



Improving the Ability of Formulating High-Level Questions Through the Discussion-Comparison Method with Critical Analysis

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ABSTRACT

Background: Prospective teachers are less able to formulate high-level questions, so teachers' skills to formulate high-level questions are still lacking, even though it really determines students' critical thinking abilities. This study aims to determine whether there is an increase in students' ability to formulate high-level questions through the discussion-comparison method 1,2 with critical analysis of articles in the Biology Education Study Program, University of Muhammadiyah Bengkulu. **Method:** This research used the Classroom Action Research (CAR) method with four cycles. **Results:** The results showed that there was an increase in the ability to formulate high-level questions of students through the discussion-comparison method 1,2 with critical analysis of articles in the Biology Education Study Program, University of Muhammadiyah Bengkulu. **Conclusion:** It is recommended for lecturers before starting learning to teach how to structure high-level questions well to their students.

Peningkatan Kemampuan Merumuskan Pertanyaan Tingkat Tinggi Melalui Metode Diskusi-Pembandingan dengan Analisis Kritis

ABSTRAK

Latar Belakang: Calon guru kurang mampu merumuskan pertanyaan tingkat tinggi, sehingga keterampilan guru merumuskan pertanyaan tingkat tinggi masih kurang, padahal sangat menentukan kemampuan berpikir kritis siswa. Penelitian ini bertujuan untuk mengetahui apakah terdapat peningkatan kemampuan merumuskan pertanyaan tingkat tinggi mahasiswa melalui metode diskusi-pembandingan 1,2 dengan analisis kritis artikel di Program Studi Pendidikan Biologi FKIP UM Bengkulu. **Metode:** Penelitian ini menggunakan metode Penelitian Tindakan Kelas (PTK) dengan empat siklus. **Hasil:** Hasil penelitian menunjukkan bahwa terdapat peningkatan kemampuan merumuskan pertanyaan tingkat tinggi mahasiswa melalui metode diskusi-pembandingan 1,2 dengan analisis kritis artikel di Program Studi Pendidikan Biologi FKIP UM Bengkulu. **Kesimpulan:** Disarankan bagi dosen sebelum memulai pembelajaran untuk mengajarkan cara menyusun pertanyaan tingkat tinggi dengan baik kepada mahasiswanya.



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Introduction

One of the important components in the learning process is the teacher's skill in asking questions, because it can increase interest, curiosity, thinking skills, and student participation in learning (Usman, 1995). According to Santos (2017), the learning process questions support students' thinking skills. While according to Alsaleh (2020) developing one of the thinking skills is the most important thing and an indicator of the quality of learning of students

who have critical thinking power. Learning with one question with more than one answer or synthesis question was the lowest of the eight countries surveyed, only 10%, while other countries above 10% and the complexity level of the question made by teachers in Indonesia, more at a low complexity level of 57%, while 40%, for a high complexity level of only 3% (Jalal, According to the Ministry of Education (2019) of 1,779 questions analyzed from 34 provinces in the 2018/2019 school year, the problem items made were mostly new at level one

(knowledge, remembering) and level two (understanding). Of the 136 Referral High Schools, only 27 schools are able to compile HOTS problems as much as 20% of their USBN problems, 84 schools compile HOTS problems below 20%, and 25 schools do not know how to structure HOTS problems.

Mitana (2018) revealed an overall average value of 86.8% of LOT questions and an average score of 13.2% of HOTS questions. Teachers' ability is very low in formulating high-level questions, inseparable from the institution that produces these teachers, namely LPTK. LPTK students as prospective teachers need to be equipped with the ability to develop questions well. Thus, LPTK graduates will be able to teach well and carry out active learning to continuously improve the quality of education in Indonesia. According to Wilson & Narasuman (2020) High-Level Thinking Skills (HOTS) among Teachers is essential to be developed in the education system to prepare students for 21st-century situations and develop students to reach their full potential. Teachers must have a broad knowledge of High-Level Thinking Skills, application, analysis and evaluation in the teaching and learning process (Nachiappan et al., 2018).

One method of learning that can develop the skills of formulating student questions is the discussion-comparison method 1.2 with critical analysis of articles. The discussion method is a way of learning by raising questions about problems that need to be solved together (Nuryani, 2005). The critical analysis component of the article consists of: 1) Book title, author, publisher, and topic 2) Author's goals 3) Concepts arising from the article, 4) Unique and interesting facts, 5) Questions arising from the article, 6) Tentative answers to questions, and 7) Self-reflection. Critical analysis activities of articles will train students to formulate questions and answers well, analyze, and synthesize that will improve critical thinking and analytical thinking (Susilo, 2014). This research was conducted to find out the ability to formulate high-level questions through the discussion-comparison method 1.2 with critical analysis of articles on the students of the Biology Education Study Program FKIP UM Bengkulu.

Method

Scope and Sample of Research

The research method used is Classroom Action Research (PTK) or Classroom Action Research (CAR). This research collaborates with other Biology Lecturers as observers. The research stage there are 4 (four) stages, namely the Planning stage (Panning) or Plan, Pelakasaan (acting, Do), Observation (observing, Do) and the stage of reflection (reflecting). The study was carried out in four cycles. Data is collected through the Critical Analysis Sheet of articles created by students, as many as four lecture topics. The course is Biological Learning Planning 3 credits.

This research was conducted in the Biology Education Study Program odd semester 2019/2020. The research population is a third semester student of the Biology Education Study Program FKIP UM Bengkulu numbered 43 people. The subject of the study was an entire population of 43 people.

Research Instruments

Research instruments in the form of essay question assignments (Table 1) in writing made by students in each lecture according to the article's topic discussed.

Table 1. Question Level Research Instruments

Indicator	Descriptor
Knowledge question	Questions that use what words, where, when, who, and mention.
Comprehension question	Questions that use words describe, describe, and compare.
Application question	Questions that use words determine, apply, adjust, calculate, and so on.
Analysis question	Questions that use words analyze, exemplify, audit, solve, diagnose, select, detail, etc.
Synthesis question	Questions that use words analyze, exemplify, audit, solve, diagnose, select, detail, etc.
Evaluation question	Questions that use the words used compare, judge, deduce and so on.

Procedure

The steps of the discussion-comparison method 1.2 with critical analysis of the article are as follows: 1) The preparatory stages, including: a. The lecturer explains the topic to be discussed. b. Lecturer explained the rules of implementation of the discussion. c. Lecturers divide discussion groups consisting of presenter groups, comparison groups 1, comparison groups 2, and participant groups (audience). d. Lecturers explain the function of each group; 2) The stage of preparing a critical analysis of the article, including: a. Lecturers provide articles related to lecture materials to be made critical analysis by students. b. Students make critical analysis of articles in their respective groups; 3) Implementation stages, including: a. The presenter group presented a critical analysis of the articles that had been created. b. The presenter group invites the comparison group 1 to respond to the critical analysis presented by the presenter group. c. Comparison group 1 responds by commenting or asking questions. d. The presenter group responded back, as well as threw it to the group of participants. e. The comparison group 1 answered the question asked earlier. f. So on for comparison group 2; 4) The conclusion stages, including: a. Lecturers and students make conclusions from discussions. b. Lecturers inform the topic of next week's lecture.

Data Collection and Data Analysis

The data collection technique in this study is documentation on the critical analysis that students make. Documentation to retrieve data on questions compiled by students. Data on students' ability to arrange high-level questions is by calculating the number of types of question levels that students arrange in each article analyzed in each learning cycle. The data is analyzed using frequency distribution, grouping the data into several cycles, then seen an increase in each cycle (4 cycles) (Emzir, 2011).

Result

The number and percentage of questions raised by students through critical analysis of articles over four cycles can be seen in Table 2 and Table 3.

Table 2. The number of questions that students organize through critical analysis of the article.

Question Aspects	Number of Questions				Σ
	I	II	III	IV	
Knowledge question	131	120	117	111	479
Comprehension question	15	15	16	16	62
Aplication question	2	3	3	3	11
Analysis question	2	6	7	12	27
Synthesis question	0	5	5	5	15
Evaluation question	0	1	2	3	6
Total	150	150	150	150	600

Table 3. Percentage of questions that arise through critical analysis of articles.

Question Aspects	Percentage of Question			
	I	II	III	IV
Knowledge question	87	80	78	74
Comprehension question	10	10	10,6	10,6
Aplication question	1,3	2,0	2	2
Analysis question	1,3	4,0	4,6	8
Synthesis question	0	3,0	3,3	3,3
Evaluation question	0	0,6	1,3	2
Total	100	100	100	100

Discussion

Based on Tables 2 and 3 above, it is seen that there is an increase in the number of questions that arise as seen from the critical analysis of articles compiled by students from cycle 1 to cycle 4.

The total number of question formulations that arise is still dominated at a low level, namely, knowledge (479 pieces), understanding (62 pieces), and applications (11

pieces), but there have also been questions at high levels, namely analysis (27 pieces), synthesis (15 pieces) and evaluation (6) questions. The question is still dominated by low-level questions, but there has also been an increase from cycle 1 to cycle 4 by 0.6%. It is also in accordance with the results of the study that the quality of students' questions is still at a low level (43.4%) and the quality of new student questions at the level of understanding (Yuliani et al, 2014; Nuraini et al, 2017). The question of high levels, the beginning of the first cycle has not yet arisen, but in the second and fourth cycles already appear, although slightly. According to Angraini and Sriyati, 2019 students' ability to formulate questions is very lacking once only 32.08%. Although there is a very small increase, it can also be interpreted that the method of discussion comparison 1 and 2 through critical analysis of the article tends to increase students' ability to formulate questions in general.

Anderson & Krathwohl (2001) (Kemendikbud, 2019) classifies the dimensions of thought processes as follows High-level thinking skills (HOTS) are the ability to create, evaluate, and analyze. Low-level skills are applicable, understanding, and remembering. Questions that arise in the discussion-comparison learning process 1.2 with critical analysis are still low-level questions, but also high-level questions have arisen. In the learning process, especially at the student level, high-level thinking skills (HOTS) should be an integral element to foster students' critical and creative thinking (Asari et al., 2019).

Based on Bloom's taxonomy level, most appear new at the level of knowledge and understanding, but have also appeared at application, analysis, synthesis, and evaluation stages. Bloom's taxonomy can not only be used with six levels of mental learning activity, but it can also be used to determine the types of questions associated with those six mental levels to think about the level of knowledge, understanding and application, which are the first three areas of the cognitive field, as the lower level, and the analysis of thought, synthesis and evaluation steps, the last three areas of the cognitive field, as a higher level. It can be said that there is an increasing tendency for students to compile high-level questions. Plecki et al. (2015) state bloom taxonomy is closely related to high-level thinking. Although teacher use of questions is largely low-level, professional development can help teachers develop skills to design and use questions that engage students in higher-level learning processes. According to Al-Husban (2020) and Tarman & Kuran (2015) Students can identify, and explore problems, but they need support to evaluate a problem and integrate solutions into existing solution knowledge. Because of these expectations, it involves elements of uncertainty and uncertainty.

The discussion-comparing method of 1.2 with critical analysis, can improve students' ability to formulate

questions well. In addition to assessing students' critical thinking skills, interpersonal skills assessment (collaborating) also covers five aspects, namely division of labor, unselfishness, how to solve problems, tolerance and motivation while intrapersonal skills (conscientious) include three aspects of working on each stage correctly, working on all stages correctly and doing it on time (Mutrofin et al., 2017; Nabella et al., 2020). This is because through critical analysis of the article, students always formulate questions after reading the article. Critical analysis of the article one of the components does formulate a critical question and answer the question. Jensen (2011) states that writing skills in making critical analyses can improve the ability to formulate high-level questions for students' critical thinking. According to Padmanabha (2018) stated critical thinking the ability to transfer learned knowledge from a particular discipline to the cognitive field. Critical thinking is associated with developing wise individual skills, such as logical reasoning and personal judgment. Masigno (2014) states that students conducting critical analysis of biological materials is a prerequisite to be able to formulate questions for self-study. Sahin & Gezer (2014) state that biological learning should be a writing activity formulating questions enriched with visuals and verbals to help qualified young people.

Students in the learning process of discussion-comparison method 1.2 can improve the ability of students to formulate questions well. The discussion method is able to improve the formulation of scientific questions in learners by issuing opinions, asking and responding to questions (Sagala, 2004). According to Taniredja et al. (2011), the discussion method can train students to formulate questions to issue their opinions or solve problems. Nurhadi (2002) in the discussion method can stimulate students to ask questions, formulate questions that make students think. Rustaman (2005) states that the discussion method is learning that raises problems in the form of questions asked during learning. Discussion methods allow building relationships with students, stimulating their critical thinking and articulating ideas clearly (Svinivki & Mckeachie, 2016). At the time of discussion, testing attitudes towards critical thinking skills is also considered in the discussion section because discussion skills have an important place in the development of critical thinking skills in discussion (Abdulgaki et al., 2018; Şeker, 2020).

At the time of discussion the students of comparison groups 1 and 2 asked questions to the presenter group, and the presenter group answered the question. The comparison group after asking the question, after being discussed with the participant group, the comparison group also answered the question asked earlier. High-level thinking, depth of knowledge, connectedness with the world outside the classroom and substantive conversations

(questions) are key (Newmann & Wehlage, 1993). From Table 5, it is seen that the questions that arise, are still dominated by low-level questions, namely level 1 and level 2, but high-level questions have arisen in cycle 2. 3 and 4. High-level questions of analysis, synthesis, and evaluation have arisen during the lecture process.

The results of reflection of Cycle I-IV, obtained the following input. The steps to improve the discussion-comparison method 1.2 are as follows. Reflection for lecturer activities, namely: 1) Lecturers must explain in advance the function of each group (Presenters, Comparison, and Participants, 2) Lecturers must understand the student questions that arise, and explain well the meaning of the question. 3) Lecturers have difficulty dividing time, because the answer to the question can widen from the context of the lecture.

Reflections for student activities, namely: 1) Students are less able to formulate questions well, maybe they have not correctly completed the material from the article, 2) Students are less able to compile high-level questions; 3) Students are not used to learning on their own, so the lecture material is only focused on one source, without looking for other references.

Conclusion

The conclusions obtained from this study are: There is an increase in the number of questions that arise both in the critical analysis of the article and at the time of the discussion processing through the discussion-comparison method 1.2 with critical analysis of the article in biology education students FKIP UM Bengkulu.

Declaration statement

The authors reported no potential conflict of interest.

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