Critical Thinking Profile of SMA Batik 1 Surakarta Students

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Abstract. Students need critical thinking skills for their future life. This is by 21st-century learning and government mandates. The purpose of this study was to determine the profile of critical thinking skills of students in SMA Batik 1 Surakarta. The research method is descriptive quantitative. Data collection was carried out by observation through critical thinking skills tests. The test instrument consists of 4 biological problems that require solving with indicators of critical thinking skills from Ennis in terms of questioning skills, drawing conclusions, evaluating, presenting reasons, and analysis. Retrieval of data on class XI-MIPA students as many as 206 students. The scoring results are converted to test result scores. The results of the study concluded that the profile of students' critical thinking skills with an average score of 55.4 with the basic level category. Skills to arrange student questions on basic level criteria, with an average score of 2.1. Skills to arrange students' reasons on the basic level criteria, with an average score of 2.4. Skills to conclude students on basic level criteria, with an average score of 2.0. Skills to arrange relationships between one data and another data students are at the advanced level criteria, with an average score of 2.6. Student evaluation skills at the basic level criteria, with an average score of 2.5.

Keywords: *Critical thinking, profile*

INTRODUCTION

The message from the Ministry of Education and Culture is contained in the attachment to the Regulation of the Minister of Education and Culture of 2016 number 22 concerning National Education Process Standards, that in learning students who are actively seeking out, learning with a scientific approach is not textual, and competency-based learning is not content-based. This is in line with the mandate of 21st-century learning, namely students have critical thinking skills and problem-solving, communication, creativity, and collaboration.

Based on this message, it is hoped that learning can develop critical thinking skills. Based on the conclusions of experts (Fisher, 2009) defines critical thinking skills, which is a skill that actively identifies, provides reasons, makes conclusions from facts, makes questions, evaluates the truth, analyzes provides explanations, clarifies and interprets statements. statements or ideas that ultimately form decisions. Robert Ennis (Ennis, 1985) defines critical thinking as "thinking that makes sense and is reflective to decide what to do or believe". Critical thinking is a thinking skill supported by trusted arguments (Kusuma, Gunarhadi, & Riyadi, 2018)

Critical thinking indicators are by Ennis (Zubaidah, Corebima, & Mistianah, 2018) and (Kusuma, Gunarhadi, & Riyadi, 2018) which are composed of several elements abbreviated as FRISCO, namely letter F for Focus, R for Reason, I for Inference, S for Situation, C for Condition, and O for Overview. 1) Focus, namely focusing on questions or issues, asking questions, answering questions to make decisions about what is believed. 2) Reason, which is to provide reasons that support or reject a decision based on the situation, relevant facts and support the

conclusion. 3) Inference, namely: making reasonable or convincing conclusions, deducing or inducing facts, identifying assumptions and seeking solutions, consideration of interpretations of situations and evidence. 4) Situation, namely understanding the situation and maintaining the situation in thinking to help clarify the question (in F) and know the meaning of key terms, the relevant parts as support. 5) Clarity, namely explaining the meaning, clarity of message delivery, or the terms or definitions used. 6) Overview, namely reviewing and thoroughly examining the decisions taken.

Critical thinking skills are important, this is following the conclusions of Pascarella and Terenzeni (Fong, Kim, Davis, Hoang, & Kim, 2017), which are needed to process data, evaluate reasons through arguments and evaluate ideas. Critical thinking skills improve learning outcomes (Fong, Kim, Davis, Hoang, & Kim, 2017), (Prihatin, Prayitno, & Rinanto, 2017), are used to solve various daily problems (Kusuma, Gunarhadi, & Riyadi, 2018), (Budiharjo, Kartowigaran, & Mahmudi, 2019), (Amin, Corebima, Zubaidah, & Mahanal, 2017), (Zubaidah, 2017). In addition, critical thinking skills can foster an independent and successful attitude in the future (Setiawati & Corebima, 2017), foster an attitude of self-reflection to find the truth so that they can make decisions (Amin, Corebima, Zubaidah, & Mahanal, 2017). Furthermore (Amin, Corebima, Zubaidah, & Mahanal, 2017) explains that critical thinking skills improve students' verbal and analytic skills. Critical thinking skills to convey ideas, construct arguments, check the credibility of sources, make decisions (Fisher, 2009), develop godly nature, character, morals, prepare students' thinking skills in various fields of science, live careers and life (Zubaidah, 2017), critical thinking skills are needed in higher education, in the field of midwifery (Carter, Creedy, & Sidebotham, 2017), radiographs (Pieterse, Lawrence, & Friedrich-Nel, 2016).

Based on the explanation above, it is necessary to research to determine the profile of students' critical thinking skills in Biology subjects at SMA Batik 1 Surakarta. The aspects of critical thinking skills that were observed according to Ennis' opinion, included questioning skills, conveying reasons, drawing conclusions, connecting the linkages between one data and another, and evaluation.

METHOD

This research is a qualitative descriptive study (Sugiyono, 2017). This research is expected to be able to explain the critical thinking profile of students in Biology objects. This research was conducted in SMA Batik 1 Surakarta in class XI MIPA students consisting of 204 students. The question is a critical thinking skill test that consists of 4 biological problems that require criteria for critical thinking skills according to Ennis, namely formulating questions, providing reasons, connecting data with other data, drawing conclusions, and evaluating. The answer key is equipped with an assessment rubric of critical thinking skills (Stupple, Maratos, Elander, Hunt, Cheung, & Aubeeluck, 2017). Data were analyzed by calculating the average of each critical thinking indicator. The average score is converted to the critical thinking skills score. The critical thinking score can be seen in table 1.

Table 1. Range of scores, values , and criteria for critical thinking skills (Ronnis, 2011)

No.	Critical thinking skills criteria	Score	Score range	Value range
1	Beginner	1	1,0 – 1,7	25 – 43
2	Basic	2	1,8 – 2,5	44 – 62
3	Advance	3	2,6 - 3,3	63 – 81
4	Sophisticated	4	3,4 - 4,0	82 – 100

Each student's score was converted to a value with equations

$$Test\ score = \frac{total\ of\ score}{7} x\ 25$$

The total student's critical thinking ability is calculated by the average test score, then converted to a table of critical thinking skills (table 1).

RESULT AND DISCUSSION

The results of observation and analysis obtained the data presented in table 2

Table 2. Observation result of critical thinking skills

	Aspect of critical thinking				
	Evaluation (overview)	Reason	Relation (Situation)	Question (Focus)	Conclution (Inference)
Persentage (%)	63.24	59.19	61.64	51.84	50.61
Average of score	2.5	2.4	2.6	2.1	2.0
criteria	Basic level	Basic level	Advanced level	Basic level	Basic level

Students' critical thinking skills in the evaluation aspect (Overview) obtained an average score of 2.53, with basic level criteria, as much as 63.24%. Students' critical thinking skills in the aspect of conveying reasons (Reason) by the problem with an average score of 2.44, with basic level criteria, as much as 59.19%. In this question, students are given a problem to correctly evaluate data that falls within the scope of biology and provide the correct reasons for their choice. Students' critical thinking skills in the evaluation aspect, that students have not been able to evaluate data that is included in the scope of biology. students determine the data, but the data they choose is not quite right. Giving reasons about the scope of biology is also less precise.

Figure 1. Respondent's answer to the evaluation aspect.

Students' critical thinking skills in the aspect of connecting between data (Situation) with an average score of 2.6, with the advanced level criteria as much as 61.64%. In this question, students are given problem data about the types of small intestine making up tissue and their functions, students are asked to explain the characteristics of the intestine based on the function of the constituent tissues. Figure 2 shows the responses of students who can connect the bonds between one data and another. Whereas Figure 3 shows the responses of students who have not been able to connect the bonds between one data and another. The student response is in the form of an explanation of the characteristics of the intestinal tissue making up the structure. Not the characteristics of the intestine that match the characteristics and function of the constituent tissue.

Figure. 1. The response of students' thinking skills on the aspect of connecting the attachment between one data and another data that obtained a score of 4.

R1 Responden 18 (18)   2 / 4 poin

Respons

Karakter usus Otot polos : bentuk oval, inti sel ditengah, benuk sel gelendong, panjang 30-200 Nm Jaringan epitel silindris selapis : terdapat sel goblet, satu lapis sel berbentuk silindris Nodus limpa : cairan yang dikumpulkan dari jaringan - jaringan , limfosit ditambah saat melewati pembekuan darah Jaringan ikat : tersusun dari se fibroblas , bersifat fleksibel, tersusun dari serat kolagen yanh berhimpitan Karakter usus dengan jaringan penysunnya sangat berhubungan untuk akan membentuk sebuah jaringan yang satu sama lain memiliki fungsi berbeda tetapi berkesinambungan yang akan membuat pertumbuhan baik.

Figure 2. The Response of students' thinking skill on the aspect of connecting the relationship between one data and another with a score of 2.

Students' critical thinking skills in the aspect of compiling questions (Focus) with an average score of 2.1, with the basic level criteria of 51.84%. Students' critical thinking skills in the aspect of compiling conclusions (Inference) with an average score of 2.0, with the basic level criteria of 50.61%. In this question, the observation data about the compounds contained in Curcuma and the ability of the compounds to kill fungi are presented as well as the results of research on the ability to inhibit fungal growth. In this problem, students are asked to formulate problem formulations and draw conclusions from the data presented. The following shows the students' responses on the aspects of compiling the questions (Focus) and drawing conclusions presented in Figure 4. Students can compose questions, but the questions are not by the aims and research data presented. The skill of concluding is not under the data presented. The average value of the students' critical thinking test was 55.4. So it can be concluded that in general, the critical thinking skills of students are at the basic level.

R2 Responden 21 (21)   4 / 8 poin

Respons

A. Sebutkan ekstrak limpang kencung B. Ekstrak limpang kencur terdiri atas (Kaempferia galanga L.) mengandung komponen zat aktif minyak atsiri, flavonoid, saponin dan methyl-p-methoxycinnamate, methyl-cinnamate, carvone, eucalyptol dan pentadecane.

Figure 3. Responses to students' critical thinking skills on the aspects of compiling questions (Focus)

Based on this condition, it is necessary to have learning that can foster critical thinking skills in the classroom. Because critical thinking skills can be trained in a guided manner (Setiawati & Corebima, 2017), and repeatedly (Changwong, Sukkamart, & Sisan, 2018). Critical thinking skills can be improved by: 1) learning content analyzes factual problems in everyday life (Snyder & Snyder, 2008), (Vong & Kaewurai, 2017), (Kusuma, Gunarhadi, & Riyadi, 2018); 2) applying contextual learning, students actively carry out investigations, solve problems, and learn from various sources (Amin, Corebima, Zubaidah, & Mahanal, 2017), 3) apply project-based, inquiry-based, case-based, or problem-based and collaboration learning (Vong & Kaewurai, 2017). The results of this analysis represent problems found in biology learning and can be used as information for biology teachers, especially to improve the quality of the learning process.

CONCLUSION

Based on the results of the research above, it can be concluded that the profile of critical thinking skills of high school students in Surakarta at the basic level category, namely the average value of 55.4. Aspects of students' critical thinking skills are observed in the aspects of preparing questions (*Focus*), conveying reasons (*Reason*), connecting the bonds between one data and another (*Situation*), compiling conclusions (*Inference*), and evaluation

(*overview*). Students' formulating questions on basic level criteria, with an average score of 2.1. Students' reasoning skills at basic level criteria, with an average score of 2.4. Skills to conclude, students on basic level criteria, with an average score of 2.0. The skill of arranging a relationship between one data and another of students is at the advanced level criteria, with an average score of 2.6. Evaluation skills of students on basic level criteria, with an average score of 2.5.

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REFERENCES

1. Amin, A. M., Corebima, A. D., Zubaidah, S., & Mahanal, S. (2017). The Critical Thinking Skills Profile of Preservice Biology Teachers in Animal. *3rd International Conference on Education and Training (ICET 2017)* (pp. 179-183). Atlantis Press.
2. Budiharjo, Kartowigaran, B., & Mahmudi, A. (2019). Development of Critical Thinking Skills Instruments on Mathematical Learning High School. *International Journal of Instruction, XII*(4), 149-166.
3.
4. Carter, A. G., Creedy, D. K., & Sidebotham, M. (2017). Critical thinking evaluation in reflective writing: Development and testing of Carter Assessment of Critical Thinking in Midwifery (Reflection). *Midwifery, 54*, 73–80.
5. Changwong, K., Sukkamart, A., & Sisan, B. (2018). Critical thinking skill development: Analysis of a new learning management model for Thai high schools. *Journal of International Studies, XI*(2), 37-48.
6. Ennis, R. H. (1985). A Logical Basis For Measuring Critical Thinking Skills. *Educational Leadership*, 44-48.
7. Fisher, A. (2009). *Berpikir Kritis Sebuah Pengantar.* Jakarta: Penerbit Erlangga.
8. Fong, C. J., Kim, Y., Davis, C. W., Hoang, T., & Kim, Y. W. (2017). A meta-analysis on critical thinking and community college student achievement. *Thinking Skills and Creativity 26, 26*, 71–83.
9. Kusuma, E. D., Gunarhadi , G., & Riyadi, R. (2018). The Strategies to Improve Critical Thinking Skills Through Problem-Based Quantum Learning Model at Primary School. *International Journal of Multicultural and Multireligious Understanding (IJMMU)*, 123-127.
10. Snyder, L. G., & Snyder, M. J. (2008). Teaching Critical Thinking and Problem Solving Skills. *The Delta Pi Epsilon Journal, L*(2), 90-100.
11. Stupple, E. J., Maratos, F. A., Elander, J., Hunt, T. E., Cheung, K. Y., & Aubeeluck, A. V. (2017). Development of the Critical Thinking Toolkit (CriTT): A measure of student attitudes and beliefs about critical thinking. *Thinking Skills and Creativity, XXIII*, 91-100.
12. Vong, S. A., & Kaewurai, W. (2017). Instructional model development to enhance critical thinking and critical thinking teaching ability of trainee students at the regional teaching training center in Takeo province, Cambodia. *Kasetsart Journal of Social Sciences, XXXVIII*, 88-95.
13. Indonesia, K. P. (2016). *Peraturan Menteri Pendidikan dan Kebudyaan No. 22 tentang Standar Proses Pendidikan.* Jakarta.
14. Pieterse, T., Lawrence, H., & Friedrich-Nel, H. (2016). Critical thinking ability of 3rd-year radiography. *Health SA Gesondheid*, 381 - 390.
15. Prihatin, Prayitno, B. A., & Rinanto, Y. (2017). Pengembangan Modul Berbasis Inkuiri Terbimbing Pada Materi Jamur Untuk Meningkatkan kemampuan Berpikir Kritis Siswa Kela X SMA Naegeri 1 Cepogo Boyolali. *Jurnal Inkuiri, VI*(1), 75-90.
16. Ronnis, D. (2011). *Asesmen Sesuai Kerja Otak Ed. kedua.* Jakarta: PT Indeks.
17. Setiawati, H., & Corebima, A. D. (2017). Empowering Critical Thinking Skills Of The Students Having Different Academic Ability in Biology Learning of Senior High School through PQ4R - TPS Strategy. *The International Journal of Social Sciences and Humanities Invention (THEIJSSHI), IV*(5), 3521-3526.
18. Sugiyono. (2017). *Metode Penelitian Pendidikan Pendekatan Kuantitatif, Kualitatif dan R&D.* Bandung: CV. Alfabeta.

19. Zubaidah, S. (2017). Berpikir Kritis: Kemampuan Berpikir Tingkat Tinggi yang Dapat Dikembangkan melalui Pembelajaran Sains. *https://www.researchgate.net/publication/318040409*, 14.
20. Zubaidah, S., Corebima, A. D., & Mistianah. (2018, Januari 08). Asesmen Berpikir Kritis Terintegrasi Tes Essay. *Symbion*, 200-213.