Problem Based Learning model. This has an impact on some of the students who become passive in the discussion activities, so that when the discussion takes place in the group there are students who just silent awaiting the thoughts of a group of friends and not actively involved in solving the problem. In addition there are some students who are still having difficulty in understanding the problems presented in the LKS. This condition demands better classroom management from the teachers.

This research is also seen from students' critical thinking ability. Assessment of students' critical thinking ability is used to find out how far students can apply the process of critical thinking, especially on indicators to formulate conclusions deductively or inductively on the concept of colloidal system. In cycle I, the level of critical thinking ability in the indicator concludes deduction and induction to the concept of living classification system is still very low or less in answer indicator 1 is to conclude the universal knowledge toward the concrete particular (deductive) knowledge which the students are asked to give An example that can illustrate a known statement, here the student is still confused as to how to answer it. Then on the 2nd indicator many students are not able to answer that is making the conclusions of two or more premises into a more general inference when compared with the two premises (inductive) here students are asked to make a conclusion of the aspects presented. Almost most of the students have difficulty responding from that aspect. Overall mastery of students' critical thinking skills have not achieved success indicators that are in good and excellent category. This is due to students' ability to answer questions on critical thinking skills tests on the material classification of living things only to what they remember and what they read. Students still have difficulty in giving conclusion from

the problem. Students rely solely on the ability of memory and sometimes many concepts are loose because not all the material can be remembered by students especially if less attention when learning. Things that need to be improved is the teacher gives direction to the students in solving the problems to further hone the ability of critical thinking so that the expected indicators in designing solutions based on the problems will be increased.

In Ekananta's research (2011) about modeling of Problem Based Learning model with Polya Heuristic strategy and critical thinking ability toward student achievement of class VII of SMP Negeri 1 Lumajang which stated that the class using Problem Based Learning model is much more increased the ability of critical thinking to the learning achievement Rather than classes that use conventional learning. This is in line with Reta's (2012) study entitled the influence of problem-based learning model on critical thinking skills in terms of students' cognitive style which states that qualitatively, critical thinking skills of students learning with problem-based learning models are higher in their qualifications than those of students With conventional models. This is because the learning model applied in the experimental class gives students the opportunity to develop their skills and critical thinking skills through complex problem-solving processes in small discussion groups, so that the students' analysis, interpretation, evaluation, inference and explanation skills are better. Improvement in cycle II is very emphasized on the implementation of the stages of implementation of learning with Problem Based Learning model so that students' ability to formulate deductive and inductive conclusions increased significantly in cycle II.

CONCLUSION

Based on the result of the study of classroom learning material of colloidal system in class VII of SMP Negeri 1 Lumajang academic year 2016-2017 showed teacher activity increase every meeting until cycle II reaching category very good, student activity increase every meeting until cycle II reach good category, critical thinking ability Students increased from 59.96% in the first cycle to 75.6% in cycle II

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