Research Article

Profile of Learning Biology Based on Critical Thinking Skills

Sufriyanti Tengah, Henny Setiawati*, Nurhasanah

Faculty of Teacher Training and Education, Muhammadiyah Parepare University, Indonesia

Abstract.
Biology learning in senior high schools is expected to develop students' critical thinking skills. Critical thinking skills are needed so that students can become independent learners who can manage their own learning. The purpose of this study was to determine the profile of biology learning that integrates critical thinking skills in senior high schools. The method used was a survey using questionnaires and interviews. The population was all the students of SMAN 2 Parepare city and the sample were class X students using purposive sampling technique. The results of the study showed that the profile of learning to think critically about critical thinking skills in biology learning of students at SMA Negeri 2 Parepare on critical thinking skills was obtained from 6 indicators in the form of the ability to interpret, analyze, evaluate, inference, explanation, and regulation with an average percentage of 66.12% in the good category. The results of the interviews also illustrate that learning to think critically has not been fully implemented in the learning process, especially in giving assignments and questions in evaluating student learning.

Keywords: biology learning profile, critical thinking skills, indicators of critical thinking skills

Corresponding Author: Henny Setiawati; email: hennysetiawati030473@gmail.com

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1. INTRODUCTION

21st century learning directs learning using models that encourage students to think at a higher level. The development of education requires that every student has these skills. According to Wagner (2010) there are 7 skills needed by students to face the 21st century, including the ability to think critically and solve problems.

Biology learning that has been carried out so far has not fully developed higher-order thinking skills such as critical thinking, so that the learning process is expected to direct the development of higher-order thinking skills (Higher Order Thinking skills) (Jamaluddin, 2017). Learning biology should empower the mastery of critical thinking skills as one of the competencies students must have. Learning biology in the 2013 Curriculum has directed learning using models, strategies or learning methods that help to master these competencies According to Anelli (2011), the main goal of learning

biology is to equip students with skills and knowledge that enable them to solve problems and make decisions in everyday life based on scientific attitudes and moral values. Likewise Kuniasi (2012), states that critical thinking skills are important for students to have because students can analyze the problems they face, find and choose solutions that are logical and useful.

Learning in schools is generally still conventional, the integration of critical thinking skills in learning is still limited. The results of previous research show that learning to think critically in schools is not maximized. Research by Royani (2021), Setiawati and Corebima (2019), shows that learning in schools still lacks the ability to empower critical thinking.

Critical thinking skills are one of the factors that support successful learning. Critical thinking is an activity that uses thinking skills that involve analyzing, assessing, and creating. According to Sadia (2008), critical thinking is an activity of asking questions, gathering information, taking efficient actions, presenting logical arguments, and making conclusions.

Based on the results of observations at UPT SMA Negeri 2 Parepare found that students' critical thinking skills were low. This happens because learning is generally still centered on educators so that the role of educators in learning is not in accordance with scientific-based learning. Efforts that can be made to find out the level of empowering critical thinking in schools is through learning surveys related to the implementation of empowering critical thinking at UPT SMA NEGERI 2 Parepare.

2. METHOD

This type of research is in the form of descriptive research conducted to find a description of biology learning based on critical thinking skills experienced by students in biology learning at UPT SMA Negeri 2 Parepare. The population of this study were all students at UPT SMAN 2 Parepare while the sample of this research was students of Class X UPT SMAN 2 Parepare using purposive sampling technique.

This research consists of preliminary, implementation, and evaluation stages. The research instrument was a questionnaire using closed statements and a Likert scale. Each answer is associated with a form of statement or attitude support which is expressed in the form of strongly agree (SS), agree (S), disagree (ST), and strongly disagree (STS). This study also used an interview instrument adapted from the Setiawati interview instrument (2017).

The data analysis technique used is descriptive analysis. Data was obtained by calculating the percentage of critical thinking skills for each student based on the group category. The calculation uses the following formula percentage.

NP = $\frac{R}{SM} X\ 100\%$

Information:

NP : Score percent sought or expected

R : Score raw materials obtained by students

BC : The ideal maximum score of the test in question is 100 fixed numbers

Assess the percentage of critical thinking skills then converted into 5 categories. Conversion of critical thinking skills is shown in Table 1.

TABLE 1: Conversion of Critical Thinking Skills.

Achievement Rate (%)	Category
81 - 100%	Very good
61 - 80%	Well
41 - 60%	Enough
21 - 40% 0 - 20%	Not enough Very less

(source: Purwanto, 2009)

3. RESEARCH RESULTS AND DISCUSSION

3.1. Research result

3.1.1. Data Analysis of Students' Critical Thinking Skills

Students' critical thinking skills are measured by 20 questions on a questionnaire, which is given to students containing statements compiled based on indicators of critical thinking skills. Each indicator is calculated as a percentage of each questionnaire item that has been filled in by students. The results obtained from the calculation of each question based on each sub-indicator are then calculated on the average percentage and interpreted with 5 categories of very good, good, fair, less and very less.

The results of the analysis of students' critical thinking skills in biology learning at UPT SMA Negeri 2 Parepare are based on the results of the questionnaire analysis that has been filled out by the respondents. The results of research related to critical thinking skills are described as follows.

3.1.2. Interpretation indicators

Interpretation indicator data can be seen in Table 2.

Table 2: Interpretation Indicators.

Statement no	K	P	K	P	K	P	K	P	Amount Respondents
	SS	%	S	%	TS	%	STS	%	
1	14	46.7 %	16	53.3,%	-	-	-	-	30
2	1	3.3 %	23	76.7%	6	20.0%	-	-	30
3	8	26.7%	18	60.0%	4	13.3%	-	-	30
16	5	16.7%	23	76.7%	2	6.7%	-		30
Score average %		**23.3%**		**66.7%**		**10.0%**			

Table 2. shows the data obtained from respondents in the strongly agree (SS) category with the highest percentage of 46.7% and the lowest with a percentage of 3.3%. The highest percentage in the agreed category (S) was 76.7% and the lowest was 53.3%. The highest percentage is in the disagree category (TS), namely 20% and the lowest percentage is 6.7%.

3.1.3. Analysis Indicator

Data analysis indicators can be seen in Table 3.

Table 3: Analysis Indicators.

Statement no	K	P	K	P	K	P	K	P	Amount Respondents
	SS	%	S	%	TS	%	STS	%	
4	3	10.0%	25	83.3%	2	6.7%	-	-	30
5	5	16.7%	21	70.0%	4	13.3%	-	-	30
7	6	20.0%	23	76.7%	-	-	1	3.3%	30
13	10	33.3%	20	66.7%	-	-	-	-	30
Average value %		**20.0%**		**74.3%**		**5.0%**		**3.3%**	

Table 3. shows the data obtained from respondents in the strongly agree (SS) category with the highest percentage of 33.3% and the lowest with a percentage of 10%. The highest percentage in the agree (S) category is 83.3% and the lowest is 66.7%. The highest percentage was in the disagree category (TS), namely 13.3% and the lowest with a percentage of 6.7%. The percentage is 3.3% in the strongly disagree category (STS).

3.1.4. Evaluation Indicator

Evaluation indicator data is shown in Table 4.

Table 4: Evaluation Indicators.

Statement no	K	P	K	P	K	P	K	P	Amount Respondents
	SS	%	S	%	TS	%	STS	%	
10	2	6.7%	16	53.3%	12	40.0%	-	-	30
18	2	6.7%	12	40.0%	19	63.3%	7	23.3%	30
19	2	6.7%	13	43.3%	15	50.0%	-	-	30
Average value %		**6.7%**		**45.5%**		**51.1%**		**23.3%**	

Table 4 shows that the data obtained from respondents in the highest and lowest categories strongly agree (SS) is the same as the percentage of 6.7%. The highest percentage is in the agree category (S), namely 53.3% and the lowest percentage is 40.0%. The highest percentage is in the disagree category (TS), which is 63.3%, the lowest is 40.0%. , and only 23.3% in the strongly disagree (STS) category.

3.1.5. Inference Indicator

Inference indicator data is shown in Table 5.

Table 5: Inference Indicator.

Statement no	K	P	K	P	K	P	K	P	Amount respondent
	SS	%	S	%	TS	%	STS	%	
8	6	20.0%	22	73.3%	2	6.7%	-	-	30
12	-	-	19	63.3%	11	36.7%	-	-	30
20	1	3.3%	27	90.0%	2	6.7%	-	-	30
Average value %		**7.8%**		**75.5%**		**16.7%**			

Table 5 shows that the data obtained from respondents in the category strongly agree (SS) is the highest with a percentage of 20% and the lowest with a percentage of 3.3%. The highest percentage is in the agree category (S), which is 90% and the lowest is 63.3%. The highest percentage is in the disagree category (TS), which is 36.7% and the lowest is 6.7%.

3.1.6. Expplication Indicator

Explication indicator data can be seen in Table 6.

Table 6: Expplication Indicators.

Statement no	K	P	K	P	K	P	K	P	Amount Respondents
	SS	%	S	%	TS	%	STS	%	
6	1	3.3%	14	46.7%	15	50.0%	-	-	30
9	1	3.3%	29	96.7%	-	-	-	-	30
11	1	3.3%	18	60.0%	11	36.7%	-	-	30
Average value %		**3.3%**		**67.8%**		**28.9%**			

Table 6. shows that the data obtained from respondents in the strongly agree (SS) category is 3.3%. The highest percentage in the agree category (S) is the highest at 96.7% and the lowest at 46.7%. The highest percentage in the disagree category (TS) is 50% and the lowest is 36.7%.

3.1.7. Regulatory Indicator

Regulatory indicator data can be seen in Table 7.

Table 7: Regulatory Indicators.

Statement no	K	P	K	P	K	P	K	P	Amount Respondents
	SS	%	S	%	TS	%	STS	%	
14	2	6.7%	15	50.0%	11	36.7%	-	-	30
15	3	10.0%	25	83.3%	2	6.7%	-	-	30
17	8	26.7%	20	66.7%	2	6.7%	-	-	30
Average value %		**14.4%**		**66.7%**		**16.7%**			

The data in Table 7 shows that the data obtained from respondents in the strongly agree (SS) category is the highest with a percentage of 26.7% and the lowest with a percentage of 6.7%. The highest percentage is in the agree category (S), namely 83.3% and the lowest percentage is 66.7%. The highest percentage is in the disagree category (TS), namely 36.7% and the lowest percentage is 6.7%.

3.1.8. Subject Teacher Interview Results

Interviews were conducted with biology teachers and students who were the research sample. The purpose of interviews with Biology teachers is to find out information about critical thinking skills in the learning process and to find out students' abilities.

Based on the results of interviews with the biology teacher, it was found that the teacher had given questions in the critical thinking category but had not maximized the evaluation questions given. This is because questions in the category of critical thinking require long and thorough work and scoring. The teacher gives critical thinking questions only on material that is suitable for testing critical thinking skills. According to the biology teacher, questions in the category of critical thinking are difficult if they are made in the form of multiple choices, and if they are in the form of essays, then the teacher needs more time to compile the rubric.

Information from interviews with students, obtained information that students' critical thinking skills are still low. Learning is still oriented towards activities that have not fully empowered students' critical thinking skills. In addition, some of them stated that they had difficulty and were incapable of assessing or evaluating and double-checking their answers.

3.2. Discussion

Critical thinking is a systematic, directed and clear thinking process which is a mental activity such as the process of observing, analyzing, researching, observing and others as a way of finding a solution in solving a problem (Husamah and Setyaningrum, 2013: 176). According to Saputra, et al (2016) critical thinking is a stage for higher order thinking.

Critical thinking is a skilled activity carried out to meet intellectual ability standards such as clarity, relevance, adequacy, and coherence (Rahman, Wahyuni & Noviani, 2018). Students' critical thinking skills are needed in the learning process to generate high curiosity, so that students will continue to seek information and think about how to solve the problems they face. Critical thinking in biology learning has a very large role in improving processes and learning outcomes for future provision. One of the characteristics of people who think critically will always look for and explain the relationship between the problems faced and other relevant experiences. The indicators used to measure students' critical thinking skills are 1) interpretation, 2) analysis, 3) evaluation,

The percentage of interpretation skills is in a good category. This means that students' interpretation skills have developed. Students can describe or write down the

meaning of the problem given clearly. According to Facione (2010), interpretation is the ability to understand and express the meaning of the meaning of various kinds of experiences, situations, and others. This aspect of interpretation relates to students' ability to understand and express the meaning of various experiences, data, events, decisions, and procedures. Analysis, namely the ability of students to identify strong and actual relationships from questions, concepts, and descriptions.

According to Thomas (2011), critical thinking skills are one of the crucial skills that need to be developed because these skills help students choose and sort information properly, express opinions or reasons, and be able to solve problems. Routine exercises carried out by students will have an impact on the efficiency and automation of thinking skills that students already have (Redhana, 2013).

The percentage of analytical skills is in the good category. Students can write down the relationship between concepts and can write down problem solving. Analysis means identifying, analyzing relationships involving questions, concepts, descriptions or other activities used in expressing beliefs, judgments, experiences, reasons, information or opinions. Analytical skills are not fully owned by students due to students' assumptions that the questions presented are difficult to understand and are reluctant to analyze questions. Based on the results of observations during learning, teachers more often give questions in the form of memorization so that students are not used to analyzing questions properly.

The percentage of evaluating skills is in the sufficient category. Students have not been trained to solve questions and carry out assessments to improve their learning progress. According to Lismaya (2019), evaluation is the ability to test the truth of statements used to convey thoughts, perceptions, views, decisions, reasons, and opinions. Evaluation is also the ability to examine the relationship between various statements, descriptions, questions, and other forms used in reflecting thoughts. This is in accordance with Arini's research (2018) that students' critical thinking skills in answering evaluation questions with a percentage of 32.86% are in the low category. Likewise, Elisanti, et al (2017) stated that critical thinking skills in the evaluation question indicator were 42.82% in the low category. The same thing was expressed by Anggiasari (2018) that students' critical thinking skills showed an indicator of evaluating skills of 41.27% in the low category. The low evaluation indicators are due to the lack of students' skills to assess the arguments of a problem and students are used to only getting information from the teacher.

Learning to think critically must be trained so that evaluation skills as an indicator of achieving critical thinking skills can also be possessed by students. Evaluation skills can

be possessed by students through learning. According to Rosnawati (2012), evaluation skills are a part of students' critical thinking skills which can be trained through giving problems in the form of various questions.

The percentage of inferencing skills is in the good category. Students have been able to draw conclusions from several problems. Students have also started to have the skills to predict alternative outcomes of their learning activities. The results of observations show that students are able to identify and solve problems until they find a conclusion. Drawing conclusions on this indicator is done so that students are able to interpret what has happened and was observed (Kioasih, 2014). Conclusion or inference is a skill related to the ability to make conclusions in solving a problem, recognize and obtain the elements needed to draw logical conclusions.

The percentage of explaining or explanation skills is in the good category. Students already have the skills to explain or give reasons for the conclusions they produce. According to Facione (2010), explanation is a student skill that can explain statements and opinions that have been expressed to become a strong opinion. Explanation skills are important to be trained so that students can be more independent in their learning. Students are able to explain the results in accordance with the problems presented. Even so, there are still some students who have not been able to answer questions by explaining according to existing statements, according to the material, and complete with explanations.

The percentage of regulatory skills is in the good category. Students have also started to get used to reviewing their learning. Students have begun to have the ability to describe and conclude their opinions to solve a problem, are able to answer questions and solve existing problems in accordance with the material, in their opinion. Self-regulation is self-reflection, making self-assessments, and justifying mistakes. According to Facione (2010), self-regulation is a student's skill in managing self-existence in dealing with problem solving. Self-regulation is the student's ability to control one of the cognitive activities, the elements used in the activity, and the results that are developed,

The results of critical thinking data analysis, as a whole show students' critical thinking skillsare in the good category, but the percentage value is still lacking. This is due to learning that still does not activate students on an ongoing basis. Learning methods do not empower the integration of empowering critical thinking skills.

4. CONCLUSION

Based on the results of data processing and analysis of the research data that has been described, it can be concluded that the profile of critical thinking skills in biology learning for SMA Negeri 2 Parepare students in the ability to think critically is in the good category, but with an average percentage of 66.12%.

5. SUGGESTION

Teachers can design learning that can improve students' critical thinking skills. Likewise for students, it is hoped that they can develop critical thinking skills through learning.

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