

ANALYSIS OF BIOLOGY PROBLEMS IN GRADE X SCIENCE TEXTBOOKS BASED ON BLOOM'S TAXONOMY ON ANDERSON'S REVISION AND COMMUNICATION SKILLS

Mela Yayu Apriangi¹, Hadiansah², Epa Paujiah³

Universitas Islam Negeri Sunan Gunung Djati Bandung, Indonesia

yayuapriangimela@gmail.com

Keywords	Abstract
Analysis Questions, LOTS, HOTS	Study This analyze problem biology in class X science book based on Anderson's revised Bloom's Taxonomy and skills communication students. Challenges learning the 21st century demands development think critical and communication, but majority question in book text Still focuses on Lower Order Thinking Skills (LOTS). Research aiming evaluate conformity question with dimensions cognitive Bloom's Taxonomy and identifying support to skills communication. Research This use approach quantitative descriptive with analyze question in book text based on LOTS and Higher Order Thinking Skills (HOTS) categories, as well as supporting elements communication scientific. Research result show that 66.32% of the questions in virus chapter and 72.29% of questions in chapter diversity creature life is at in LOTS category, with domination level cognitive remembering (C1) and understanding (C2). The proportion of HOTS, such as analysis (C4) and creation (C6), very low, indicating limitations in facilitate think critical. Support to skills communication is also minimal, limited to discussion simple without strengthening presentation or debate. Study This highlight the need improvement amount question HOTS based and enrichment element communication in book text For support learning holistic. Findings This give implications important for development more teaching materials balanced and relevant with demands Independent Curriculum. Books text expected can push student For think critical, creative, and communicative, supporting scientific literacy in the era of modern learning.

Corresponding Author : Mela Yayu Apriangi

E-mail: Universitas Islam Negeri Sunan Gunung Djati Bandung



INTRODUCTION

In the era of globalization, education has become element key in determine quality source Power man a nation. Global issues regarding education highlight the need system adaptive learning to changes, including in aspects curriculum and methods evaluation. One of the the approach that gets attention wide is implementation Bloom's Taxonomy, in particular revisions made by Anderson and Krathwohl (2001). Revisions This emphasize importance achievement competence cognitive through analysis, evaluation, and creation, which are relevant with demands 21st century (Anderson & Krathwohl, 2001).

In the Indonesian context, the issue specific that often appear is How Biology textbooks, especially at the high school level, are able to reflect demands competence cognitive said. Analysis questions biology in book text often show mismatch with level expected cognitive. For example, Apriangi (2024) found that Lots question in science books for class X only focus

on the level of understanding basic, so that No push student For develop skills think critical and communication. This is show the need update in compilation questions and evaluation learning.

Urgency study This is also supported by the findings (Tony, 2021), which shows that book school electronics (BSE) high school biology often No fulfil criteria level cognitive Anderson's revised Bloom's Taxonomy. While that, Hasanah (2017) highlighted that implementation evaluation learning biology at Blitar City High School Still use approach less traditional effective in increase competence students. Both studies This underline the need more analysis deep For ensure that textbooks meet standard expected education.

Review literature show that implementation Anderson's revised Bloom's Taxonomy in textbooks have potential For increase quality learning. Juhanda, (2016) take notes that analysis question based on level cognitive help teachers understand level difficulty appropriate question with ability students. More Furthermore, Mulyasa (2021) emphasized importance implementation The 2013 curriculum demands integration between competence cognitive and skills communication. Therefore that, analysis This No only important For evaluate quality textbooks, but also for increase effectiveness learning in a way overall.

Updates offered in study This is a more approach comprehensive in analyze question biology based on Anderson's revised Bloom's Taxonomy. Nugraha & Jamilah, (2024) mention that revision This give clear guidance for educator in to design question that is not only test knowledge factual, but also ability analytical and synthetic. With Thus, research This contribute in provide a more comprehensive evaluation model relevant with need modern education.

Based on existing references, Rahmawati and Nugroho (2021) highlighted importance evaluation skills communication student through question biology based on Bloom's revised taxonomy . This is relevant with findings Sapitri, Kurniati, and Yuliawati (2022), who showed that that quality biology final exam questions often not reflect need student For think critical. Sari and Ulfa (2022) also noted that Lots high school biology textbook failed measure skills think critical student in a way adequate.

Under development evaluation education, Sudjana (2019) and Purwanto (2020) emphasize importance principles and techniques development - oriented evaluation competence students. Analysis This become base in compile instrument evaluation that is not only measure results learning, but also supports a more comprehensive learning process. holistic . Ulfa and Sari (2022) showed that analysis textbooks that focus on scientific literacy can help increase quality learning biology at high school level.

Overall analysis This aiming For give a comprehensive overview about quality biology textbook class X. With use Anderson's revised Bloom's Taxonomy as framework work, research This expected can give solution on existing problems and support development education more biology good in the future.

RESEARCH METHODS

This study uses a quantitative approach with a descriptive method, which aims to describe a phenomenon or situation systematically, factually, and accurately. In this study, the researcher analyzed LOTS (Lower Order Thinking Skills) and Higher Order Thinking Skills (HOTS) questions in grade X science books on Biology material based on Bloom's revised Bloom Taxonomy in categories C1 to C6, and analyzed the distribution of communication skills development in manuscripts contained in grade X science books. This analysis was carried out using the Bloom Taxonomy framework, where each question and manuscript in the book was analyzed to identify and describe the form of LOTS and HOTS questions, and to determine the development of students' communication skills objectively and systematically.

Thus, this study provides a clear and detailed picture of the form and cognitive level of LOTS and HOTS questions in textbooks, as well as how far is the book This support development ability communication students (Adilah Sabir, 2021).

Time and Place of Research, namely in the even semester at SMA N 1 Taraju in the 2023/2024 academic year, residents used all biology questions and texts in the grade X science book which were the objects of analysis to see the distribution of questions and scripts in the LOTS and HOTS categories and Communication Skills and The object of research is the distribution of questions and scripts in the LOTS and HOTS categories and Communication Skills.

Then the selected sample was one science book for grade X from the most commonly used publisher in SMA Negeri 1 Taraju, Tasikamalaya Regency entitled "The World of Natural Sciences" written by Dra. Maryati, M.Pd, Dr. Endang Susilowati, S.Si., M.Si, and Arinto Nugroho, S.Si. and in this book is also in accordance with the Merdeka Curriculum. Sample selection was carried out by purposive sampling, with the criteria of books that are widely used and recognized by the Ministry of Education, Culture, Research and Technology. And using Bloom's Taxonomy revised by Anderson and Krathwohl classifies cognitive processes into six levels: remembering, understanding, applying, analyzing, evaluating, and creating. This revision adds dimensions of knowledge, namely: factual, conceptual, procedural, and metacognitive (Anderson & Krathwol, 2001). Meanwhile, supporting data includes manuscripts or texts in books related to communication skills. In addition, the results of the analysis of the distribution of questions and manuscripts, for evaluate fulfillment criteria Bloom's Taxonomy and support skills communication .

RESULTS AND DISCUSSION

From the results of the research on the two materials, there are diagrams including:

1. Presentation of Analysis Results of Questions on the Chapter on Viruses and Their Role at the Cognitive Level

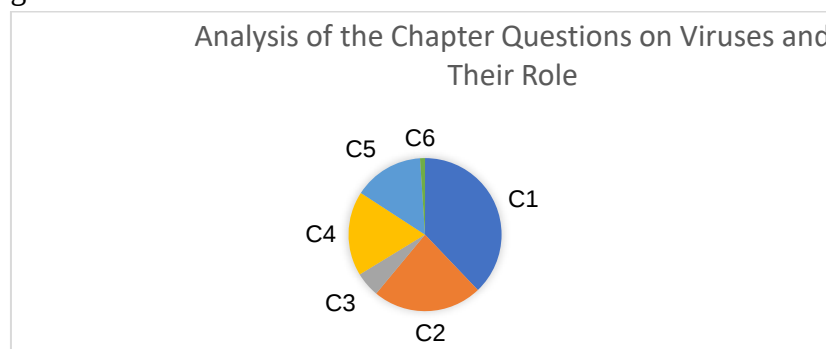


Figure 1. Presentation of Results of Analysis of Questions on the Chapter on Viruses and Their Role at the Cognitive Level

Analysis results show that majority question in chapter This is at the LOTS level, with domination level cognitive C1 (remembering) as many as 36 questions and C2 (understanding) as many as 22 questions. The proportion questions at the level cognitive C3 to C6 is very small, indicating that book text more focus on mastery information base than development skills think critical and creative. This is reflect that although material about the virus has potential For push

analysis deep, book text Not yet take advantage of it optimally for support learning HOTS-based (Sabir, 2021; Anderson, 2001).

2. Presentation of Analysis Results of Diversity Chapter Living Things with Cognitive Levels

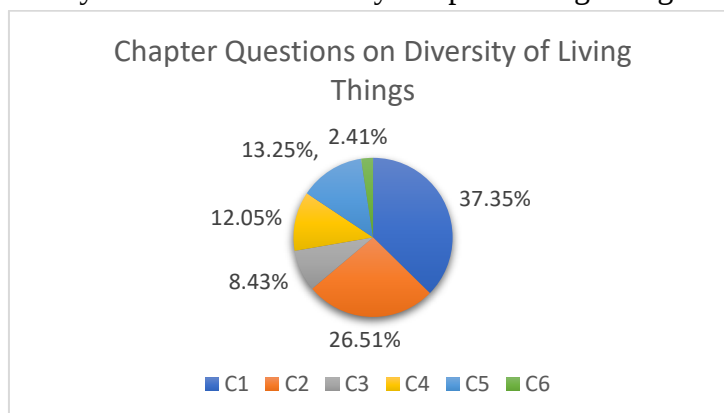


Figure 2. Presentation of the Results of the Analysis of the Chapter on the Diversity of Living Things with Cognitive Levels

In chapter diversity creature life, pattern similar seen, with 31 questions at C1 and 22 questions at C2. Questions at levels C3 to C6 are very few, with only 7 questions at C3 level. Analysis This show that chapter This Not yet push student For think critical or evaluate concepts diversity life. In fact, the concept This own potential big For associated with global issues such as conservation environment and sustainability (Zohar, 2023; Utami, 2023).

3. Presentation of Results of Analysis of HOTS and LOTS Questions in the Chapter on Viruses and Their Role

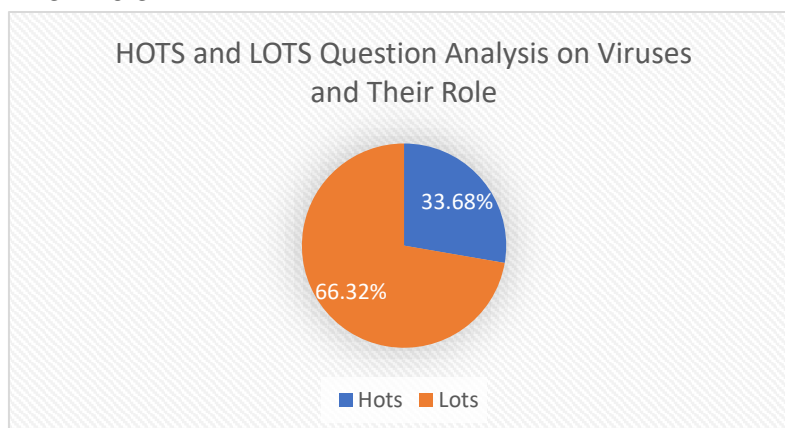


Figure 3. Presentation of the Results of the Analysis of HOTS and LOTS Questions in the Chapter on Viruses and Their Role

Analysis show that Of the total 63 questions, 66.32 % were answered in LOTS category. Most of be at the level cognitive C1 and C2. Only some small questions that support HOTS, such as analysis (C4) or evaluation (C5). This is reflect the need improvement amount prompting questions student For do evaluation critical to the impact of the virus or submit solution innovative related the role of viruses in ecosystem (Anderson, 2001; Yola, 2022).

4. Presentation of HOTS Questions Chapter Analysis Results about Diversity Living things

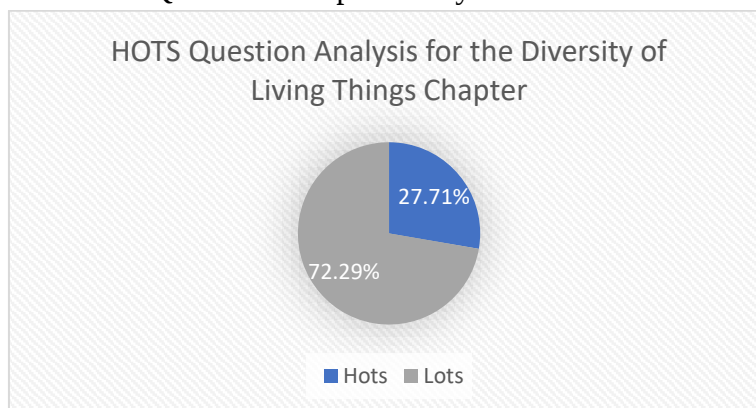


Figure 4. Presentation of the Results of the Analysis of HOTS Question Chapters on the Diversity of Living Things

Of the 60 questions analyzed, 72.29 % were in LOTS category, with domination level cognitive C1 and C2. Proportion questions at the HOTS level are very low, with only 7 questions on C3 and some small at C4 to C6. This is show that although chapter This potential big For push analysis deep, like discussion about endangered species extinct, book text Not yet give Enough support For development of students' HOTS (Setiawan, 2023).

5. Comparative Presentation of HOTS, LOTS, and Communication Skills Analysis Results

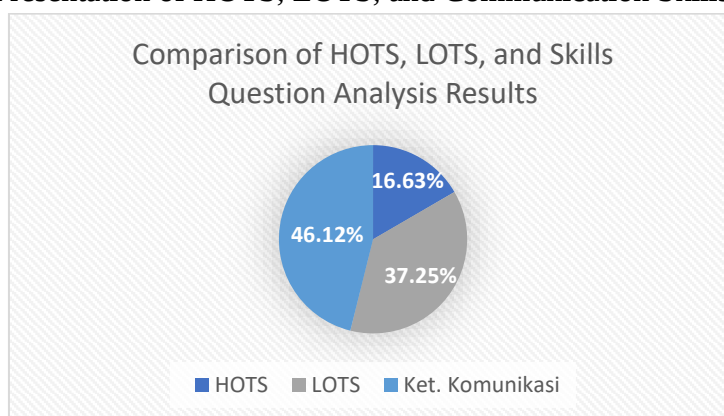


Figure 5. Comparative Presentation of HOTS, LOTS, and Communication Skills Analysis Results

These results indicate that the questions in this book are more likely to test basic skills than critical thinking and problem- solving skills. communication, which is still can improved For support development more students holistic. The comparison results show that textbooks focus more on LOTS than HOTS, with minimal contribution to communication skills. Most of the questions only involve simple discussions, without facilitating more complex scientific communication, such as presentations or debates. To support holistic learning, it is necessary to add problem-based questions that encourage analysis, evaluation, and development of creative solutions. Activities like this can improve students' communication skills and their scientific literacy (Yola, 2022; Suparman, 2023).

The analysis of the distribution of LOTS (Lower Order Thinking Skills) and HOTS (Higher Order Thinking Skills) questions in grade X Biology textbooks based on Bloom's Revised Anderson Taxonomy aims to evaluate the extent to which the textbooks support the development of students' thinking skills. LOTS covers basic skills, such as remembering, understanding, and applying (C1-C3), while HOTS involves analyzing, evaluating, and creating (C4-C6), which are important for practicing critical and creative thinking (Anderson & Krathwohl, 2001). In addition, the evaluation also considers the development of communication skills, which can be seen through discussion questions, written reports, and oral presentations (Arifin, 2023).

In biology materials such as viruses and biodiversity, there is potential to build problem-based questions that not only trigger in-depth analysis but also train students' scientific communication skills. For example, questions that ask students to analyze the impact of virus reproduction in an ecosystem or present solutions for biodiversity conservation can improve evaluative and argumentative thinking skills (Zohar, 2023; Utami, 2023). This analysis provides insight into whether this book is suitable for the needs of modern education that emphasizes learning and collaboration based on skills high (Arifin, 2023).

CONCLUSION

Analysis to book Biology class X shows that majority question in book text This Still dominated by the Lower Order Thinking Skills (LOTS) category, especially at the level cognitive C1 (remembering) and C2 (understanding) according to Anderson's revised Bloom's Taxonomy. Only part of it small questions that meet Higher Order Thinking Skills (HOTS) categories such as analysis (C4), evaluation (C5), and creation (C6). Findings This indicates that book text the Not yet fully support development skills think critical and creative students. In addition, although there is elements Supporter For skills communication, its contribution Still limited to discussion simple and yet give enough space For more activities complex like presentation or debate. This is show the need improvement in design questions and activities learning to be more capable support scientific literacy and ability think level relevant height with challenge 21st century.

REFERENCE

- Anderson, L. W., & Krathwohl, D. R. (2001). *A Taxonomy for Learning, Teaching, and Assessing: A Revision of Bloom's Taxonomy of Educational Objectives*. New York: Longman.
- Apriangi, MY (2024). *Analysis question biology in science books for class X based on Anderson's revised Bloom's taxonomy and skills Communication : Research in class X IPA SMA N 1 Taraju Tasikmalaya*.
- Arikunto, S. (2018). *Basics of Educational Evaluation*. Jakarta: Bumi Aksara.
- Asadin, TA (2021). Analysis competency test questions book school electronics (BSE) high school biology based on Bloom's taxonomy revised by Anderson. *Indonesian Journal of Biology Education*, 7(2), 215- 226. <https://repository.uinjkt.ac.id/dspace/handle/123456789/56484>
- Hasanah, U. (2017). Analysis implementation evaluation learning biology class X even semester at SMAN Kota Blitar . *Indonesian Journal of Biology Education*, 3(2), 89-98. DOI: <http://dx.doi.org/10.17977/um052v7i1p39-46>

- Juhanda, A. (2016). Analysis question level cognitive Bloom's Taxonomy Revised in Books Electronic School (BSE) Biology High School. *Journal Teaching Mathematics and Science Natural Science*, 21(1), 61-66. <https://doi.org/10.18269/jpmipa.v21i1.36258>
- Marlen T, Fida R. (2022). Analysis Biology textbooks for grade X high school used in schools For measure skills think critical students. *BioEdu : Periodic Biology Education Science*, 11(2), 123-134. DOI: <https://doi.org/10.26740/bioedu.v12n2.p414-431>
- Mulyasa, E. (2021). *Development and Implementation Curriculum 2013*. Bandung: Teenagers Rosdakarya .
- Nugraha, W. (2024). Anderson's revised Bloom's Taxonomy and its objectives education as well as its implementation in learning . *Journal of Education*, 10(1), 15-25.
- Purwanto, N. (2020). *Principles and Techniques of Evaluation Teaching* . Bandung: Teenagers Rosdakarya.
- Qomariah, L., & Setiawan, ESR (2015). Analysis Contents Book Electronic School (BSE) biology class XI semester 1 based on science literacy. *Edusains*, 7(1), 1-10. DOI: <https://doi.org/10.15408/es.v7i1.1403>
- Rahmawati, F., & Nugroho, SE (2021). Evaluation Skills Communication Student through Biology Questions Based on Revised Bloom's Taxonomy in Class X Textbooks. *Biosphere : Journal of Biology Education*, 13(1), 45-56.
- Sabir, A. (2021). Analysis of LOTS and HOTS Problems Based on Bloom's Revised Anderson Taxonomy in Biology Textbook. *Journal of Education and Learning*, 18(2), 145-156.
- Sapitri, A., Kurniati, T., & Yuliawati, A. (2022). Analysis quality Biology final exam questions for senior high school grades X and XI MIA. *Bioeduca : Journal of Biology Education*, 4(1), 45-56. DOI:10.21580/ bioeduca.v 4i1.8433
- Sari, AF, & Ulfa, SW (2022). Problems Analysis in High School Biology Textbooks Based on Cognitive Domain of Bloom Taxonomy. *Journal of Mathematics and Natural Sciences Education*, 23(3), 833- 843. DOI: <http://dx.doi.org/10.23960/jpmipa/v23i3.p833-843>
- Setiawan, A. (2023). Evaluation of the Quality of Learning Questions: A Case Study on Science Subjects in Junior High School. *Journal of Educational Research*: 6(1): 45-56.
- Sudjana, N. (2019). *Assessment of Learning Process Results Teaching* . Bandung: Teenagers Rosdakarya .
- Utami, D. &. (2023). The Effect of HOTS Questions on Critical Thinking Ability in Biology Materials. *Journal of Science Education*: 15(1): 125-134.
- Widodo, A. (2006). Revision Bloom's Taxonomy and development grain question . *Indonesian Journal of Biology Education*, 2(1), 17-25.
- Zohar, A. &. (2023). Higher-order thinking skills and low-achieving students: Are they mutually exclusive? *The Journal of the Learning Sciences*. 12(2): 145-181.