
The Application of Guided Inquiry Learning to The Ability of Critical Thinking and Cognitives Learning

Titin Gustari

Program Magister Pendidikan Biologi
Pascasarjana Universitas Riau Pekanbaru 28293
gustaritin17@gmail.com

ABSTRACT

This study aims to determine the ability of critical thinking and biology learning outcomes through the application of guided inquiry learning. This research is a classroom action research (PTK), with descriptive analysis. Subjects in this study were students of class X ATP 4 SMK Negeri Pertanian Pekanbaru which amounted to 28 students consisting of 23 male students and 5 female students. The result of data analysis of critical thinking ability of students obtained in the first cycle is 78% with category critical enough increase of 1% in cycle II to 80% with critical category. Results of data analysis and cognitive learning outcomes for the absorption of students before the PTK is 71.7%, after PTK 72.2%, then an increase of 0.5% before the PTK. Absorption of students in the second cycle of 73% occurred in increase of 0.8% of the cycle I. Student classical completeness before the PTK is 39%, after the PTK in the first cycle of 61%, then an increase of 22% from before the PTK, and Classical mastery in cycle II is 64%, then there is an increase of 3%. Based on the results of the study showed that the application of guided inquiry learning can improve the ability of critical thinking and cognitive learning outcomes of biology of class X students ATP 4 SMK Negeri Pertanian Pekanbaru.

Keyword : *Guided Inquiry, Critical Thinking, Cognitive Learning Outcomes, PTK*

Introduction

According to Sardiman, (2012:12) learning is a change. In this case, learning means an effort to change the behavior. Learning will change the learner, to the good behavior, although there is still a possibility the change to the bad behavior.

In the learning process, cannot separated from the process of thinking. The most important in empowering students potentialitys to empower the ability to think critically in learning. Critical thinking is a reasonable or logical way of thinking reflectively to determine what to do and believe. Thinking process that using a symbolic process that states real objects, events and using symbolic statements to discover the fundamental

principles of an object and event (Arends *in* Muhfaroyin, 2009).

Based on the observation results to the 10th grade students of SMK Negeri Pertanian Pekanbaru, obtained some information about the difficulties faced in teaching and learning process so that teaching is not optimal, including: students tend to memorize the biological concepts such as what is written in their text book, less of motivation in giving arguments in learning process, and less critical students towards subject matter and lack of understanding of the concepts given by the, so that the learning result toward Knowledge of Conceptual Understanding is only 39% complete. The above problems can be solved with many ways that teachers can apply in

teaching that can improve activeness, understanding and learning result of the students. One of them is inquiry guided. Inquiry strategy is a series of learning activities that emphasize the critical and analytical thinking process to seek and find the answer of the question that being asked. Thinking process itself is usually done through answer and question between teachers and students (Sanjaya, 2010:204).

The advantage of the inquiry learning model is learning that emphasizes the development of cognitive, affective, and psychomotor aspects in a balanced way, so that this learning strategy is considered more meaningful, in accordance with the development of psychology which considers learning is the process of behavior change thanks to the experience and learning that can serve the above average skills students (Sanjaya, 2013:208).

In accordance with the problem then the goal to be achieved in this research is to determine

the ability of critical thinking and cognitive learning toward 10th grade of ATP 4 Biology studentsat SMK Negeri Pertanian Pekanbaru.

Methodology

This research was conducted toward 10th grade of ATP 4 Biology students at SMK Negeri Pertanian Pekanbaru, the subjects of the research are all students of 10th grade ATP 4 SMK Negeri Pertanian Pekanbaru which amounted to 28 students consisting of 23 male students and 5 female students with heterogeneous academic ability. The basic reason for taking 10th grade ATP 4 class students as the subject of the research because these students have low academic ability compared to other 10th grade classes.

The design of classroom action research in the inquiry learning application using image media toward critical thinking ability and cognitive learning result of biology students can be seen in Figure 1 as follows:

Implementation Phase

Implementation on guided inquiry learning research toward critical thinking ability and

cognitive learning result of 10th grade of ATP 4 Biology students can be described in following table.

Implementation Phase of Guided Inquiry learning

No.	Activity	
	Teacher	Students
1.	<p>Opening Activity 10 minutes</p> <ul style="list-style-type: none"> Teacher says greeting (praying), greet and check student attendance Teacher giving motivation and apperception to the students. Teacher write the topic and learning objective. Teacher distribute the pictures anf students worksheet(s). 	<ul style="list-style-type: none"> Answer greeting, praying and preparing learning process. Students answer the teachers’s question(s). Students pay attention, write the topic and learning objective that wrote by teacher. Students receive the picture and worksheet(s).
2.	<p>Main Activity ± 65 minutes</p> <ul style="list-style-type: none"> Teacher make groups of students and 	<ul style="list-style-type: none"> Students sits on their group.

	<p>arrange the students to sit on their group.</p> <ul style="list-style-type: none"> • Explain the main subject matter that will be learn. • Problems Presentation <ul style="list-style-type: none"> ➤ Teacher present the problems by asking some questions related to the students worksheet to provoke students curiosity • Make hypothesis <ul style="list-style-type: none"> ➤ Teacher guide the students in making related hypothesis based on problem statement. ➤ Before discussion phase, teacher will point some students to present his/her hypothesis. • Designing experiment / observation <ul style="list-style-type: none"> ➤ Guide the students in doing observation to earn the exact information. • Experiment / Observation Process. <ul style="list-style-type: none"> ➤ Teacher guide the students to earn information through experiment/ observation. 	<ul style="list-style-type: none"> • Students pay attention to the teacher explanation. • Students read and understanding the problems that given by teacher. Such as : Is.....? • Present an hypothesis related to the problem statement. • Some students explain their preliminary hyphothesis. • Design an observation based on to step on worksheet. • Doing an observation to earn exact result.
<p>3</p>	<ul style="list-style-type: none"> • Collecting and analyzing data <ul style="list-style-type: none"> ➤ Finalize observation activity. ➤ Point one of the groups to present group discussion result and lead the students to do a class discussion, teacher as facilitator and moderator while class discussion be held. ➤ Respond and supporting the right answer by good reason. • Make a conclusion <ul style="list-style-type: none"> ➤ Lead the students in finding the right basic learning concept so that the student could make a conclusion. <p>End Activity ± 10 minutes</p> <ul style="list-style-type: none"> • Askig the students to collect students worksheet(s) and make a report that will be collect on the next meeting. • Giving a written test to the students to know the student's ability in understanding subject matter. 	<ul style="list-style-type: none"> • Finalize the observation activity. • The choosen group will present the group discusion result in front of the class. • Students pay attention to the teacher explanation and take a note. • Collecting worksheet(s). • Take a written test carefully.

	<ul style="list-style-type: none"> • Close the teaching and learning activity and says greeting. 	<ul style="list-style-type: none"> • Answer greeting.
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Data Collecting Instrument.

To obtain the data in this study, is using the test instrument of critical thinking ability in learning and cognitive learning result instrument. Collecting student’s critical

thinking ability instrument was conduct by observation. Measuring critical thinking skills are prepared through student’s worksheet(s) whose assessment refers to the rubric

Critical Thinking Ability Test Rubric

No	Indicator	Measurement Ability Aspect	Score
1.	Formulating problems	<ul style="list-style-type: none"> • Not giving the formula. • Giving unrelated formula • Giving the less accurate formula. • Giving the right formula 	0 1 2 3
2.	Formulating Hypothesis	<ul style="list-style-type: none"> • Not giving the hypothesis. • Giving unrelated hypothesis. • Giving the less accurate hypothesis. • Giving the right hypothesis 	0 1 2 3
3.	Collecting Data	<ul style="list-style-type: none"> • Including no observation data. • Including unrelated observation data. • Including incomplete data • Including the right and complete data 	0 1 2 3
4.	Analyzing Data	<ul style="list-style-type: none"> • Not giving complete and righ analysis. • Giving incomplete analysis and less accurateanswer. • Giving the right answer but incomplete analysis. • Giving the right and complete analysis. 	0 1 2 3
5.	Make a Conclusion	<ul style="list-style-type: none"> • Not making any conclusion • Make a simple and less accurate conclusion. • Make a simple but the right conclusion. • Making a complete and accurate conclusion. 	0 1 2 3
Maximum Score			15

Modify according to JalinusdanAlimdalam Sari (2011)

Data Analysis Technique

Critical Thinking Ability Data Processing

The data obtained were analyzed by using descriptive data analysis technique, to facilitate in analyzing data and to measure

students' critical thinking ability, then the value was given according to the category of assessment as follows.

Table 3. Critical Thinking ability Interval and Category

Interval (%)	Category
90 – 100	Very Critical Thinking
80 – 89	Good Critical Thinking
70 – 79	Average Critical Thinking
≤69	Less Critical Thinking

(Source: Arikunto, 2003:45)

Cognitive Learning Result Data Processing

The value of Character Education Strengthening is derived from the student's

cognitive value, consist of Written Test (WT), Homework (HW), and Daily Test (DT).

3.7 Descriptive Data Analytical Technique

Data processing with descriptive analytical technique aims to describe student's learning result of biology subject after the application of guided inquiry learning. According to Elfis (2010), data analysis of the achievement of biological student's learning results is conduct based on student's understanding, individual completeness, and classical completeness

RESULT AND ANALYSIS

Cognitive Learning Result Data Analysis before Class Application Research (CAR)

Student's Cognitive Learning Result GradeBefore CAR

NO	Category	Interval	Before CAR	
			Numbers of Students	Percentage (%)
1	Very Good	93 – 100	-	-
2	Good	85 – 92	5	18
3	Average	78 - 84	7	25
4	Less	70-77	11	39
5	Less Once	≤ 69	5	18
Numbers of Students			28	100
Absorption Average (%)			71,7	
Category			Less	
Individual Completeness			12 Students	
Classical Completeness			39 %	(Incomplete)

Explained that the absorption average of students before the Class Application Research is 75.9% with good category, 5 students, with the percentage of 18%, in the average category are 7 students with percentage of 25%, less category are 11 students with percentage of 39%, and less once category are 5 students, with a percentage of 18%. Students Individual Completeness before the CAR of 28 students are: 12 students are complete and 16 students

are incomplete because they still under of Minimum Completeness Criteria that was determined by Grade of 78.

Cycle I of Cognitive Absorption ability Analysis

The cognitive average grade of Cycle I is obtained from the average Test gradetimes 40% plus the average Homework grade multiplied by 20% plus the average daily test grade multiplied by 40%. After using the

cognitive results value analysis formula, then Absorption cognitive value can be seen as the obtained the cycle I cognitive average value. table follows:

In cycle I for cognitive value has not been completed because it has not reached 85% of students who complete. Thus cycle I student’s cognitive value of classical completeness has not been achieved.

Cycle I Students Cognitive average for Absorption ability, Individual Completeness, Classical Completeness.

NO	Category	Interval	Cognitive Value of Absorption	
			Numbers of Students	Percentage (%)
1	Very Good	93 – 100	2	7
2	Good	85 – 92	3	11
3	Average	78 - 84	12	43
4	Less	70-77	6	21
5	Less Once	≤ 69	5	18
Numbers of Students			28	100
Absorption Average (%)			72,2%	
Category			Less	
Individual Completeness			17students	
Classical Completeness			61%	(Incomplete)

Comparison of Student’s Cognitive Value of Absorption, Individuals Completeness, and Classical Completeness Before CAR and Cycle I

NO	Category	Interval	Before CAR (%)	Cycle I (%)
1	Very Good	93 – 100	-	2 (7)
2	Good	85 – 92	5 (18)	3 (11)
3	Average	78 – 84	6 (21)	12 (43)
4	Less	70-77	9 (32)	6 (21)
5	Less Once	≤ 69	8 (29)	5 (18)
Numbers of Students			28 (100)	28 (100)
Absorption Average (%)			71,7 %	72,2 %
Category			Less	Less
Individual Completeness			11students	17 Students
Classical Completeness			39% (Incomplete)	61% (Incomplete)

Student’s Critical Thinking Ability Data Analysis on Cycle I

Based on the data obtained from the results of observation toward students individual report, can be presented using students critical thinking data based on the indicator points

Average of Critical Thinking Based on Item of Cycle I Indicator

NO	Critical Thinking Indicators	Student's Critical Thinking On Each Meeting			Average (%)
		1 st meeting (%)	2 nd meeting (%)	3 rd Meeting (%)	
1	Finding Problems	Sudahada	69 (95,8)	62 (89,8)	92,7
2	Finding Hypothesis	69 (92)	51 (70,8)	53 (76,8)	79,8
3	Collecting Data	57 (76)	68 (94,4)	65 (94,2)	88,2
4	Analyzing Data	50 (66,7)	61(84,7)	57 (82,6)	78
5	Make a Conclusion	32 (42,7)	47 (65,2)	48 (69,5)	59,3
Number of students		25	24	23	
% of critical thinking		69,3	82,1	82,5	78%
Category		Less Critical	Critical	Critical	Average Critical

Cycle II Result Observation Data Analysis

Student's Result Observation Analysis for Cycle II Cognitive Grade

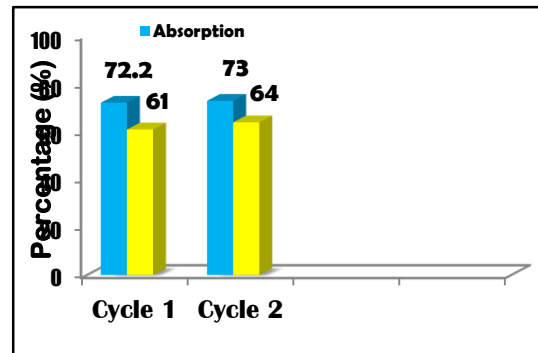
Average of Student's Absorption, Individuals Completeness, Classical Completeness for Cycle II Cofnitive Grade

NO	Category	Interval	Cognitive Grade of Absorption	
			Number of students	Percentage (%)
1	Very Good	93 – 100	2	7
2	Good	85 – 92	4	14
3	Average	78 - 84	12	43
4	Less	70-77	1	4
5	Less once	≤ 69	9	32
Number of students			28	100
Absorption average (%)			73%	
Category			Less	
Individuals Completeness			18students	
Classical Completeness			64%	(Incomplete)

Comparison of Student's Cognitive Grade for Absorption, Individuals Completeness and Classical Completeness on cycle I and II

NO	Category	Interval	Siklus I	Siklus II
1	Very Good	93 – 100	2 (7)	2 (7)
2	Good	85 – 92	3 (11)	4 (14)
3	Average	78 - 84	12 (43)	12 (43)
4	Less	70-77	5 (18)	1 (4)
5	Less once	≤ 69	6 (21)	9 (32)
Number of students			28 (100)	28 (100)
Absorption average (%)			72,2 %	73%
Category			Less	Less
Individuals Completeness			17 Students	18Students
Classical Completeness			61% (Incomplete)	64% (Incomplete)

It can be explained that there is an increase in the learning results of cognitive values on Cycle I and Cycle II. Cognitive grade on absorption on Cycle I is 72.2%, while the cognitive absorption value on Cycle II is 73%, an increase of 0.8%. Cognitive value of individual completeness on Cycle I for 28 students are 17 students declared as complete and 11 students declared as incomplete, while the cognitive grade of individual completeness on Cycle II for 28 students are 18 students declared as complete and 10 students declared as incomplete. Cognitive grade of classical completeness on cycle I 61% while in cycle II has increased by 6% to 64%.The increased of cognitive grade of learning results on Cycle I and Cycle II can be seen in the following figure.



Students Critical Thinking Ability Data Analysis on Cycle II

Critical Thinking ability criteria are based on five indicators, those are: 1) finding problems, 2) finding Hypothesis, 3) collecting Data, 4) Analyzing data, 5) make a conclusion

Average of Critical Thinking based on Cycle II Indicators

NO	Critical Thinking Indicators	Student’s Critical Thinking On Each Meeting		Average (%)
		5 th meeting (%)	6 th meeting (%)	
1	Finding Problems	56 (98,2)	66 (88)	93,1
2	Finding Hypothesis	53 (93)	63 (84)	82,5
3	Collecting Data	26 (45,6)	59 (78,6)	62,1

4	Analyzing Data	46 (81)	58 (77,3)	85,1
5	Make a Conclusion	39 (68,5)	64 (85,3)	76,9
Number of students		19 Students	25 Students	
% Critical Thinking		77,2	82.6	80
Category		Average Critical	Critical	Critical

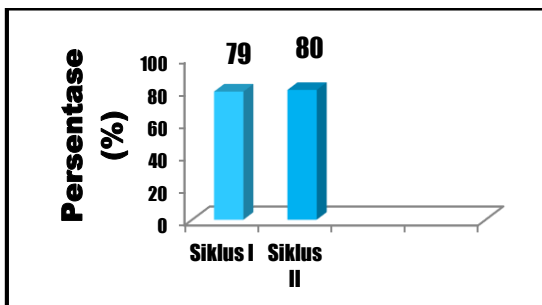
Can be seen the critical thinking skills of students grade X class ATP 4 SMK Negeri Pertanian Pekanbaru with the implementation of guided inquiry learning in cycle II has increased in the percentage of the average critical thinking ability of the 5th meeting is 77.2% with the category average critical. The highest critical thinking indicator is finding problem with percentage 98,2%, and the

lowest indicator is Collecting data with percentage 45,6%. The average percentage of critical thinking ability of the 6th meeting was 82.6% with the critical category. The highest critical thinking indicator is finding problem with the percentage of 88%, and the lowest indicator analyzing data with 77.3% percentage. Generally, each indicator has increased

Comparison of Student’s Critical Thinking Ability After CAR Cycle I and Cycle II

Average of Student’s Critical Thinking Ability for each Indicator on Cycle I and Cycle II

Critical Thinking Indicators	Cycle I (%)	Cycle II (%)	Average
Finding Problems	90.7	93,1	91,9
Finding Hypothesis	79,8	82,5	81,1
Collecting Data	88,2	62,1	75,1
Analyzing Data	78	85,1	81,5
Make a Conclusion	59,1	76,9	68
Average	79	80	
Category	Average Critical	Critical	



Conclusion

After the implementation of guided inquiry learning in cycle I there is an increase in learning results, it can be seen from the absorption of students in the first cycle of 74.2% with less category toward the second cycle of 76.6% with the category less with an increase of 24 %. Classical completeness of students in the cycle I is 54% and increased by 13% to 67% in cycle II. The average critical thinking ability of students in the cycle I is

79% with the category average critical and increased by 1% to 80% with the critical category in cycle II.

Suggestion

It is expected that teachers of Biology subject in the teaching process can use guided inquiry learning method for teaching and can improve students' critical thinking ability

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