

ANALYSIS OF ELEMENTARY SCHOOL STUDENTS' CRITICAL THINKING SKILLS IN THE SUBJECTS OF NATURAL SCIENCE AND SOCIAL STUDIES

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Abstract: The ability to think critically is a skill that students need to cope with the challenges of today's world. The aim of this study is to analyze the critical thinking skills of fourth-grade students in science materials at SD Islam Ummina and SDN 1 Tunjungan for the 2022/2023 academic year. This research employs a quantitative descriptive method, with data collected by providing High Order Thinking Skills (HOTS) questions with critical thinking indicators related to science material to 52 students of grade IV SD. The results of the PAP analysis on the final test showed that 7 students (13%) had high critical thinking skills, 5 students (10%) had good critical thinking skills, 18 students (35%) had sufficient critical thinking skills, and 22 students (42%) had low critical thinking skills. Furthermore, in the distribution of student answers, the minimum score was 110 with a percentage of 21% for question number 7, which utilized type C5 questions with complex multiple-choice formats. Thus, the students' ability to solve questions at levels C4, C5, and C6 is still low. Based on these results, it can be concluded that the critical thinking skills of fourth-grade students at SD Islam Ummina and SDN 1 Tunjungan are still low.

Keywords: Critical thinking skills, HOTS questions, Science and Social Science Material.

Abstrak: Kemampuan berpikir kritis merupakan kemampuan yang dibutuhkan siswa dalam menghadapi perkembangan zaman. Tujuan penelitian untuk menganalisis kemampuan berpikir kritis pada materi IPAS siswa kelas IV SD Islam Ummina dan SDN 1 Tunjungan tahun ajaran 2022/2023. Metode penelitian ini menggunakan deskripsi kuantitatif dengan teknik pengumpulan data dengan memberikan soal HOTS dengan indikator berpikir kritis pada materi IPAS kepada 52 siswa kelas IV SD. Hasil analisis PAP pada hasil tes akhir menunjukkan sebanyak sebanyak 7 siswa (13%) memiliki kemampuan berpikir kritis tinggi, sebanyak 5 siswa (10%) memiliki kemampuan berpikir kritis baik, 18 siswa (35%) memiliki kemampuan berpikir kritis cukup, serta 22 siswa (42%) memiliki kemampuan berpikir kritis rendah. Selanjutnya pada bagian sebaran jawaban soal siswa skor minimum adalah 110 dengan presentase 21% berada di soal nomor 7, dimana soal tersebut menggunakan soal tipe C5 dengan tipe soal pilihan ganda kompleks. Dengan demikian kemampuan siswa menyelesaikan soal pada level C4, C5, dan C6 masih rendah. Berdasarkan hal tersebut dapat disimpulkan bahwa kemampuan berpikir kritis siswa kelas IV SD Islam Ummina dan SDN 1 Tunjungan masih rendah.

Kata Kunci: Kemampuan berpikir kritis, soal HOTS, materi Ilmu Pengetahuan Alam dan Sosial.

INTRODUCTION

Effective education to compete at the global level is education that not only focuses on academic abilities but also develops students' potential in other skills such as creativity, communication, collaboration, and adaptability. Fitriyani et al. (2019) emphasize that 21st-century education should prioritize the development of four key skills: communication, collaboration, critical thinking, and creativity (Saraswati & Agustika, 2020).

Menurut Wijaya et al., (2016) education should be able to produce human resources with complete competencies, known as "21st-century competencies". 21st-century competencies include creativity, critical thinking, communication, and collaboration skills, often abbreviated as the "Four Cs".

Based on the results of the Programme for International Student Assessment (PISA) survey on science literacy, Indonesia's education system still lags far behind that of other developed and developing countries. Indonesia is known for its low-quality education, as evident from the PISA survey results showing Indonesia's low rankings in reading, science, and mathematics in 2018. In the survey, Indonesia ranked 74th out of 79 countries included (Fitriyani* et al., 2021). The PISA results can be used as a benchmark to assess students' critical thinking abilities in Indonesia, as PISA questions present concrete problems that students must solve (Fauzi & Abidin, 2019).

Critical thinking is one of the essential skills in 21st-century education. It is a thinking process used to solve problems and gain deeper understanding of a topic. Through critical thinking, individuals can carefully evaluate information, make better decisions, and create more effective solutions for complex problems. Thus, critical thinking is an important skill to be developed in 21st-century education. (Soraya et al., 2019). Wahyuningtyas & Simanjuntak, (2020) state that critical thinking is a process involving problem-solving and collaboration with the goal of enhancing students' understanding and knowledge. This process involves carefully evaluating information, making better decisions, and creating more effective solutions for complex problems. In 21st-century education, the development of critical thinking skills becomes crucial to help students acquire new knowledge and face the challenges of a rapidly changing and complex world. According to Darmawati et al., (2013), critical thinking is the ability to think logically and reflectively in making decisions about what to believe or do. Karim

(2011) states that critical thinking is one of the important abilities in fostering a scientific attitude in the teaching of Natural and Social Sciences (NSS) in schools. Critical thinking skills can be enhanced through science education that focuses on systems, structures, concepts, principles, and relationships between elements.

NSS, which stands for Natural and Social Sciences, is a field of study that explores living organisms and inanimate objects in the universe, along with their interactions, as well as human life both as individuals and social beings that interact with their environment. In general, science is defined as a combination of knowledge organized logically and systematically, considering cause and effect (Kebudayaan, 2017). This field of knowledge encompasses both natural and social knowledge. (Decision of the Ministry of Education and Culture and the Ministry of Research, Technology, and Higher Education No. 8/H/KR/2022 Regarding Learning Outcomes, 2022).

As time progresses, humanity is increasingly faced with complex challenges. The challenges we face today are very different from those in the past. Therefore, the development of science and technology continues to be pursued to seek solutions to every emerging problem. In line with this, NSS education needs to be enhanced so that the younger generation can effectively face and overcome future challenges. (Yanitsky, 2017).

NSS (Natural and Social Sciences) helps to stimulate students' curiosity about the phenomena occurring around them. Through this, they can gain an understanding of how the universe interacts with human life on Earth. This understanding is crucial for identifying problems and seeking solutions to achieve sustainable development. In NSS learning, the fundamental principles of scientific methodology will be taught, thus cultivating a scientific attitude, including a high level of curiosity, critical thinking skills, analytical abilities, and the ability to draw accurate conclusions. All of these can cultivate wisdom within the students. (Sammel, 2014).

Students still have low critical thinking skills because in their learning process, they are less accustomed to problem-solving activities and tend to rely more on memorization. This approach is ineffective for developing students' critical thinking abilities. In addition to improving critical thinking skills, students also need to enhance their understanding of the concepts related to NSS subjects. (Dewi & Ibrahim, 2019).

METODE

The research method used is quantitative descriptive research. Quantitative descriptive research is a type of research that aims to describe, examine, and explain a phenomenon using numerical data without intending to test a specific hypothesis or establish relationships between variables. In other words, this research focuses on the description of an objectively observed phenomenon. (Acesta, 2020). This study focuses on a single independent variable, which is critical thinking ability. The sampling technique used in this study is saturation sampling, which involves selecting the entire population as the research subjects. Therefore, the sample size for this study consists of 24 students from class IV of SD Islam Ummina and 28 students from class IV of SDN 1 Tunjungan for the academic year 2022/2023. The total population is 52 students. Data collection from the population is conducted through the use of High Order Thinking Skills (HOTS) test questions and interviews as instruments.

The test instrument used is the High Order Thinking Skill (HOTS) test for NSS subjects, consisting of 10 complex multiple-choice and essay questions. Student answer sheets are assessed using a scoring rubric with a maximum score of 100 and a minimum score of 0. After the instrument is successfully developed, it is then validated by several expert biology lecturers and education evaluation course lecturers. The test items are distributed according to a grid that is aligned with the following critical thinking indicators.

Table 1. Test blueprint

Learning objectives flowchart	Aspects of critical thinking	Indicators of critical thinking	Question indicators	Level	Question format s.	Question numbers
Students can correctly analyze the various methods of plant propagation in their respective regional food sources	Providing a simple explanation	Identifying or formulating questions.	Given an informational text, students are able to find explicit information (who, when, where, why, how) within the text.	L2/C4	Essay	1
		Creating a summary	The text provides information, allowing	L3/C4	Essay	3

			students to infer changes in events, procedures, ideas, or concepts within the text.			
		The text gives information that enables students to understand and deduce changes that occur in events, procedures, ideas, or concepts presented in the text.	The text presents information that enables students to explain the main idea and several supporting ideas within the text	L3/C4	Complex multiple-choice questions	2
Students can accurately summarize the concept of plant reproduction.	Building basic skills.	Considering data sources	Students can access and retrieve information from a presented image	L3/C4	Essay	4 and 5
Students can analyze the history of their respective village's local cuisine effectively.	Make a conclusion	Drawing conclusions from research findings	Students can draw conclusions from the given information text regarding (who, when, where, why, how).	L3/C6	Essay	6
		Creating and determining deliberation outcomes	Students generate and determine the findings from the given information text regarding (who, when, where, why, how)	L3/C5	Complex multiple-choice questions	7
	Providing further explanation	Defining terms and considering	Students can define and consider	L3/C5	Essay	8

		definitions	information presented in a text.			
Students can accurately summarize the concept of plant reproduction	Implementing strategic steps	Deconstructing assumptions	Students can identify assumptions in a presented image	L3/C5	Essay	10
		Constructing arguments	Students can construct arguments based on the presented image	L3/C5	Essay	9

After obtaining the final score, an analysis is conducted using the RAP (Reference Point Assessment) analysis technique. RAP represents the passing standard or the threshold between pass and fail that has been set from the beginning of the assessment. This technique is used to ensure that the established reference point aligns with the pre-agreed criteria.. (Saraswati & Agustika, 2020). Therefore, based on the elementary school student assessment guidelines, the RAP score can be obtained, as shown in the following Table 2:

Table 2. RAP Score Guidelines

Score Range	Category
88-100	Excellent
74-87	Good
60-73	Fair
0-59	Poor/need guidance

Then it is converted using the following formula:

$$\text{Score} = \frac{\text{score interval}}{\text{maximum score}} \times 100$$

Thus, the reference point assessment score is obtained as shown in Table 3.

Table 3. Reference Point Assessment Score

Score Range	Category
88-100	High critical thinking skills
74-87	Good critical thinking skills
60-73	Moderate critical thinking skills
0-59	Low critical thinking skills

RESULTS AND DISCUSSION

Result

The data on critical thinking skills were obtained from the students' final scores in answering Higher Order Thinking Skills (HOTS) questions in the NSS subject. The questions consisted of 10 items with the topic of Plant Reproduction based on local

wisdom in Blora. The students' answer sheets were analyzed using an assessment rubric to obtain the final results. The students' final scores were analyzed using the previously established Reference Point Assessment (RAP). The students' final scores were also analyzed using descriptive statistics to obtain measures of central tendency represented by mean, median, mode, and measures of score dispersion represented by standard deviation. Thus, the critical thinking skills can be represented in the figure below.

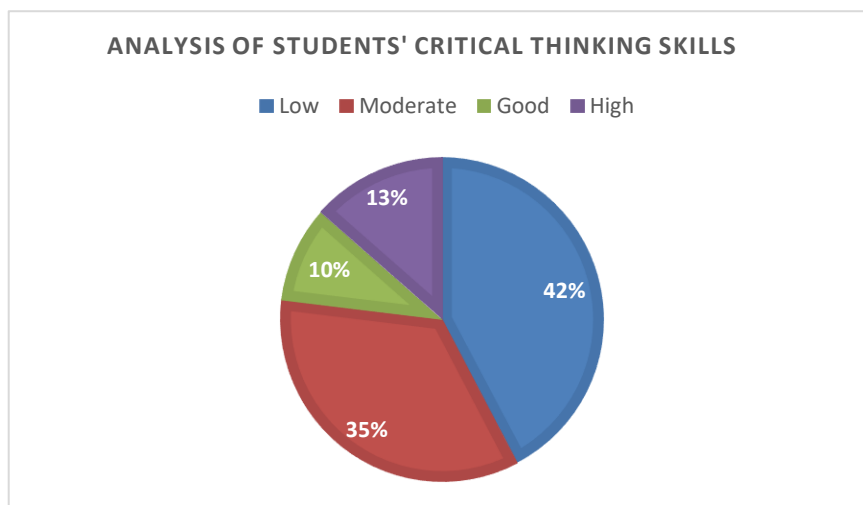


Figure 1. Analysis Of Students' Critical Thinking Skills

The results of the PAP analysis on students' critical thinking skills in the figure show that out of 52 students, 7 students (13%) have high critical thinking skills, 5 students (10%) have good critical thinking skills, 18 students (35%) have moderate critical thinking skills, and 22 students (42%) have low critical thinking skills. The measures of central tendency and score dispersion of the students' scores are described in Table 4.

Table 4. Student Score Analysis

Highest score	88
Lowest score	13
Mean	59.7
Modus	88
Median	65
Standard deviation	19,63

The table shows that the students were able to achieve the highest score of 88, while the lowest score was 13. Based on the RAP analysis, it indicates that the students in the fourth grade of elementary school tend to have low critical thinking skills. The following is the distribution of answers to the HOTS questions completed by the students.

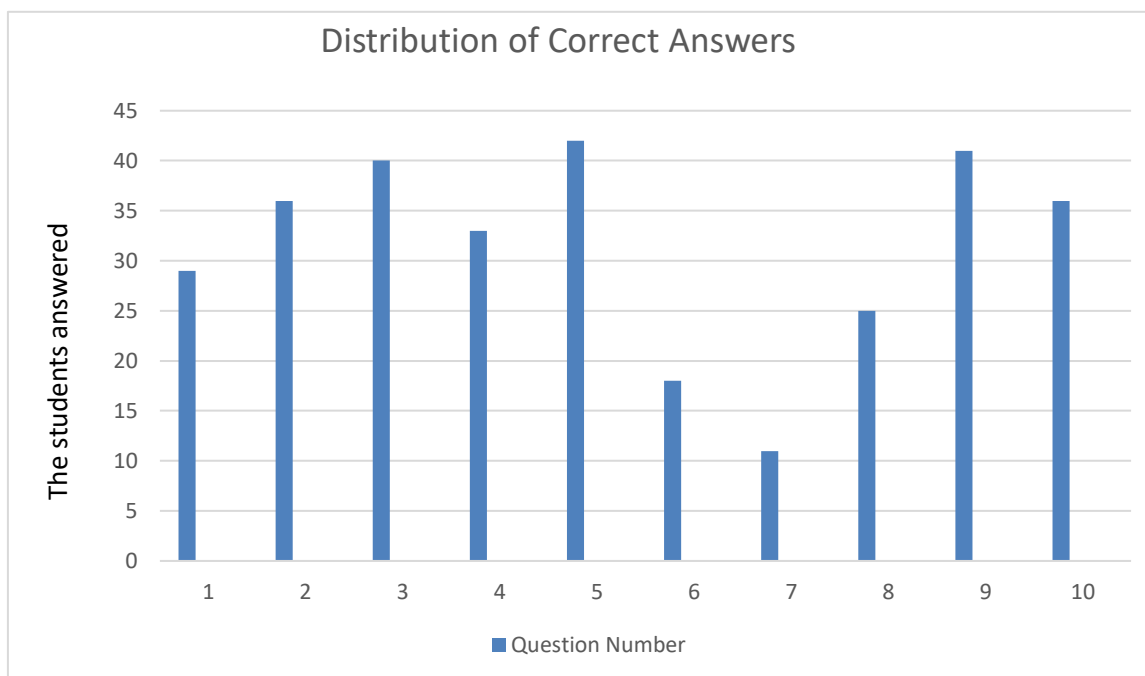


Figure 2. Distribution of Correct Answers

To assess students' achievement in the Higher Order Thinking Skills (HOTS) cognitive domain, an analysis of scores for each question was immediately conducted, as shown in Table 5.

Table 5. Score Achievement for Each Question

Question numbers	1	2	3	4	5	6	7	8	9	10
Maximum Score	10	10	10	10	10	10	10	10	10	10
Total Maximum Score	520	520	520	520	520	520	520	520	520	520
Total Score	299	363	400	335	420	183	110	250	410	362
Percentage	58%	70%	77%	64%	81%	35%	21%	48%	79%	70%
Highest Value	10	10	10	10	10	10	10	10	10	10
Lowest Value	0	0	0	0	0	0	0	0	0	0
Mean	5.75	6.98	7.69	6.44	8.07	3.51	2.11	4.80	7.88	6.96
Modus	10	8	10	10	10	0	0	0	10	10
Median	10	8	10	10	10	0	0	2.5	10	10
Standard Deviation	4.81	2.10	4.21	4.73	3.94	4.69	4.08	4.89	4.08	4.23

Table 5 shows the distribution of correct student answers for each question. The maximum score for questions 1 to 10 is 10, so if all 52 students score a perfect 10, the maximum score for those questions would be 10 multiplied by 52, which is 520. The

highest number of students who answered correctly is for question number 5, with 42 students. Therefore, the percentage of student answers for question number 5 from these results is 81%. Question number 5 is a cognitive domain C4 question type in the form of an essay. Here is the format of question number 5.

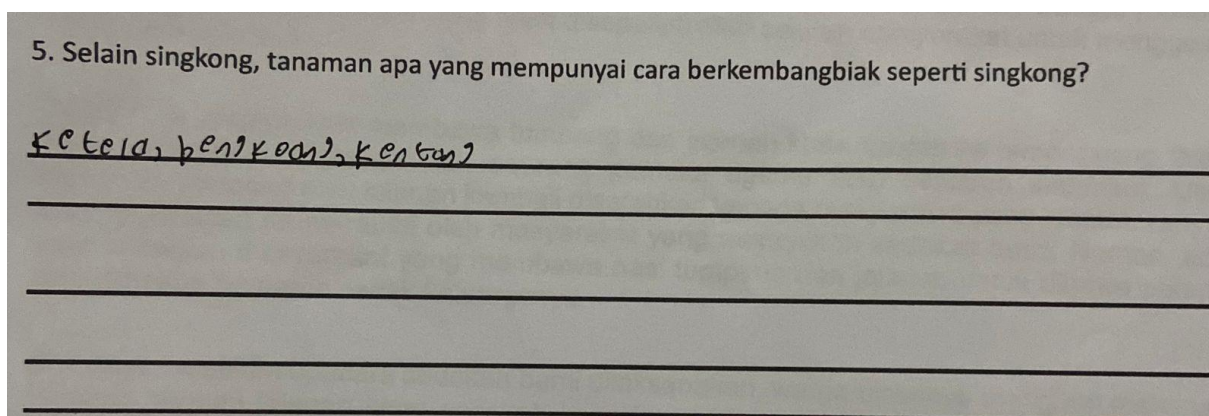


Figure 3. Answer to Question Number 5

The minimum score is 110 with a percentage of 21% for question number 7, which uses the C5 question type involving complex multiple-choice questions. Here is an example of an answer to question number 7.

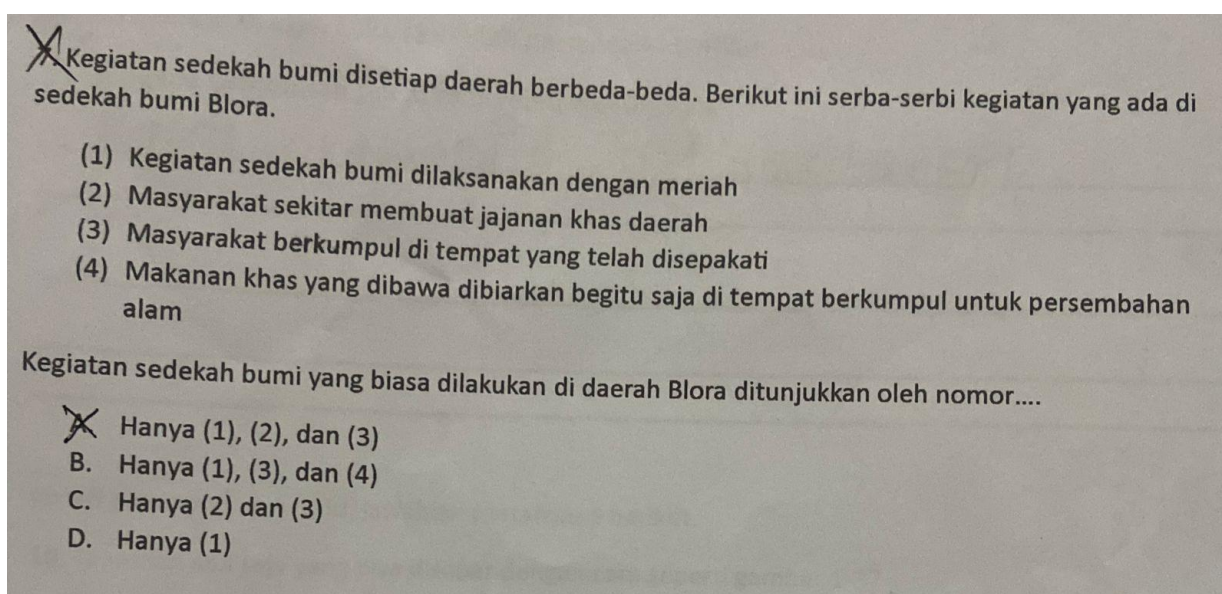


Figure 4. Answer to Question Number 7

Based on the answers to the question, it is known that the students' HOTS (Higher Order Thinking Skills) ability at the C5 cognitive level only reaches 21% with a low category. This is evidenced by the example answer to the C5 level question where students have not fully understood the passage and the question. Weaknesses in their thinking can be seen from the thinking indicators. At the first level, which is formulating

the problem, students are unable to conclude what is known and asked, thus hindering the next step of critical thinking, which is planning problem-solving strategies by finding relationships between the obtained information. It is evident that students have not been able to plan problem-solving strategies, possibly because they did not carefully review the given question.

Furthermore, it has been determined that this type of question is a complex multiple-choice question where students are required to gather information relevant to the question from the reading passage. Based on the test answers, students are not yet accustomed to answering complex multiple-choice questions by drawing conclusions from the information in the reading passage.

Discussion

The data on students' critical thinking skills in answering HOTS questions in the NSS subject in Grade IV at Ummiina Islamic School and Tunjungan Public Elementary School were obtained from a test based on three HOTS cognitive domains: analyzing, evaluating, and creating. Based on the analysis results, it was found that 42% of students tended to have low critical thinking skills and still faced difficulties in solving questions in the C4 (analyzing) and C5 (evaluating) cognitive domains. Relevant research conducted by Saraswati & Agustika, (2020) also found that the high-level thinking skills of Grade V students at Padang Sambian Public Elementary School were categorized as sufficient, with an average score of 46.859. These findings also indicate that students' skills in the C6 (creating) cognitive domain are still low. It cannot be denied that these results are influenced by students' lack of familiarity with HOTS-type questions. Students are more accustomed to learning and answering questions that require low-order thinking skills (LOTS). Considering that daily quizzes or class assessments mostly focus on the C1 to C3 domains (LOTS), there are limited questions in the C4 cognitive domain, as mentioned by the school principal during the observation activities

It is noted from the analysis of students' answers to HOTS questions that they face difficulties in solving complex multiple-choice questions. The analysis of the distribution of students' answers also mentions that students tend to struggle in constructing sentences, especially in essay questions. The essence of essay questions is designed to allow students to organize their own answers. Students have the opportunity to provide answers in different ways, while still being open to achieving the same score. Essay questions are

useful for measuring students' learning outcomes and thinking skills (Murti et al., 2018). Students are also accustomed to multiple-choice question formats, where they answer questions without the need to write down the steps or processes to obtain the answers.

Relevant research conducted by Acesta, (2020) on 23 students from grade IV of SDN Unggulan Kuningan revealed that 25% of the students were able to answer HOTS questions. According to Puspitasari et al., (2021) the ability to think critically can be assessed by analyzing several indicators of critical thinking, including analyzing, evaluating, and interpreting. The development of critical thinking skills is crucial for students as it can enhance their cognitive learning outcomes. Moreover, students will find it easier to gather information and solve problems (Ananda & Fauziah, 2022).

During the implementation of the HOTS research, students were given a set of 10 questions consisting of essay, multiple-choice, complex multiple-choice, and matching questions. Each question represented a different cognitive domain of HOTS. Questions in the cognitive domain C4 (analyzing) were related to students' ability to analyze and identify information in the question, organizing it into a structured form. For example, in essay questions, students needed to understand the issues presented in the text and then express their conclusions in their own words. Questions in the cognitive domain C5 (evaluating) focused on students' ability to make decisions or judgments about a certain approach in order to align with a target. In the cognitive domain C6 (creating), questions assessed students' ability to strategize their approach to problem-solving and generate multiple solutions. According to Yulianti & Lestari, (2018) questions in the domains of analysis, evaluation, and creation require more complex problem-solving skills as they involve critical thinking. This is in line with Suhendro et al., (2021) who state that students can explore complex, reflective, and creative experiences to achieve the goal of acquiring knowledge, including analytical, synthetic, and evaluative thinking skills.

In the previous section, it was explained that HOTS falls within the cognitive domain of Bloom's taxonomy, which was further refined by Anderson and Krathwohl into C1-remembering, C2-understanding, C3-applying, C4-analyzing, C5-evaluating, and C6-creating (Rahmi & Alberida, 2017). LOTS, as explained by Sani et al., (2020) refers to mechanical abilities that are limited to routine tasks, such as memorizing and simply repeating information that has been previously learned, without engaging in critical thinking or developing new ideas. In classroom learning, LOTS is reflected in one-way

teaching activities dominated by the teacher, providing little opportunity for students to actively think. Additionally, it is also evident in assessment activities that rely heavily on recall-based questions.

Referring to Brookhart, HOTS learning can be divided into three categories: HOTS as creative thinking, HOTS as critical thinking, and HOTS as problem-solving. When faced with a problem, individuals need to have the skills to apply their knowledge, make informed judgments, and critically evaluate by providing logical and scientific reasoning, ultimately solving the problem using pre-established strategies (Saraswati & Agustika, 2020). This study specifically focuses on the critical thinking abilities of each student. The results of this study indicate: 1) students in Grade IV of SD Islam Ummina and SDN 1 Tunjungan in the 2022/2023 academic year tend to have low critical thinking abilities and still have limited mastery of questions in the cognitive domains of C4, C5, and C6, and 2) students in Grade IV of SD Islam Ummina and SDN 1 Tunjungan tend to face difficulties when answering essay questions or struggle with constructing sentences, and they still have difficulty drawing conclusions from reading texts.

CONCLUSION

Based on the research findings and discussions, several conclusions can be drawn. Firstly, the analysis of the RAP results indicates that Grade IV students of SD Islam Ummina and SDN 1 Tunjungan tend to have low critical thinking abilities and they still face difficulties in solving questions in the cognitive domains of C4, C5, and C6. Secondly, Grade IV students of SD Islam Ummina still struggle to construct their own sentences in answering essay questions and draw conclusions from reading texts to answer complex multiple-choice questions. These conclusions are derived from the implications of improving students' thinking abilities in each level of cognitive domain through HOTS-based assessments.

Several suggestions can be given to both students and teachers. Teachers are advised to assess students' abilities in solving HOTS-type NSS questions, so they can design and implement teaching methods that enhance critical thinking abilities. It is also recommended for teachers to systematically introduce and reinforce the concepts of the subject matter, as well as the strategies for solving problems. Teachers can guide students to approach HOTS-oriented questions step by step, from understanding the question, planning the problem-solving strategy, implementing the plan, and reviewing the answer.

This way, when students encounter various types of HOTS questions, they will be able to solve them effectively and accurately. For students, it is advisable to engage in extensive reading and strive to understand the information presented in the texts. Additionally, students can practice critical thinking skills by independently practicing HOTS questions.

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