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Content analysis of the independent curriculum physics science textbook from the perspective of critical thinking aspects and HOTS

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Abstract: This study aims to reveal characteristics of critical thinking and cognitive elements in HOTS category questions from the Independent Curriculum Senior High School Physics Science Textbook in the material of Magnitudes and Measurements. This content analysis study employs the descriptive analysis method, as well as qualitative and quantitative approaches. The Science Textbook Physics independent curriculum for class X Senior High School was utilized as the study's sample. According to the findings of this study, the two text books evaluated elevate critical thinking features such as interpretation, analysis, evaluation, explanation, inference, and self-regulation, with the aspect of interpretation prevailing at 35.14% in book A and 33.35% in book B. While the findings of the HOTS category question analysis for both books revealed that both books discovered HOTS category questions with components of analyzing (C4) and evaluating (C5), no HOTS categories were discovered for the element of creating (C6). Most of the problems in the two books are still dominated by LOTS (low order thinking skill) questions, indicating that learning to think at a higher level requires more than just textbooks and direct instruction from the teacher. As a result, in order for students to think at a higher level, direct instruction from the teacher is required.

Keywords: Content Analysis; Physics Science Textbook; Independent Curriculum; Critical Thinking; High Order Thinking Skill

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Introduction

In learning, textbooks become an important supporting component to provide a reference for students and teachers in the learning process. In addition, the use of textbooks as teaching materials can support students' learning and reading processes (Novitasari et al., 2019). Textbooks are a learning resource for students in achieving competencies that must be achieved based on the curriculum that has been developed (Van den Ham & Heinze, 2018). In science, textbooks become an important tool for efficiently interpreting content, educational goals and curriculum methods (Kim et al., 2011). In order for textbooks to serve as a learning intermediary between teachers and students, it is expected that students would be able to create their own competency in accordance with the curriculum's interpretation. Textbooks serve as the foundational material for planning and organizing the study of subject material in the curriculum as well as a source of knowledge for guiding and educating students toward course goals (Ünsal & Güneş, 2003). In addition, questions in textbooks greatly influence student success (Riazi, A., & Mosalanejad, 2010). This is so that students' cognitive, affective, and

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psychomotor skills can grow to their full potential (Ulucay & Demirel, 2011). Due to Indonesia's independent curriculum, textbooks are essential to guiding students' learning in the classroom.

Projects and intracurricular learning are two activities that help Pancasila students construct their profiles so that they can concentrate on growing their character and competence while learning the independent curriculum (Rahina & Syamsi, 2023). In addition, the use of the Independent Curriculum focuses on literacy and numeracy activities, both social and essential content (Fransiska et al., 2023). A textbook is required to support an independent curriculum since the material includes literacy and numeracy learning that is driven by the issue of students' low levels of reading comprehension and numeracy in Indonesia (Aditya et al., 2022; Lemos et al., 2021). Textbooks in the independent curriculum have an important role considering that learning focuses on students (Student Centered Learning) and focuses on literacy and numeracy competencies. The independent curriculum's textbooks give students the tools they need to complete the learning stages on their own. When selecting a subject textbook, it is vital to take teachers' and students' input into consideration. Students are encouraged to be active and are expected to possess several 21st century skills, including the ability to think critically.

To assess arguments or actions done in order to address complicated problems, critical thinking is a metacognitive skill that seeks to be logical, reflective, and work-focused (Cansoy et al., 2018; C. P. Dwyer et al., 2014; Paul & Elder, 2006). Students' critical thinking skills have an important role in the learning process. Critical thinking helps students engage in purposeful reasoning, thereby enabling them to evaluate hypotheses, make decisions, and present reasonable solutions to complex problems (Haghparast et al., 2014; Hynes et al., 2011). When faced with complicated problem solving, students with critical thinking abilities quickly analyze, evaluate, and connect with the facts or arguments (Butler, 2012; Mutakinati et al., 2018) and have a more complex understanding (C. Dwyer et al., 2011). Students that possess critical thinking abilities are better equipped to comprehend the scientific method and can formulate more insightful inquiries in science class (Tsai, 2013). Critical thinking skills are necessary for daily activities and affect student success academically and professionally in the future (Khasanah et al., 2019; Quitadamo et al., 2008). Critical thinking skills are the basis of independent learning and investigation, therefore they are very important for students (Jiang & McComas, 2015). As a result, developing students' critical thinking skills becomes crucial when it comes to learning, including through the material in textbooks. Six categories—Interpretation, Analysis, Evaluation, Explanation, Inference, and Self-Regulation—can be used to categorize indicators of critical thinking abilities (Facione, 2011).

Table 1. Critical thinking skills indicators

No	Critical Thinking Components	Description
1	Interpretation	To express and understand a meaning from various experiences, events, matrices, procedures, rules, situations or data.
2	Analysis	To determine or establish inferential and actual relationships between questions, concepts, statements, forms or descriptions of representations to express opinions, information, reasons, beliefs, judgments or experiences.
3	Evaluation	To assess the truth or credibility of a statement, representation or other concept in the form of a record or description of a person's belief, situation, judgment, experience, perception, or opinion as well as to assess the logical nature of the inferential relationship of an argument.
4	Explanation	To explain and justify a process in the form of reasoning supported by data, evidence, criteria, conceptual, methodological, and contextual which serve as the basis for reference of one's results and present the results of one's reasoning in the form of credible arguments.
5	Inference	To determine, establish and secure the components needed to conclude a credible statement; to hypothesize a design; to decide what information is relevant and reduce the consequences that flow from representations, inquiries, descriptions, opinions, beliefs, concepts, data, judgments, or other principles.

No	Critical Thinking Components	Description
6	Self-Regulation	To monitor and find out a person's cognitive activities which are in the form of results learned by applying skills through analysis and assessment of inferential relationships with an orientation towards the process of correcting, validating, confirming, or questioning one's reasoning activities and achievement results.

Source: (Facione, 2011)

Critical thinking skills give students the chance to analyze knowledge logically, pertinently, and effectively, which can get them ready for independent study. Since they are able to understand objectives and points of view, evaluate specific arguments, and reach judgments using evidence-based reasoning, students' use of critical thinking can determine how successful they are in school (Amin et al., 2020; Hadisaputra et al., 2020; Kavenuke et al., 2020; Monteiro et al., 2020). However, in order to increase their capacity for critical thought, students require training and testing materials, one of which is practice questions at the HOTS (High Order Thinking Skill) level. Students must use critical thinking, creativity, and innovation to solve issues as part of the HOTS competence. In order for HOTS to function as a thinking skill, it must be supplemented with cognitive abilities in decision-making, generalizing concepts, investigating decisions, assessing decisions, and monitoring processes (Heong et al., 2012; Wang & Wang, 2014). HOTS is part of Anderson and Kratwohl's revised Bloom's taxonomy in which there are six cognitive processes ranging from low-order thinking skills (Low Order Thinking Skills) which include remembering, understanding, and applying to higher-order thinking skills (High Order Thinking Skills) which include: analyze, evaluate and create (Anderson et al., 2001; Krathwohl, 2002). High Order Thinking abilities are grouped into three categories, including (1) higher order thinking as a transfer; (2) high level thinking as critical thinking; and (3) high level thinking as problem solving (Brookhart, 2010). The dimensions of cognitive domain in the HOTS category based on the revision of Bloom's Taxonomy by Kratwohl (2002) are shown in Table 2.

Table 2. Revised Bloom's taxonomy for the high order thinking skill (HOTS) category

Type	Revised Bloom's Taxonomy	Description
C4	Analyze	Describe the parts and determine the relationships
C5	Evaluate	Make judgments based on criteria and standards
C6	Create	Assemble the elements to form a functional unit

Source: (Krathwohl, 2002)

Every reference book that students use in their coursework should contain practice questions in the HOTS category since they can aid students in developing their critical, creative, and inventive thinking abilities. Indonesia consistently scored low in the TIMSS (Trends in International Mathematics and Science Study) research from 2003 to 2015, which raises questions about how well-quality education is being supported in Indonesia. Students who have the ability to use higher-order thinking skills can solve challenges they encounter on a regular basis (Rintayati et al., 2020; Vidergor, 2018). Higher-order thinking-based learning can make it easy for students to understand the material while at the same time stimulating students to build good problem solving (Barak & Dori, 2009). Therefore, the process of critical thinking and the application of HOTS (high order thinking skill) exercises to students are important in learning at school, one of which is physics.

It is crucial to use high order thinking skills and critical thinking abilities when learning physics to solve problems from the course material. Physics is a natural science subject that examines all naturally occurring phenomena that can have their symptoms abstracted quantitatively. Basically, science teachings are vital in efforts to think critically in solving problems since they link to everyday life and go beyond simply remembering and understanding existing content (Akhsan et al., 2020; Dyrberg et al., 2017). Science learning must emphasize the approach of everyday life in order to provide direct experience to students so that they can easily understand the concept of scientific natural phenomena (Selvianiresa & Prabawanto, 2017). Therefore, critical thinking skills and high order thinking skills have

an important role in the science learning process, especially in physics, so it needs to be instilled in the content of science textbooks.

In recent years, there have been problems with the use of science textbooks in schools since they still do not provide good and adequate representation of Nature Of Science (NOS) (Li et al., 2020). In addition, several science textbooks cannot meet the requirements of scientific inquiry so that they are not optimal in developing students' inquiry and scientific reasoning skills (Li et al., 2018). Additionally, many science textbooks fail to adequately teach students how to use their critical thinking skills (Oikonomidis, 2019). Some science textbooks still contain misconceptions, the majority of which fall into the oversimplification and undergeneralization categories, making it difficult for students to develop the concept as a whole (Novitasari et al., 2019). Science textbooks continue to lack the influence of insight that might give students a sense of the environment and help them develop critical and advanced thinking. Science textbooks still lack information and resources on low-carbon topics that may inform students about the greenhouse effect (Hudha et al., 2021). Science textbooks need to include information on disaster mitigation because, in addition to environmental awareness, there aren't enough of them (Nurdiyanto et al., 2020). For students' abilities to develop in accordance with the competency goals achieved by competencies in the independent curriculum, including critical thinking skills and high order thinking skills (HOTS), it is necessary to take into account the elements contained in the book's content when choosing textbooks as a learning reference.

To make physics education in schools more relevant, efforts have been undertaken to enhance students' critical thinking and high order thinking abilities. This has been done in part because of the urgency in this independent curriculum. This effort is made through a study of content analysis in physics textbooks for the independent curriculum on critical aspects and high order thinking abilities, so that students and teachers prefer to use learning resources so that the competencies and aspects planned can be achieved in students to the greatest extent possible, especially if they want to achieve critical thinking and higher order thinking abilities. Therefore, this study aims to reveal aspects of critical thinking and cognitive elements about the HOTS category in the independent curriculum high school physics textbooks in the material of Magnitudes and Measurements.

Method

This research uses descriptive analysis with qualitative and quantitative approaches. The research subject in this study was the Science Textbook of Physics of the Independent Curriculum Class X which was used in Senior High School. The sampling technique in this content analysis research used a purposive sampling technique. The selected research samples were the Independent Curriculum Physics Science Textbook published by the Ministry of Education and Culture as book A and the Independent Curriculum Physics Book of Natural Sciences for Senior High School Class X which was published by one of the private book publishers often found in Indonesia schools as book B. Book A was chosen as a sample content analysis textbook because it is the main guideline for the independent curriculum which was issued directly from the Ministry of Education and Culture, while book B was chosen because it serves as a comparison to book A, as well as being a book that is often found in schools as a reference book Natural Science Physics book in the independent curriculum.

The data in this study were analyzed using the content analysis method by analyzing indicators of critical thinking aspects and cognitive elements in the HOTS category in both Science and Physics textbooks in terms of magnitude and measurement. This content analysis research flowchart can be shown in Figure 1.

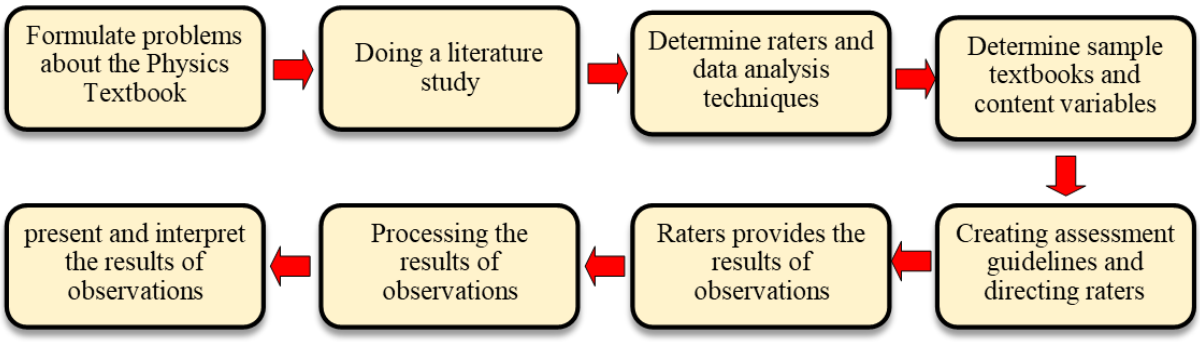

Figure 1. Content analysis research methods flowchart

Textbook analysis research can assist educational researchers and teachers in knowing the effectiveness of certain approaches with books so that they can understand teaching and curriculum development (Chang & Silalahi, 2017). Meanwhile, Krippendorff (2004) argues that content analysis is a research technique for making conclusions that are replicated from text (or other meaningful material) to the context of its use. In analyzing the data, raters examined indicators of critical thinking aspects and cognitive elements in the HOTS category in both books. The raters consisted of 1 expert physics education lecturer and 2 physics teachers. The analysis was carried out by calculating the percentage of critical thinking aspects and cognitive elements in the HOTS category that emerged from each textbook. The stages of data analysis were carried out as follows:

1. Summing up all appearances of indicators for aspects of critical thinking skills and cognitive elements in the HOTS category from each part of the book analyzed.
2. Calculating the percentage of occurrence of indicators for each part of the book analyzed. The Percentage category of each aspect (p) is calculated using the formula:

   $$p = \frac{\Sigma \text{ indicator for each category}}{\Sigma \text{ category total indicator}} \times 100\ \% \quad (1)$$

   (Bluman, 2003)
3. Determining the reliability of observations. The data was obtained in the form of a checklist from observers on the assessment sheet for aspects of science process skills. The observer gives a check mark (√) in the appropriate column. The format used is a format with "yes" and "no" categories. The data obtained is entered into the agreement contingency table format.
4. Determining the Coefficient of Agreement. After the agreement contingency table is filled, it is then entered into the formula. The numbers found as matches are the numbers in the cells that are diagonal to the number cell. Next, these numbers are entered into the Crude Index Agreement formula with the equation:

   $$KK = \frac{(P_0 + P_e)}{(1 - P_e)} \quad (2)$$

   Information:
   KK : Coefficient of agreement
   P_0 : Observation Consent
   P_e : Expectation Approval
5. Categorizing the data obtained with the agreement coefficient category or kappa interpretation in Table 3.

Table 3. Interpretation Kappa

Category	Poor	Slight	Fair	Moderate	Substantial	Almost Perfect
Kappa	0.0	0.20	0.40	0.60	0.80	1.0

Kappa	Agreement
0,81-1,00	= Almost perfect agreement
0,61-0,80	= Substantial agreement
0,41-0,60	= Moderate agreement
0,21-0,40	= Fair agreement
0,01-0,02	= Slight agreement

< 0 = Less than chance agreement
(Viera & Garrett, 2005)

Results and Discussion

Two topics are investigated in this content analysis study: the category of High Order Thinking Skills (HOTS) questions and various facets of critical thinking. The books chosen for this content analysis study were chosen using a technique called purposive sampling. The sample books chosen were the Independent Curriculum Physics Science Textbook published by the Ministry of Education and Culture as book A and the Independent Curriculum Physics Book of Natural Sciences which was published by one of the private book publishers often found in Indonesia schools as book B. The substance of Magnitude and Measurement is the subject under analysis. In order to assess the validity of the data, this research used researcher triangulation, which involves three observers.

The information gathered from the three observers in the book is studied in the form of calculation statements, questions, and checklists before being handled into an agreement contingency table. Calculations based on the rough conformity index formula produced the coefficient of agreement (KK). Researchers agreed to calculate the appropriateness index between observers in order to assess the degree of trustworthiness of research findings. The data is then transformed into frequencies and percentages and shown in tables and graphs for simple comprehension. Research findings were acquired by further analyzing the collected data using content analysis. Recapitulation of critical thinking agreement coefficients for each book is presented in Table 4 and Table 5.

Table 4. Recapitulation of KKs on critical thinking between observers 1, 2 and 3

No	Book	Observers 1 and 2		Observers 1 and 3		Observers 2 and 3	
		KK	Category	KK	Category	KK	Category
1	A	0.71	High	0.75	High	0.65	High
2	B	0.65	High	0.58	Enough	0.53	Enough

Table 5. Recapitulation of KK HOTS question categories between observers 1, 2 and 3

No	Book	Observers 1 and 2		Observers 1 and 3		Observers 2 and 3	
		KK	Category	KK	Category	KK	Category
1	A	0.91	Very High	0.95	Very High	0.86	Very High
2	B	0.93	Very High	0.95	Very High	0.92	Very High

Based on the results of calculations using the Coefficient of Agreement (KK) equation, in Table 4 it can be seen that the acquisition of the coefficient of agreement from critical thinking content shows that book A among observers achieves an overall “High” category agreement index and for book B among observers it achieves an agreement index the "High" category between observers 1 and 2, but for observers 1 and 3 & observers 2 and 3 the value of the agreement index is included in the "Enough" category. Whereas in Table 5 it can be seen that the acquisition of agreement coefficient values from the HOTS item category content in both book A and book B obtained an agreement index with the category "Very High". These categories are seen in the category of agreement coefficients according to Viera & Garrett.

The observation agreement index which has a Coefficient of Agreement (KK) value equal to 1 means that there is no difference of opinion regarding the emergence of indicators between three observers in the analysis of textbooks. The observation agreement index, which has a Coefficient of Agreement (KK) value that is not equal to 1, indicates that the three observers evaluating textbooks have different perspectives on the formation of indicators. The research findings demonstrate sufficient, high, and very high categories, therefore the data are suitable for use in research even though there are differences of opinion regarding the establishment of critical thinking and HOTS question categories.

Aspects of Critical Thinking

The percentage of emergence critical thinking aspects in book A is presented in Table 6 and the pie chart in Figure 2.

Table 6. Recapitulation of KK HOTS question categories between observers 1, 2 and 3

No.	Aspects of Critical Thinking	Emergence of Critical Thinking Aspects (%)			
		P1	P2	P3	Average
1.	Interpretation	35.92	33.33	36.17	35.14
2.	Analysis	13.59	11.11	12.77	12.49
3.	Evaluation	19.42	18.89	23.40	20.57
4.	Explanation	24.27	30.00	24.47	26.25
5.	Inference	5.83	5.56	3.19	4.86
6.	Self-regulation	0.97	1.11	0.00	0.69

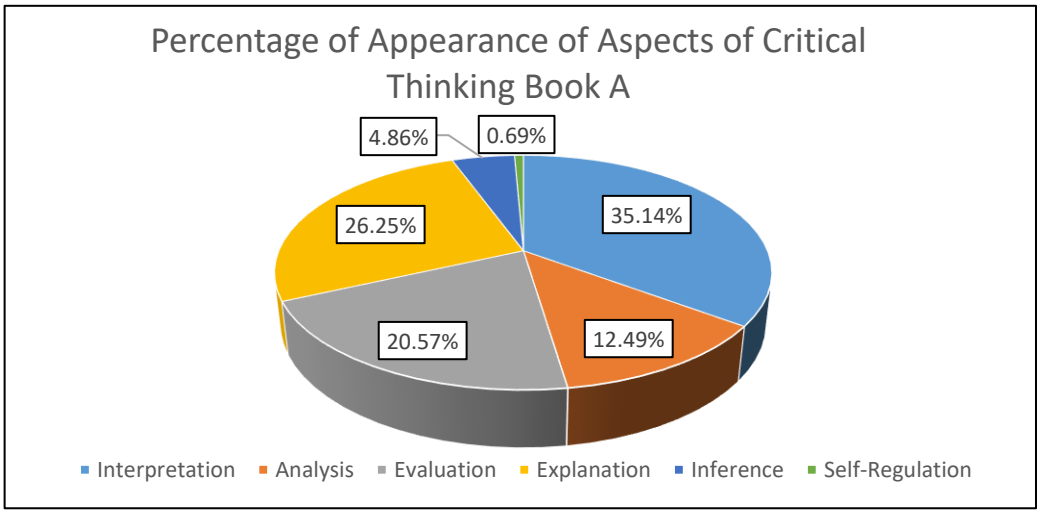

Figure 2. The percentage of critical thinking aspects in book A

The results of the analysis regarding the emergence of aspects of critical thinking in book A are generally shown in Table 6 and also presented in a pie chart in Figure 2. Based on the table it can be seen that the emergence of the "Interpretation" aspect shows the highest average occurrence of 35.14% and the most low appearance on the aspect of Self-regulation with a percentage of 0.69%. Based on Table 6, it is also shown that book A already contains all aspects of critical thinking, although with a different number of occurrences. Overall, book A under study can train students' critical thinking skills in aspects namely Interpretation, Analysis Evaluation, Explanation, Inference and Self-regulation. The aspect of critical thinking that appears the most in book A is the aspect of interpretation and the aspect that appears least often is the aspect of Self-regulation.

In book B the percentage of occurrence of critical thinking aspects in the book is presented in Table 7 and the pie chart in Figure 3.

Table 7. The percentage of appearance of critical thinking aspects in book B

No.	Aspects of Critical Thinking	Emergence of Critical Thinking Aspects (%)			
		P1	P2	P3	Average
1.	Interpretation	32.28	31.62	36.75	33.55
2.	Analysis	11.02	10.26	8.55	9.94
3.	Evaluation	22.83	27.35	23.08	24.42
4.	Explanation	21.26	21.37	17.09	19.91
5.	Inference	7.87	6.84	10.26	8.32
6.	Self-regulation	4.72	2.56	4.27	3.85

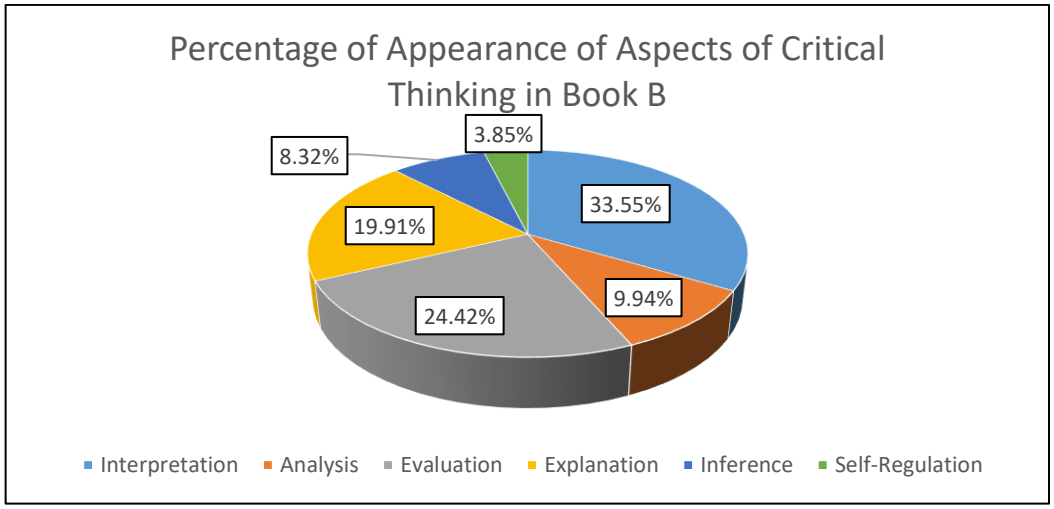

Figure 3. The percentage of critical thinking aspects in book B

Table 7 summarizes the findings of the examination of the emergence of critical thinking elements in book B, and the pie chart in Figure 3 also includes the data. Based on the table it can be seen that the emergence of the "Interpretation" aspect shows the highest average occurrence of 33.35% and the "Self-regulation" which has the lowest occurrence of 3.85%. According to the chart, it is also clear that book B already covers all critical thinking concepts, including interpretation, analysis, evaluation, justification, inference, and self-regulation, but they do so in a slightly different order. In general, studying B textbooks helps develop students' critical thinking abilities. The Interpretation aspect dominates aspects of critical thinking that arise in book B, while the Self-regulation aspect only emerges occasionally.

The findings of this study show that the Interpretation aspect dominates the development of the critical thinking component from the two books studied in book A and book B, whereas the Self-regulation aspect has a low emergence rate. This is confirmed by the findings of an interview in one of the research, which show that self-regulated based teaching materials need to be modified in order to foster inventive learning (Kusmaharti & Yustitia, 2022).

Based on Table 6 and Table 7 it can be seen that the emergence of critical thinking aspects in each book shows a different percentage. The percentage of emergence of these aspects of critical thinking when presented in the form of a bar chart is shown in Figure 4.

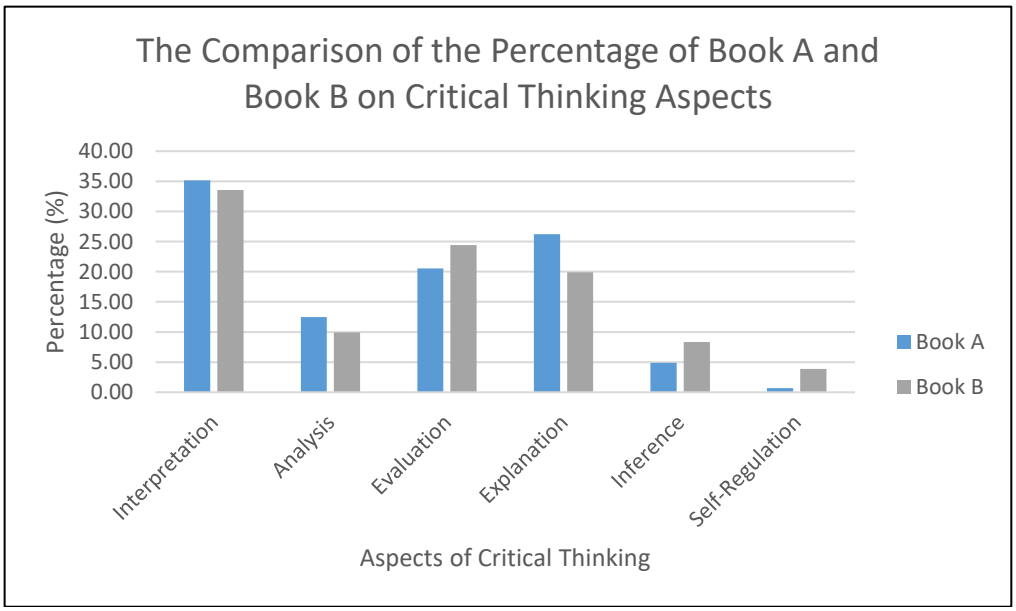

Figure 4. The comparison of the percentage of appearance of critical thinking aspects in book A and book B

According to the bar chart, the two text books analyzed, namely the Independent Curriculum Physics Science Textbook published by the Ministry of Education and Culture as book A and the Independent Curriculum Physics Book of Natural Sciences published by one of the private book publishers commonly found in Indonesian schools as book B, have reflected several aspects of critical thinking as planned in the 21st century competency (4C) and independent curricula. Through the activity of reading textbooks students can provide good feedback about understanding and provide statements from book content, thus stimulating students' critical thinking skills (Setyawan et al., 2020). In addition to being a source of knowledge for students, textbooks can also help them exercise critical thinking abilities because these two textbooks include a wide range of topics that can teach students' critical thinking. Textbooks that represent critical thinking can instruct and motivate students to develop and strengthen their critical thinking skills.

HOTS (High Order Thinking Skills) Question Type Categories

The percentage of the HOTS question type categories in book A is presented in Table 8 and the pie chart diagram in Figure 5.

Table 8. The percentage of HOTS question type categories in book A

No.	Question Type Category	Occurrence of Question Type Categories (%)				
		P1	P2	P3	Average	Total Percentage
1.	Remember (C1)	20.45	22.73	20.45	21.21	
2.	Understand (C2)	25.00	20.45	22.73	22.73	60.61
3.	Apply (C3)	15.91	13.64	20.45	16.67	
4.	Analyze (C4)	22.73	25.00	20.45	22.73	
5.	Evaluate (C5)	15.91	18.18	15.91	16.67	39.39
6.	Create (C6)	0.00	0.00	0.00	0.00	

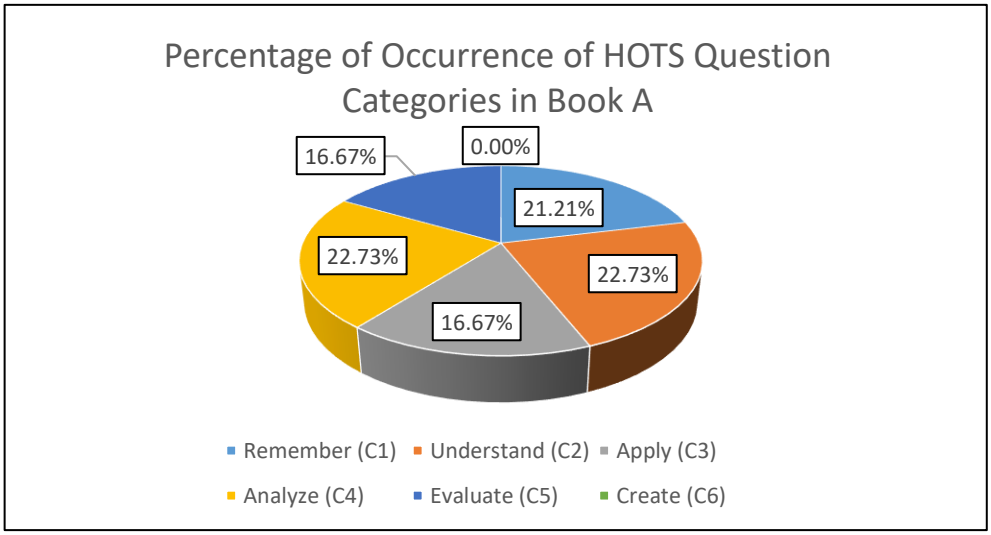

Figure 5. The percentage of HOTS question type categories in book A

The results of the analysis regarding the categories of the HOTS question types in book A are presented in Table 8 and Figure 5. Based on Table 8, it shows that in book A there are many HOTS question categories C4 (analyzing) of 22.73%, while in the HOTS question category C6 (create) does not appear in book A. Even though it has a different number of occurrences, the questions in book A are still dominated by LOTS (Low Order Thinking Skills) questions with a percentage of 60.61% while HOTS (High Order Thinking Skills) questions) has an occurrence percentage of 39.39%. So that it can be said that in book A most of the questions are in the LOTS category, and for the HOTS category they include C4 (analyzing) and C5 (evaluating). One example of several HOTS questions in book A can be shown in Figure 6 and Figure 7.

Someone purchases 5 kg of eggs for IDR 24,000.00 per kilogram. The egg was weighed on a rusty scale, as mentioned in question 2 (there is a systematic error of rusting that causes the balance to shift over its tolerance limit, which is 20 grams for a 5 kilogram scale). The buyer's loss as a result of measuring inaccuracies is...

- ☐ Rp 300
- ☐ Rp 480
- ☐ Rp 3.000
- ☐ Rp 4.800

How to work:_____

Figure 6. One of the HOTS questions in book A is in the analyzing category

You will use three distinct measurement tools to gauge the same object. Will the measurement outcomes, in your perspective, be the same or different? Explain why!

Figure 7. One of the HOTS questions in book A is in the evaluating category

The questions in Figure 6 instruct students to conduct analyses of measurements in the context of daily life so they can ascertain the outcomes of the case measurement errors. In contrast, the questions in Figure 7 encourage students to submit ratings pertaining to a measurement and to offer justifications as arguments to support the outcomes of the student evaluations.

The percentage of HOTS question type categories in book B is presented in Table 9 and the pie chart in Figure 8.

Table 9. The percentage of HOTS question type categories in book B

No.	Question Type Category	Occurrence of Question Type Categories (%)				
		P1	P2	P3	Average	Total Percentage
1.	Remember (C1)	4.84	4.03	6.45	5.11	
2.	Understand (C2)	12.10	12.90	10.48	11.83	56.99
3.	Apply (C3)	38.71	40.32	41.13	40.05	
4.	Analyze (C4)	32.26	29.84	31.45	31.18	
5.	Evaluate (C5)	12.10	12.90	10.48	11.83	43.01
6.	Create (C6)	0.00	0.00	0.00	0.00	

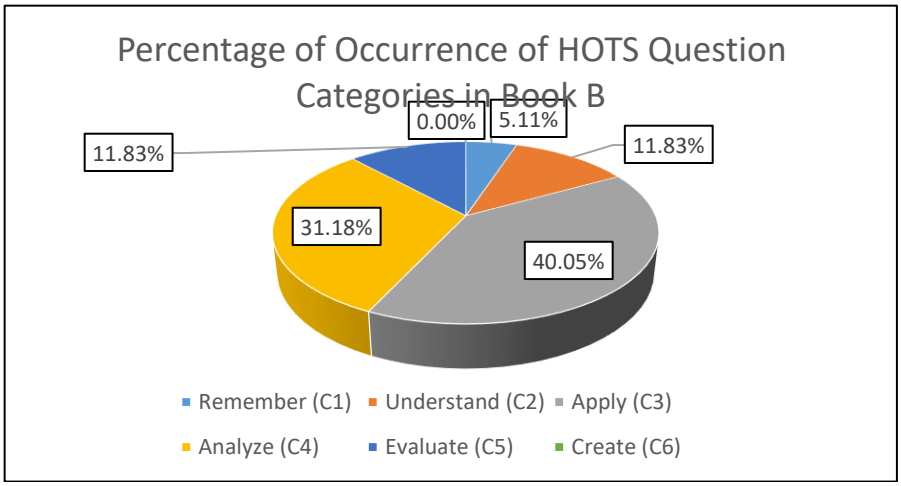

Figure 8. The percentage of HOTS question type categories in book B

The results of the analysis of the type of question categories in book B are shown in Table 9 and Figure 8. Based on Table 9, it can be seen that in book B there are many HOTS C4 (analyzing) question categories, while in HOTS C6 (creating) the question categories have not appeared in book B. The questions in book B are still dominated by the questions in the LOTS (Low Order Thinking Skills) category with an occurrence percentage of 56.99% and in the HOTS (High Order Thinking Skills) category questions the percentage is 43.01%. So it can be said that in book B most of the questions are in the LOTS category, and the HOTS questions cover categories C4 (analyzing) and C5 (evaluating). One example of HOTS questions in book B can be shown in Figure 9 and Figure 10.

On the ocean floor, volcanic eruptions result in explosions that produce air bubbles. The frequency of the air bubble oscillation is precisely proportional to $\mathrm{Y^a\lambda^b E^c}$. If E is the explosion energy, Y is the hydrostatic pressure, and λ is the wavelength, the values of a, b, and c are respectively....

A. 1, 1, 1
B. 1, 1, $\frac{1}{2}$
C. 0, 0, 0
D. 1, 3, -1
E. 1, -1, 3

Figure 9. One of HOTS questions in Book B is the analyzing category

Compare the uncertainty value of a single measurement with the uncertainty value of repeated measurements. Which do you think is more thorough? Explain your answer!

Figure 10. One of HOTS questions in Book B is the evaluating category

Figure 9 illustrates how the questions in book B's category of analyzing give a case of the phenomenon of a volcanic explosion in the sea, giving students insight while also instructing them to analyze values based on the case. Figure 10 contrasts this by illustrating how the questions in book B's evaluating category encourage students to analyze both single measurements and repeated measurements before supporting their conclusions with arguments from other students.

Table 8 and Table 9 illustrate that the percentages for the various HOTS question types vary depending on the book. When depicted as a diagram, Figure 11 shows the percentage of the HOTS question type categories.

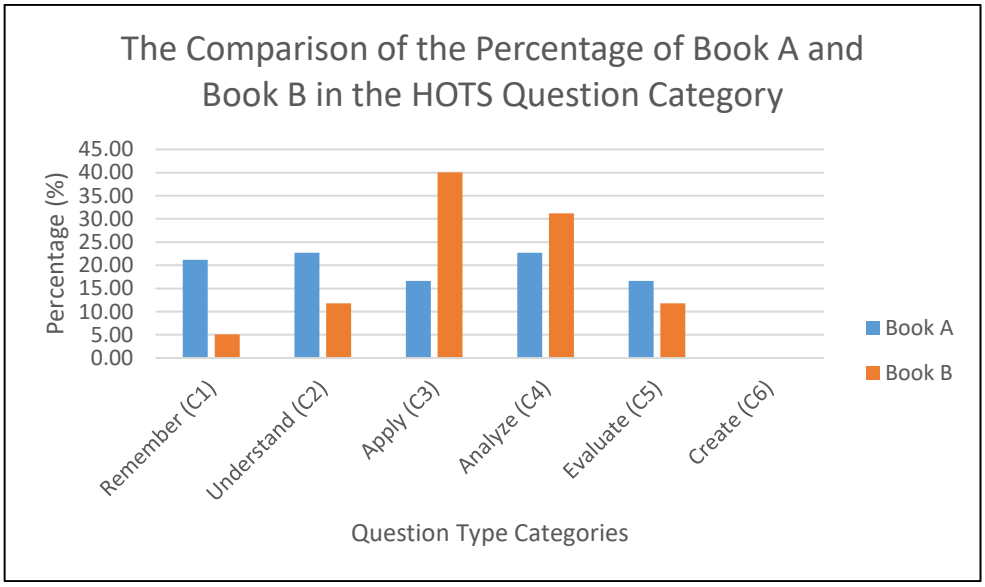

Figure 11. Comparison of the percentage of HOTS question type categories in book A and B

Conclusion

The Independent Curriculum Physics Book of Natural Sciences, published by one of the private book publishers frequently found in Indonesian schools as book B, and the Independent Curriculum Physics Science Textbook, published by the Ministry of Education and Culture as book A, both contain all aspects of critical thinking, namely interpretation, analysis, evaluation, justification, inference, and self-regulation. Two of the novels under consideration are dominated by the emergence of interpretation features, whereas book A and book B seldom ever contain self-regulation aspects.

In relation to the examination of the HOTS question categories in books A and B, the findings show that HOTS question categories C4 (analyze) and C5 (evaluate) are present in both books, however category C6 (create) is absent from both books. Category C4 (analyzing) of the HOTS is the most prevalent category in both books. Even yet, two volumes continue to be predominated by questions in the LOTS (Low Order Thinking Skills) category, necessitating instructor guidance in addition to textbook instruction for students to learn how to think critically at a higher level.

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