



Profile Students Critical Thinking Skill on Reproductive System Materials

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abstract

This study aims to analyze and determine students' critical thinking skills on the material of the reproductive system. The method of this research is descriptive quantitative. The sample of this research is 98 students. The data is an analyzed test question. Instruments use critical thinking skills, according to Ennis. Data analysis technique using descriptive analysis. The data analysis results showed that students' critical thinking skills were the highest category (72.12%). The dominant is based on the data analysis, a high category in making strategies and tactics (82.36%) and providing further explanations (79.34%). Providing an elementary clarification of 66.42% and inference 71.05% is enough. The lowest was found in basic support skills (60.03%). Overall, students' CTS was high. But that is needed to be improved. Therefore, the teachers must provide test questions with more varied learning models.

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1. Introduction

The Essence of education is a medium to change personal attitudes. In 21st-century education, has learning paradigm leads to higher-order thinking skills to connect a fact and concept in real life. The competence of knowledge is certainly related to learning objectively and focusing. The ability to think, according to Bloom, consists of the dimensions of knowledge and cognitive. Cognitive dimensions consist of lower thinking and higher-order thinking skills (HOTS). The first dimension of higher-order thinking ability is critical thinking (Al-hoorie et al., 2020). Critical thinking skills are one of the basic capital or intellectual capital. They are a fundamental part of human maturity, so it is essential to be taught at every level of education (Susantini et al., 2018).

When referring to the results of the PISA (Program for International Student Assessment) National Center for Education Statistics, students' higher-order thinking skills are still low. Critical thinking skills are students' efforts to identify, formulate a problem, seek relevant information, look for causal relationships, consider things by distinguishing between facts, opinions, and assumptions (Yunita et al., 2018).

Critical thinking is a process that considers carefully and determines its credibility to produce a conclusion (Zakiah et al., 2019). Lai (2011) that critical thinking includes analyzing opinions, drawing conclusions using deductive or inductive reasoning, making decisions, and solving problems. Based on this idea, critical thinking means a person's activity in considering things using certain standards. Critical thinking skills are students' efforts to identify, formulate a

problem, seek relevant information, look for causal relationships, feel things by distinguishing between facts, opinions, and assumptions. (Yunita et al., 2018). The critical thinking skills indicators updated by Ennis include aspects of elementary clarification, basic support, inference, advanced clarification, and managing strategies and techniques (Enis et al., 2015). The CTS is very important cause it plays an essential role in supporting life challenges globally, enabling students to solve problems and decisions in life (Rosba et al., 2021).

Preliminary studies conducted by interviewing teachers instated high schools at SMAN 1 Cibatu Purwakata that the learning evaluation tools provided to students had not yet reached the high-level thinking level (HOTs) or critical thinking. However, critical thinking skills are essential in the learning process. Then the evaluation questions, especially on the reproductive system material, from 40 multiple choice questions given by the teacher, there are 12 questions belonging to C1 (remembering), ten questions belonging to C2 (understanding), and seven questions belonging to C3 (applying). This indicates that there is no critical thinking, and learning biology is included in the dimensions of low-level thinking. This is relevant to the three-year PISA study from 2009 to 2015 for Indonesia showing low results because students are less accustomed to higher-order thinking. In addition, the results shown from the test results are also caused by several other factors, such as the learning process that takes place in the class that is not accustomed to training critical thinking skills according to the demands of the 21st century (Febri et al., 2018).

Critical thinking skills are essential in studying biology because of biology's cohesive and complex problems. One of the scopes of biology is the human reproductive system. It is substantial to be studied and included in the curriculum for high school. The material of the reproductive system is quite complex. This study aims to determine and analyze the thinking skills of Class XI students on the material of the reproductive system. This research is substantial because few studies analyze reproductive system material's critical thinking skills.

2. Method

This research is a descriptive study with a quantitative approach. The descriptive quantitative approach is a study to measure the value of one or more independent quantitative data (Sugiyono 2019:68). This purpose is to generalize from a sample to a population to make inferences about this population's characteristics, attitudes, or behavior (Creswell et al., 2014).

This research begins with a preliminary study by conducting interviews with school teachers, and then the instrument is validated by a material biologist. The next step is testing the instrument and then analyzing the instrument until finally the instrument is given to 98 respondents, and the results are analyzed descriptively. The sampling technique is by total sampling. The sample was 98 students from class XI IPA 1, IPA 2, and IPA 3.

According to Ennis, this research is descriptive using instruments developed based on the core aspects of critical thinking skills, including *elementary clarification, basic support, inference, advanced clarification, strategies, and tactics* (Ennis, 2011). The test the essay test of reproductive system material. The instrument analysis uses ANATES ver. 5.0 to determine the validity of the questions, reliability, and difficulty level. The instrument test was composed of 11 items, and all question items were valid (Pearson correlation $<.04$), and the question instrument was a reliable instrument.

The data analysis uses SPSS version 24, presented in descriptive statistics. First, Determine the score of each item in the research, and then determine the average (*mean, median, modus*) after creating tables, diagrams of the results of critical thinking skills after that, determine the average percentage of each critical thinking indicator.

The interpretation of critical thinking data is in the categories as shown in table 1.

Table 1. Categorization of critical thinking skills (CTS)

Interval %	Category
81.25 x 100	Very high
71.5 x 81.25	High
62.5 x 71.5	Enough
43.75 x 62.5	Low
0 x 43.75	Very low

(Supriyati et al., 2018, p. 75)

3. Result and Discussion

The results showed that each class has a different mean, mean interval value, and mode. The category of Critical thinking of IPA 1 and IPA 3 is higher than the class of IPA 2. Because they are in the range (71.5-82.5) while the class of IPA 2 obtain 71.46 (enough). Referring to the data, the class average is 72.12, so it is in the highest criteria.

Table 2. Descriptive statistics critical thinking skill-based on class

Class	Mean	Modus	Median	Standard Devices
IPA 1	73.35	75.00	75	9.63
IPA 2	71.46	65.91	69.32	9.21
IPA 3	71.55	70.45	70.45	12.4

When viewing from the mean obtained by each class, there are differences. These differences are triggered by the feature and plurality of each class. Online learning can have an impact because the learning services received by each student can be different. Some students can not access learning due to network disruption. that the obstacles experienced by students in online learning include internet connections, quota packages, and inadequate devices (Albab, 2020).

High critical thinking skills cannot be separated from the learning process by a teacher by the teacher to create an effective learning atmosphere even though it is carried out remotely. The teacher's ability to improve students' mastery of the reproductive system concept by giving quizzes, questions, or worksheets can make habituation for the student to answer a question. Furthermore, sufficient facilities can establish good learning.

Table 3. Percentage of indicators of reproductive system critical thinking skill for all classes

Percentage of critical thinking skills indicators					
	Elementary Clarification	Basic Support	Inference	Advanced Clarification	Strategies And Tactics
IPA1	65.4%	66.4%	70.45%	82.2%	85.23%
XI IPA 2	66.4%	58.1%	72.3%	77.2%	81.6%
XI IPA 3	67.47%	55.6%	70.43%	78.63%	80.24%

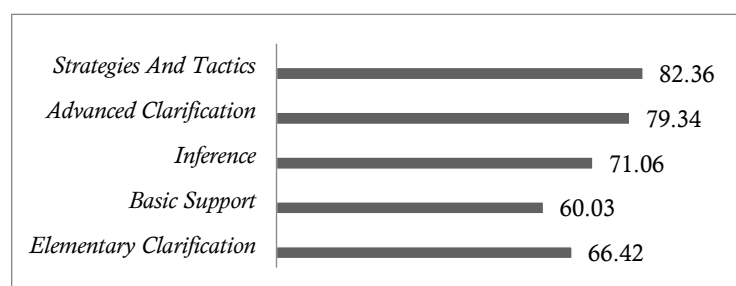


Figure 1. Percentage (%) of critical thinking skills indicators

Based on the data above, it is shown that the most dominating indicator is in making strategies and tactics because it is included in the highest criteria with an average of 82.36%. At the same time, the basic support skills are still lower, with an average percentage of 60.03%, than making strategies and tactics. In addition, the percentage gain on each indicator of students' critical thinking skills is different.

The critical thinking indicator focusing on questions, analyzing arguments, and understanding a graph obtains an average of 66.42%; this average comes from the research sample. It shows that students can provide elementary clarifications and explain their problems. However, 33.58% of students have not explained a focus on the questions given and by themselves. The obstacles in analyzing arguments are caused by feeling lazy to read and think. It happens because of the habit. The students' internal factors are the reason causing the low CTS, which was informed from this study. One of these factors is the lack of ability to face higher order thinking skills questions by most students. As a result, students are less accustomed to using their thinking skills (Fauzi et al., 2019). Teachers can improve students' argument analysis skills by asking questions that stimulate students to argue, compare their arguments with other arguments, and provide opportunities for students to express opinions about the discussion being studied (Fuadi et al., 2016).

Aspects in basic support skills include considering the credibility of the sourcing, observing and considering the results of observations, and using outside knowledge. Based on statistical results, it is known that the average and percentage of student acquisition is 60.03%, so it is included in the low criteria. Students are not accustomed to being given stimulation and observing related phenomena in everyday life through articles. Low CTS is caused by a lack of development in the learning aspect. Learning often tends to be theoretical and rote (Rosba et al., 2021).

Another aspect that is measured is the conclusion (inference). In concluding, there are several things, including making deductions, interpreting logic, identifying. Based on the data analysis, a percentage of 71.06% (Enough). Based on the results of students' answers, the ability to conclude needs to be trained again because there are still students who have not been able to make decisions and consider the results on the items students make decisions about the use of contraceptives to support government programs. In addition, in terms of making deductions regarding the conclusion of the relationship between the hormones estrogen and progesterone in delaying pregnancy. Not a few students still use reasoning to answer a problem without the right concept (Tamami et al., 2017).

Meanwhile, the conclusion aspect is also important to master because it identifies every argument needed to draw a reasonable conclusion, to form allegations and hypotheses, and to consider relevant information. It has three principles, among which is to make generalizations and to use language that describes generalizations, including definite references in making decisions (Huang & Ning, 2021)

According to Surata (2012) in Supriyati (2018:78), to improve aspects of the ability to make conclusions, you can use learning patterns between hypothetical-deductive and empirical-inductive patterns. In addition, some students have not been able to conclude because students are not accustomed to concluding the usual learning process (Susantini et al., 2018).

The advanced indicator explanation. Based on the analysis of students' skills in this aspect, it is included in the high category of 79.34%. The achievement of most students in providing further explanations can be caused by students who are diligent in reading. Reading can train critical thinking because students can feel the sense of the language used when reading. This is related to

(Noprianda et al., 2019) that honed critical thinking skills (CTS) are skills to provide further explanations because, by reading, students can explore more detailed information. The explanation should not only be a description or a phenomenon but include an explanation of the causal or process relationship, the reinforcing argument, which links logical descriptions and relationships and uses the memorial data as the basis of explanation (Febri, 2018)

Strategies and tactics, in this aspect students, are asked to determine an action or make a solution to a problem and interact with others. Based on the research results as a whole, the average percentage of 82.36% is included in the very high category. This indicates that students can decide on an action. For example, in the questions presented, students can prevent reproductive organ diseases. It is illustrated in the students' answers to question.

Most of the students decide to take Fertilization in vitro if there is infertility and want to have children. This is in line with the research of Supriyati (2018), which found results in making strategies and tactics to get a high percentage. This shows that students can decide on actions and provide reasons that support an opinion. The critical thinking skill aspects of the students who enter other good categories equal 66% at strategies. It is a self-consciousness to watch over the cognitive activities. The elements employed in activities primarily apply skills to question, confirm, validate, or correct either one's reasoning or outcome (Febri, 2018).

Teachers can use strategies to develop students' abilities in making strategies, deciding actions by giving a problem from events, and asking students to take action. As for improving critical thinking skills, indicators of interacting with other people can be through group work activities (Dalimunthe et al., 2020). To make tactics in solving problems, the first thing to do is focus on the main question or idea. There are five processes in finding solutions: identifying the problem, finding the core and representing the problem, determining possible strategies, taking action, and evaluating what has been done (Brookhart et al., 2010).

Based on the analysis results of critical thinking skills in the reproductive system material at SMAN 1 Cibatu still needs to be improved. Teachers as educators and teachers play an important role in improving students' critical thinking skills. In addition, the desire and motivation to learn also contribute to critical thinking skills. General factors affecting students' critical thinking skills include self-motivation, intellectual development, self-regulation, experience, routine habits (Hartini et al., 2021).

In addition, the use of learning models can also support the development of students' critical thinking skills. PJBL, PBL, and STEM models can improve students' critical thinking skills (Sundari et al., 2021). The applied learning style "Understanding by Design" was used to develop "thinking players." A planning matrix was used to develop problem-solving approaches (Huang & Ning, 2021).

4. Conclusion

Based on the results of the data analysis, the thinking skills of students in class XI IPA are in the high category, with an average acquisition of 72.12. The dominant critical thinking indicators appear in making strategies and tactics with 82.36% and Advanced clarification of 79.34%. For providing an elementary clarification of 66.42% and inference, 71.05% are enough. The low indicator is found in the aspect of basic support, 60.03%. This must be improved again to be better. This research CTS was not analyzed based on gender differences. Therefore further research is needed with more respondents to find out the profile of students' CTS and detailed analysis to determine external factors that affect CTS.

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