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Research Artikel

CRITICAL THINKING AND BIOLOGICAL LITERACY: RELATIONSHIP WITH CONCEPTUAL UNDERSTANDING OF PLANT TISSUE

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Abstract

Biology learning currently requires students to have critical thinking ability and biological literacy so that they can improve conceptual understanding. The purpose of this study was to analyze the correlation between critical thinking ability and biological literacy in conceptual understanding of plant tissue. This research method is quantitative descriptive research using a correlational study. The research sample used 92 students from SMA Negeri 37 Jakarta. critical thinking ability instrument uses essay type test with 24 questions, biological literacy uses multiple choice type test with 10 questions and concept mastery is a multiple-choice type test with 30 questions. In variable showed that the fifth indicator was the lowest in critical thinking, biological literacy was the lowest in the nominal dimension, and mastery of concepts corresponded to the difficulty of the cognitive level of the questions. The results of hypothesis testing show that there is a positive and linear correlation between critical thinking ability and biological literacy with conceptual understanding of plant tissue. Multiple linear regression model Multiple linear regression model $\hat{Y} = 13.077 + 0.399X1 + 0.413X2$. Critical thinking ability and biological literacy contribute 33.5% to conceptual understanding. Critical thinking skills and biological literacy have a positive relationship but with different strengths and levels of contribution to the mastery of plant tissue concepts.

Keywords*: Biological literacy; critical thinking; conceptual understanding; plant tissue.*

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INTRODUCTION

Biology learning currently requires students to have 21st-century learning skills. One of the HOTS abilities needed is critical thinking and problem-solving (Rindah et al., 2019). The process of learning biology to find a concept and practice reading comprehension skills can change students (Djamahar et al., 2018). Conceptual understanding is equipped with the ability to be able to apply concepts in everyday life (Nugraheni et al., 2017). Mastery of students' concepts is interpreted as a result of cognitive learning from the results of cognitive thinking through learning activities or processes (Aini et al., 2018). Students still perceive learning biology as a rote lesson dominated by foreign names and terms (Zuhara et al., 2018). An example in the main study of plant tissue material, because there are too many plant tissue sub-materials, it is not easy to be given verbally, and there are material objects that cannot be imagined in the abstract and studied theoretically (Rohmawati, 2018; Yuanda et al., 2017).

Conceptual understanding is measured by Bloom's taxonomy with cognitive levels C1 – C6. The six levels of the thinking process are remembering), understanding, applying, analyzing), evaluating, and creating. These six levels are used to formulate learning objectives and levels, commonly referred to as C1 to C6 (Anderson & Krathwohl, 2001). One of the abilities of students that must be trained is the ability to think critically because it guarantees the success of learning (Alfonso, 2015; Sulistyowarni et al., 2019). Indonesia is at the bottom (PISA, 2018). Critical thinking ability is the ability to think processes to assume, investigate or evaluate, and the logic that underlies other people's ideas (Putra & Sudarti, 2015).

There are several experts who put forward the theory of critical thinking, namely Ennis (1985) who states that critical thinking is thinking to decide what action to take, Facione (2013) states that critical thinking is self-regulation in making decisions, and Beyer (1995) who explains the nature of the ability to think critically.

Indicators of critical thinking skills according to Ennis (1985) are 1) provide simple explanations by focusing, analyzing arguments and asking or answering questions; 2) build basic skills by considering sources, observing and considering reports; 3) conclude by deducing or inducing the results as well as making and determining the results of the considerations; 4) provide further explanation by identifying terms and considering their set strategies and tactics by determining actions and interacting with others.

Critical thinking skills influence students to focus, find reasons, and analyze the problems they face (Ulger, 2018). For students to get used to conceptual understanding, critical thinking skills must be trained and honed by providing continuous stimulus and training (Hidayati et al., 2021). Critical thinking skills affect the literacy skills of students (Ristanto et al., 2018).

Literacy skills are students' ability to apply scientific concepts in everyday life (Holbrook & Rannikmae, 2009). The ability to use scientific knowledge and its application in society is called scientific literacy. Biological literacy is the ability to understand and recognize biological problems and integrate ideas using scientific inquiry in making decisions and conveying results to others (McBride et al., 2013). The problem encountered was a lack of interest in reading literacy-type questions experienced by students. Textbooks used have not been able to include components of scientific literacy to implement in curriculum 2013 (Lasminawati et al., 2019). Scientific literacy skills have been assessed by PISA since 2000 and Indonesia has always been at the bottom of scientific literacy tests.

According to Uno and Bybee (1994), biological literacy is divided into four levels, namely 1) Nominal, students can identify terms and questions, and provide explanations about biological concepts; 2) Functional, students can use biology vocabulary, define terms correctly, and provide feedback; 3) Structural, understands the concept of biological schemes, has process knowledge and skills, and can explain biological concepts in their language; 4) Multidimensional, understand the position of biology, know the nature of biology, and understand the interaction of biology with real life (Krauja & Birzina, 2018).

Therefore, each individual needs to have the ability to think critically and be biologically literate in conceptual understanding. Not all students who have biological literacy will not necessarily their critical thinking ability. As for students who can think critically but do not have biological literacy. As well as students who have critical thinking ability and biological literacy will have an impact on conceptual understanding (Dayelma et al., 2019). If biological literacy's student is low, it can be implied that their critical thinking skills are also low (Rahayuni, 2016).

The understanding of learning science for the formation of biological literacy and critical thinking in students is not fully understood, because students are still stuck with their old habits and cannot use their thinking skills properly accompanied by literacy activities. Has an impact on the learning process that only relies on students' conceptual mastery. The purpose of this study was to analyze the correlation between critical thinking ability and biological literacy with conceptual understanding of plant tissue. Another purpose is measuring the level of critical thinking skills, biological literacy, and mastery of plant tissue concepts in students using assessment instruments.

METHOD

This research is a quantitative research and uses a descriptive method with a correlational study to analyze whether or not there is a correlation between two or more variables (Arikunto, 2010). In this study, there are three variables to be measured consisting of 2 independent variables, namely critical thinking skills (X_1), biological literacy (X_2), and the dependent variable, namely conceptual understanding of plant tissue (Y).

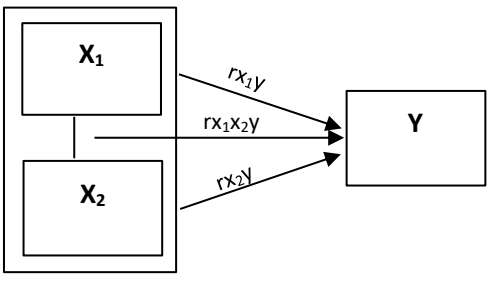

Figure 1. Research Design

The population was SMA Negeri 37 Jakarta students. The research was carried out in December 2022 to July 2023. Three classes of XI MIPA with a total of 92 students were selected using multi-stage sampling.

The critical thinking ability instrument is measured by the Ennis indicator using an essay test totaling 24 items with the instrument grid listed in Table 1. Assessment with a minimum of 0 and a maximum of 5, criteria for critical thinking ability in Table 2. The biological literacy instrument refers to the dimensions developed by Uno dan Bybee are listed in Table 3. Assessment with a test in the form of multiple-choice questions (a, b, c, d, e) totaling 10 questions with a correct score of 1 and an incorrect score of 0 with the biological literacy criteria in Table 4. Instruments of conceptual understanding of using a multiple-choice type test totaling 30 questions (Table 5). Using Bloom's taxonomy with cognitive levels (C2 – C5) with the criteria conceptual understanding in Table 6.

Testing the validity of critical thinking instruments using Pearson Product Moment. Items are said to be valid if rcount > rtable at $\alpha = 0.05$. Based on the validity test with n = 32 with rtable 0.349 obtained 24 questions valid critical thinking variables.

Table 1. Critical thinking skills instrument

No.	Indicator	Number of Question Items
1.	Give a simple explanation	4, 13 3, 18 1, 19
2.	Build basic skills	2, 17 10, 14
3.	Conclude	12, 15 8, 20 11, 21
4.	Provide further explanation	6, 22 9, 16
5.	Set strategy and tactics	7, 23 5, 24

(Ennis, 1985)

Table 2. Criteria for critical thinking skills

Interval	Criteria
$81.25 < x \leq 100$	Very High
$71.50 < x \leq 81.25$	High
$62.50 < x \leq 71.50$	Medium
$43.75 < x \leq 62.50$	Low
$0 < x \leq 43.75$	Very Low

(Hughes, 2014)

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Testing the validity of multiple-choice instruments for biological literacy variables and conceptual understanding using Point Biserial. The biological literacy instrument obtained 8 valid questions and 2 invalid questions.

Table 3. Biological literacy instrument

Dimensions of Biological Literacy	Number of Question Items
Nominal	6, 7
Functional	1, 8
Structural	2, 3, 5, 9*
Multidimensional	4, 10*
Total	**10**

(Uno & Bybee, 1994)
*Invalid question

The range of scientific literacy criteria in biology modified according to Purwanto (2009), is as follows.

Table 4. Criteria for scientific literacy in biology

Interval	Criteria
86 – 100	Very high
76 – 85	High
60 – 75	Medium
55 – 59	Low
≤ 54	Very low

(Purwanto, 2009)

The conceptual understanding instrument obtained 25 valid questions and 5 invalid questions. Calculation of reliability using Alpha-Cronbach, if it is obtained more than 0.60 then the items are considered reliable.

Table 5. Conceptual understanding of plant tissue instrument

No	Indicator	Item Number (Cognitive Level)	Total
1.	Remember and identify	2 (C3), 10 (C3), 11 (C3)	3
2.	Understand and differentiate	*7 (C5), 9 (C4), *22 (C3)	3
3.	Apply and categorize	1 (C5), 3 (C4), *5(C5), 23 (C4)	4
4.	Analyze	6 (C4), 8 (C4), 14 (C4), *15 (C4), 16 (C4), 17 (C3), 18 (C3), 19 (C3), 20, C4), 24 (C4), 25 (C4), 26 (C5), 27 (C2), 28 (C3), 29 (C3), *30 (C3)	16
5.	Integrate and analyze	4 (C5)	1
6.	Evaluate, create, and compile	12 (C4), 13 (C4), 21 (C5)	3
Total			**30**

* Invalid question

Table 6. Criteria for conceptual understanding of plant tissue.

Intervals	Criteria
86 – 100	Very high
71 – 85	High
56 – 70	Medium
41 – 55	Low
0 < 40	Very low

(Agip, 2009)

The instrument is distributed using the Google form in real time class. After the data collection is complete, it will be analyzed to obtain results and conclusions. Data testing uses SPSS version 27.

The prerequisite test uses the Kolmogorov-Smirnov (KS) test and the Bartlett test at $\alpha = 0.05$. Test the hypothesis with regression and correlation. Simple regression test for hypothesis 1 and hypothesis 2 and multiple regression for hypothesis 3. Simple correlation test to determine the degree of relationship between X_1 and Y (hypothesis 1) and variables X_2 and Y (hypothesis 2), while the relationship between variables X1 and X2 with Y (hypothesis 3) using multiple correlations.

RESULTS AND DISCUSSION

The results of the assessment data for three variables, namely critical thinking skills (X_1), biological literacy (X_2), and conceptual understanding of plant tissue (Y) were obtained from 92 students of class XI MIPA SMA Negeri 37 Jakarta with descriptive statistics in Table 7.

Table 7. Descriptive Statistics of Research Variables

Statistical Size	Critical Thinking Ability (X_1)	Biological Literacy (X_2)	Conceptual Understanding of Plant Tissue (Y)
Average	70.94	58.83	65.78
SD	16.58	18.58	19.54
Maximum	97.50	100,00	100.00
Minimum	25.00	25.00	24.00
Total samples	92.00	92.00	92.00

The normality test using the Kolomogrov-Smirnov (KS) test obtained a significance value of $0.135 > \alpha = 0.05$. After carrying out the normality test, a homogeneity test was carried out using the Bartlett test for each variable X_1, X_2, and Y, and a value of $0{,}001 < \alpha = 0.05$ was obtained.

Table 8. Normality Test and Homogeneity Test

Var.	Sig. KS	Sig. Bartlett	Conclusion
X_1	0,135	0,001	Distributing
X_2	0,135	0,001	Normal &
Y	0,135	0,001	Homogeneous

Critical Thinking Ability

Based on the research results, the average value of critical thinking skills of 71 is included in the medium criteria (Tabel 7). The average value is not much different from the research by Ramdani et al. (2020) because this research also uses the Ennis indicators, obtained an average value of 71.69 with high criteria. The criteria with the highest acquisition with very high criteria were obtained by 29 participants (32%). While the least criteria were obtained by 4 students (4%) with very low criteria (Table 9).

Table 9. Percentage of Each Critical Thinking Assessment Criteria

Interval	Criteria	Frequency	(%)
$81.25 < x \leq 100$	Very high	29	32
$71.50 < x \leq 81.25$	High	27	29
$62.50 < x \leq 71.50$	Medium	8	9
$43.75 < x \leq 62.50$	Low	24	26
$0 < x \leq 43.75$	Very low	4	4
Total		**92**	**100**

The indicators of critical thinking ability in Table 10 in providing simple explanations (indicator 1) and concluding (indicator 3) show an average value of 73 which is a high criterion. The first indicator requires students to answer and solve problems, students must know the topic and content of knowledge. Supporting research conducted by Zakhrah et al. (2015) and Ramdani et al. (2020) shows a higher value than other indicators. But the research was tested on junior high school students. The indicator with the lowest average value is set strategy and tactics (indicator 5).

The second indicator is building basic skills with an average score of 72. So that students can analyze the truth of a given information or discourse. Critical thinking skills will familiarize students with examining and re-clarifying the information obtained. Research shows the same results by Ardiyanti (2016) with an average of 76.38 in the high criteria. Critical thinking is used when trying to understand an idea, collect data, study, and apply information to solve problems.

The fourth indicator provides further explanation with an average score of 70.89 in medium criteria which refers to the assessment carried out by (Acedo & Hughes, 2014). Students are required to be able to identify terms, and definitions, and consider definitions and assumptions. Critical thinking is a process in which students answer questions that are not easy to answer with relevant information that does not exist rationally (Inch, 2014). To think critically effectively it is necessary to help determine the accuracy of information and recognize arguments or misconceptions in learning activities (Arends, 2012; Norrizqa, 2021).

Students are required to determine an action in a case to be able to solve the problem on function plant tissue. The questions given are about the role of plant tissue, if the plant can live in a certain environment. Thus, the fifth indicator, setting strategies and tactics with an average value of 64, gets the lowest score of the other indicators. If students can make decisions by involving their critical thinking skills, then they can make decisions wisely and set strategies (Facione, 2011).

Table 10. Analysis of Each Critical Thinking Assessment Indicator

No.	Indicator	Average	SD	Criteria
1.	Give a simple explanation	73	15,80	High
2.	Build basic skills	72	16,89	High
3.	Conclude	73	18,94	High
4.	Provide further explanation	70	23,02	Medium
5.	Set strategy and tactics	64	21,72	Medium

Biological Literacy

The research results obtained an average value of students' biological literacy of 58.8 (Table 7) which is in the low criteria. Biological literacy can develop high-level abilities, including using scientific concepts, being able to place, classify technology for problem solving, and being able to know related or unrelated information. This is like the research conducted by Septiani et al. (2019) with an average value of 51.09 with very low criteria. A total of 44 students or 48% of them scored below 54 which is included in the very low criteria (Table 11).

Table 11. Percentage of Biological Literacy

Intervals	Criteria	Frequency	(%)
86 – 100	Very high	11	11,96
76 – 85	High	0	0,00
60 – 75	Medium	36	39,13
55 – 59	Low	1	1,09
≤ 54	Very low	44	47,83
Total		**92**	**100**

Based on the results of the biological literacy variable data in Table 12, the values of all dimensions are included in the very low criteria with the highest average score on the functional dimension of 67.50 and the lowest on the nominal dimension of 44.50. Nominal dimension, students need to identify terms and questions, as well as explain biological concepts. However, students tend to be good at memorizing concepts and lacking in applying their concepts (Pantiwati & Husamah, 2014). So, get the lowest value of 44.50. In line with the research of Suhadi et al., (2023) the functional dimension has the lowest score of 44%, students have difficulty remembering biological terms according to biological concepts (Suhadi et al., 2023).

Functional dimension, students can use biology vocabulary, define terms correctly, and provide feedback. Lack of information that students get to understand definitions, vocabulary, and terms in the material used as a reference (Fadilah et al., 2020). The average value is 67.50 with very low criteria. When students who have good knowledge aspects can identify scientific issues, and explain scientific phenomena using scientific evidence properly and precisely (Hanifah & Retnoningsih, 2019).

Structural dimensions obtained an average of 49.67 with very low criteria. Because the questions given contain the functions of plant tissue parts and how these parts affect plants. Students need to understand the concept of biological schemes, have process knowledge and skills, and be able to explain biological concepts in their language. This is because students have not been able to understand concepts to conclude, provide arguments, read discourses, and answer problems properly or that require scientific investigation (Arief & Utari, 2015).

Table 12. Descriptive Analysis of Level Biological Literacy Assessment Dimensions

Dimensions	Average	SD	Criteria
Nominal	44,50	0,50	Very low
Functional	67,50	0,44	Very low
Structural	49,67	0,50	Very low
Multidimensional	60,00	0,48	Very low

Conceptual Understanding of Plant Tissue

The results of the average value of the variable conceptual understanding of plant tissue from 92 students in class XI MIPA SMA Negeri 37 Jakarta amounted to 71 (Table 7), included in the high criteria. This is like the research conducted by Ramdani et al. (2020) in accordance with the results regarding the analysis of the relationship between students' critical thinking abilities and mastery of basic science concepts with an average value of 76.20 including high criteria. Based on the research, the value of each assessment criterion for conceptual understanding of plant tissue is in Table 13.

Table 13. Percentage Criteria of Conceptual Understanding of Plant Tissue

Intervals	Criteria	Frequency	(%)
86 – 100	Very high	17	18.48
71 – 85	High	24	26.09
56 – 70	Medium	22	23.91
41 – 55	Low	17	18.48
< 40	Very low	12	13.04
Total		**92**	**100**

The assessment of students is based on the minimum completeness criteria (KKM) that apply to SMA Negeri 37 Jakarta in Figure 2 with a score of 75, only 39% of students get scores above the KKM. When working, students consider the questions given to be difficult and foreign, because they are different from the questions usually given. When students can master the concept well, it makes it easier to reach the KKM that has been set by the school (Meha et al., 2022). According to the results obtained, KKM can be influenced by mastery of concepts.

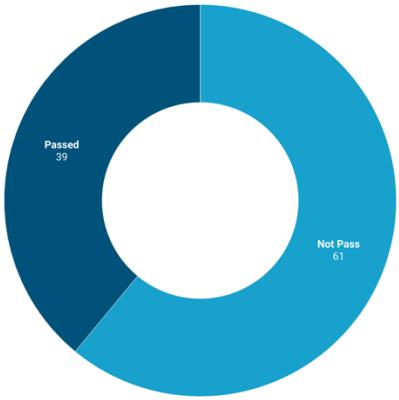

Figure 2. Percentage of Minimum Completeness Criteria Values (KKM).

Table 14 shows the highest average value at the C2 level of 76.09. Students can understand because the questions given have already been explained by the teacher when teaching. This is in line with research from Yustiqvar et al. (2019) and Wulandari et al. (2011) at level C2 obtained the highest score. Students find questions at C3-C5 levels difficult because they are used to being given questions at C1 (memory) and C2 (understanding) levels and are not used to higher levels. If during the learning process conceptual understanding is still low, it is because students have not been able to capture, master, and explain in their language without changing the true meaning and are still waiting for orders or explanations from the teacher (Meha et al., 2022).

Inhibiting factors and obstacles that occur when students work on test instruments that can influence research results are (1) poor classroom management, class conditions and atmosphere during work that are not conducive. Seating arrangements that are not arranged cause students not to focus (Berjamai & Davidi, 2020). (2) students are given less space and time when working on it, because time is short, and the choice of data collection schedule is not appropriate. (3) students cannot convey their arguments optimally, which affects the indicators measured such as providing further explanations. Students who can provide arguments accompanied by evidence, evaluate, and accept or reject conclusions are said to be able to think critically well (Siswono, 2008).

Table 14. Descriptive Analysis of Level of Conceptual Understanding

Cognitive Level	Average	SD	Criteria
C2	76.09	42.89	High
C3	67.53	24.59	Medium
C4	68.03	20.50	Medium
C5	52.99	25.64	Low

Correlation between Critical Thinking Ability and Conceptual Understanding of Plant Tissue

The results of testing the first hypothesis show that there is a positive and linear relationship between the ability to think critically and conceptual understanding of plant tissue (Figure 2). This means that increasing the ability to think critically will increase mastery of the concept of plant tissue. Students who get high critical thinking scores do not always get high conceptual understanding scores.

Simple linear regression model $\hat{Y} = 29.385 + 0.513X$. The simple regression model significance test with $\alpha = 0.05$ obtained $0{,}001 < 0.05$ because H_0 was rejected, so the first hypothesis regression model was declared significant. The linearity test of the regression model with $\alpha = 0.05$ obtained an F_{count} $2.155 < F_{table(0,05)(1)(42)} = 4.073$, because H_0 accepted. So that the relationship between the variable ability to think critically and conceptual understanding of plant tissue is linear.

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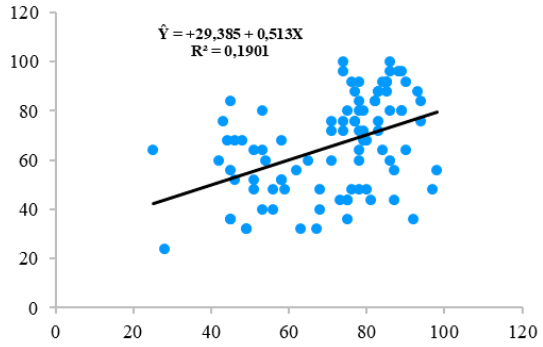

Figure 2. Simple Linear Model between Critical Thinking Ability (X_1) and conceptual understanding of Plant Tissue (Y).

The strength of the relationship between the two variables with a coefficient value of 0.436 is at a moderate level of relationship. Critical thinking ability contributes 19% to conceptual understanding. Critical thinking in learning includes the competencies needed to build knowledge so that students can have high-level knowledge and improve the results of concept mastery (Rachmadtullah, 2015).

The learning process needs to instill the ability to think critically to instill conceptual understanding in students. Critical thinking is a cognitive process of assessing an argument, a fact, or a relationship between two or more objects by providing evidence to be able to make a decision (Marudut et al., 2020). When teachers apply effective learning approaches, such as the process skills approach, and are based on critical thinking, it is expected that students can better understand the concepts presented.

Correlation between Biological Literacy and Conceptual Understanding of Plant Tissue

The results of testing the first hypothesis show that there is a positive and linear relationship between biological literacy and mastery of the concept of plant tissue (Figure 3). This means that increasing biological literacy will increase conceptual understanding of plant tissue. Evidenced by the strength of the relationship between the two variables with a coefficient value of 0.476 is at a moderate level of correlation.

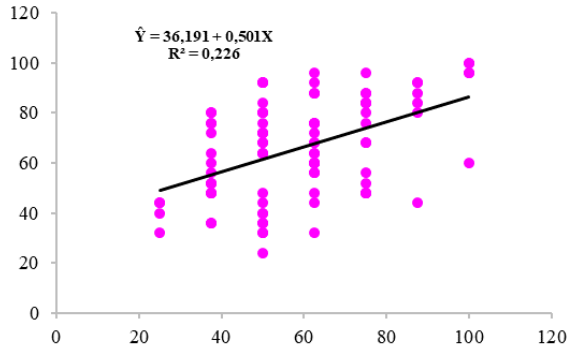

Figure 3. Simple Linear Regression Model between Biological Literacy (X_2) and Conceptual Understanding of Plant Tissue (Y)

Simple linear regression model $\hat{Y}$ = 36.191 + 0.501X. The simple regression model significance test with α = 0.05 obtained 0.001 < 0.05 because H_0 was rejected, so the second hypothesis multiple regression model was declared significant. The regression model linearity test with α=0.05 obtained a significance result of 0.812 > 0.05 dan F_{count} = 0.450 < $F_{table(0,05)(1)(5)}$ = 6.608, because H_0 accepted. So that the relationship between biological literacy variables and conceptual understanding of plant tissue is linear.

Biological literacy contributes 22.6% with a variable coefficient of 0.476 to conceptual understanding. In line with research by Alfionora & Hasnah Putri (2021), combined with several literatures, it shows a correlation result of 0.66 means that the implementation of scientific literacy contributes to the biology learning being carried out. Scientific literacy and students' metacognitive abilities need to be improved so that students are more independent in the learning process (Djamahar et al., 2018).

Increasing biological literacy can be done by developing teaching materials that contain aspects of biological literacy. Application of appropriate learning models that pay attention to context to be able to solve problems in scientific ways. In addition, complete facility support is tailored to the needs so that the objectives of the learning process are achieved. Learning with a scientific approach can be applied to improve students' biological literacy skills because it has an impact on increasing inquiry, stimulating interest in scientific issues, and students' sense of responsibility (Asyhari & Hartati, 2015)

Correlations between Critical Thinking Ability and Biological Literacy with Conceptual Understanding of Plant Tissue

The results of testing the third hypothesis show that there is a positive and linear correlation between critical thinking ability and biological literacy with conceptual understanding of plant tissue Multiple linear regression model $\hat{Y} = 13.077 + 0.399X_1 + 0.413X_2$. This means that increasing critical thinking ability and biological literacy will increase conceptual understanding of plant tissue. Evidenced by a coefficient value of 0.578 which is at a moderate level of correlation (Sugiyono, 2012). Mastery of concepts influences scientific literacy and the higher the mastery of concepts, the higher students' critical thinking skills (Ihsan et al., 2019; Yustiqvar et al., 2019). If students have good conceptual understanding ability, cognitive learning outcomes will be more optimal (Husein et al., 2017). The coefficient of determination (R *Square*) is 0.335. This causes critical thinking ability and biological literacy to contribute 33.5% to conceptual understanding.

The significance test of the multiple regression model with $\alpha = 0.05$ obtained $0.001 < 0.05$ because H_0 was rejected, so the third hypothesis of the multiple regression model was declared significant. Test the linearity of the multiple regression model with $\alpha = 0.05$ obtain F_{count} 3.382 < $F_{table(0,05)(1)(75)}$ 3.968 because H_0 rejected. So that the relationship between the variables of critical thinking (X_1), biological literacy (X_2), and conceptual understanding of plant tissue (Y) is linear.

Critical thinking is included as one of the abilities in higher-order thinking. Critical thinking ability are needed in solving problems, so they are needed in making decisions (Norrizqa, 2021). Critical thinking ability is one of the factors that influence scientific literacy. By the statement of Derosa and Joseph, (2014), the purpose of science education is to form human beings who have creativity and critical thinking by directing students to be literate in science.

The ability to think critically makes a greater contribution than biological literacy to the conceptual understanding of plant tissue, with a contribution that is still under the contribution of the two together. Supporting research conducted by Rahayuni (2016), that the ability to think critically is directly proportional to scientific literacy. Other research confirms that cognitive processes are influenced by critical thinking ability and inductive-deductive reasoning (Zuriyani, 2012). Critical thinking is included as one of the abilities in higher-order thinking. Critical thinking ability are needed in solving problems, so they are needed in making decisions (Norrizqa, 2021).

Students' reading comprehension to explore information is needed to be able to think critically about the biology reading material. Biological literacy is very necessary when students learn because students are stimulated to actively read and examine phenomena to answer existing problems (Lestari, 2017). It can be concluded that critical thinking skills and biological literacy will improve students' a good conceptual understanding of plant tissue

CONCLUSION

There are three conclusions from this research, namely first, there is a positive and linear relationship and critical thinking skills contribute to mastery of the conceptual of plant tissue. Second, there is a positive and linear relationship and biological literacy contributes as much to mastering the conceptual of plant tissue. Third, there is a positive and linear relationship and critical thinking skills and biological literacy contribute to mastery of conceptual of plant tissue. So, critical thinking ability and biological literacy have a positive relationship with moderate relationship strength and different levels of contribution to mastery conceptual of plant tissue.

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