Analysis Of The Cognitive Level Of Competency Test Questions In Junior High School Mathematics Textbooks Based On The Revised Bloom Taxonomy

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Abstract: Cognitive ability is one of the substantial things in learning mathematics so that textbooks which act as the main source of learning should encourage the development of students' cognitive abilities and learning goals. The aim of this research is to describe the results of the cognitive level analysis of junior high school mathematics textbooks for class VII semester I based on the revised Bloom's Taxonomy and numeracy. The type of research used is descriptive research. Data was collected by recording and coding the contents of the book which focused on example questions, Let's Practice questions and Competency Test questions. The data analysis technique uses descriptive statistics. The results of the research show that there are several existing literature studies that the cognitive level analysis of competency test questions in mathematics books must be revised so that students can understand the mechanism of questions according to the reading material regarding the contents of the book. The questions contained in textbooks do not contain a good proportion between each cognitive level, and there are still few numeracy questions involving personal, social or scientific contexts.

Keywords: textbook, cognitive level, bloom's taxonomy

Abstrak: Kemampuan kognitif merupakan salah satu hal substansial dalam pembelajaran matematika sehingga buku teks yang berperan sebagai sumber belajar utama harus mendorong perkembangan kemampuan kognitif dan belajar siswa. Tujuan penelitian ini adalah untuk mendeskripsikan hasil analisis tingkat kognitif buku ajar matematika SMP kelas VII semester I berdasarkan Taksonomi dan Numerasi Bloom revisi. Jenis penelitian yang digunakan adalah penelitian deskriptif. Pengumpulan data dilakukan dengan mencatat dan memeriksa isi buku yang difokuskan pada contoh soal, soal Latihan dan soal Uji Kompetensi. Teknik analisis data menggunakan statistik deskriptif. Hasil penelitian menunjukkan bahwa dari beberapa studi literatur yang ada bahwa analisis tingkat kognitif soal uji kompetensi pada buku matematika harus direvisi agar siswa dapat memahami mekanisme soal sesuai bahan bacaan mengenai isi buku. Soal-soal yang terdapat di buku teks belum memuat proporsi yang baik antara masing-masing tingkat kognitif, dan masih sedikit soal berhitung yang melibatkan konteks pribadi, sosial, atau ilmiah.

Kata kunci: Buku Teks, Tingkat Kognitif, Taksonomi Bloom

Introdution

Mathematics is one of the compulsory subjects at all levels of education and is the basis for various other sciences as well as developing thinking patterns. According to Jamal (2018), mathematics needs to be given to all students to equip students with the ability to think logically, analytically. , systematic, critical and creative. As well as the ability to work together. One of the factors that influences this is success with the objectives of learning mathematics, namely facilities and infrastructure in the form of teaching materials or textbooks.

Textbooks are an important component in the process of teaching and learning activities and one of the important learning tools in determining the success of students' learning process. Apart from containing lesson material, the textbook used also contains questions that help educators in the process of evaluating student learning outcomes, namely that it can meet the criteria for good questions and the questions in the textbook should measure the cognitive dimensions of students. This can be done by categorizing the questions at the cognitive level of Bloom's revised taxonomy.

So far, there have been several studies related to the cognitive level of questions in students' mathematics textbooks. Susanti & Trapsilasavi (2016) conducted cognitive level research on questions in the 2013 curriculum class VII mathematics textbook published by the Ministry of Education and Culture based on Bloom's taxonomy. Apart from that, Cahyono & Adilah (2016) also conducted research on questions contained in the Class VII curriculum mathematics textbook 2013 reviewed from the cognitive domain of TIMSS. Giani & Zulkardi (2015) also analyzed the cognitive level of questions in the chapter on linear equations and inequalities with one variable and obtained the percentage of questions for each cognitive level: C1 (3.23%), C2 (30.97%), C3 (61.93%), C4(3.87%), C5(0%), C6(0%) where these results do not meet the proportion of questions that support the achievement of basic competencies.

Thus, this is a form of consideration for educators in selecting and sorting the contents of books according to students' needs so that it does not become an obstacle during the learning period. And students must also increase their understanding of learning because each level definitely has a higher level of learning so that in the future You can increase your understanding according to the learning material.

This article is useful for the benefit of students and educators in the teaching and learning process so that learning in the classroom is more effective and efficient. This has an effect on students' understanding, where students are given learning material by educators. The task of educators apart from teaching is to measure understanding of the discussion being taught so that students gain the knowledge and knowledge that educators teach at school and the importance of this article is to develop students' knowledge in material taught by educators so that it can be applied in real life.

Research conducted by Mestika Fatwa Meutia, Nurul Astuty Yensy B., and Rusdi regarding the analysis of questions in the function limits chapter in the Ministry of Education and Culture's class , C3 as much as 46%, C4 as much as 20%, C5 as much as 6%, and C6 as much as 0% (Meutia, et al., 2021). Apart from that, similar research conducted by Heri Heryanto, Agus Susanta, and Hanifah regarding the cognitive level of class VII mathematics textbook questions regarding arithmetic also showed an uneven percentage (Heryanto, et al., 2021). From the two studies mentioned previously, it was found that the distribution of cognitive levels in the textbook questions was uneven. The uneven proportion of questions is one of the weaknesses in textbooks (Giani, 2015: 3). Therefore, it is necessary to carry out a special study, especially regarding cognitive level analysis of questions used in other mathematics textbooks. This analysis will later be used as an evaluation so that the quality of the questions created can improve.

The problem in this article is what is the level of suitability of competency test questions in junior high school mathematics textbooks with the revised Bloom's taxonomy. This is related to the number of students and teachers who find it difficult to solve competency questions that are not in accordance with those in the previous discussion so this is one of the problems in this paper and whether there are changes to increase the integration of Bloom's taxonomy in the learning process. This is still a consideration for educators because it is difficult to provide questions that match the discussion in the book, so they have to create new questions or search for them from online learning media to make learning more effective and efficient.

Methodologi Research

The type of research used by researchers is descriptive research, descriptive research with a research approach, namely qualitative research, which is research that prioritizes issues of process and meaning/perception where this research is expected to be able to reveal various qualitative information with thorough and meaningful description-analysis, which also does not reject quantitative information in the form of numbers or amounts. The data collection technique used is the documentary study technique. The documents used by researchers are competency test questions in mathematics and science textbooks for junior high school equivalents for class IX in the revised 2013 curriculum published by Erlangga

The instruments used in this research were two instruments, namely a classification sheet and a validation sheet according to cognitive levels of practice questions regarding trigonometric equations based on the perceptions of observer 1, namely the researcher and observer 2, namely colleagues, using the six cognitive categories of the revised Bloom's Taxonomy. Categorizing the cognitive level of each question, the researcher used an indicator for assessing the cognitive level of the question based on Bloom's revised taxonomy.

Table 1. Table of Cognitive Level Assessment Indicators for Questions

Cognitive Categories and Processes	Definition
Recognize	1) Contains knowledge related to trigonometric equations (including coverage of the subchapters trigonometric identities and inverse trigonometric functions) 2) Contains properties or information related to trigonometric equations (including coverage of the subsections trigonometric identities and inverse trigonometric functions)
Recalling	Contains the process of remembering or presenting concepts/principles/formulas related to trigonometric equations (including coverage of the sub-chapters trigonometric identities and inverse trigonometric functions).
Interpret	1. Process or describe the information obtained/known into mathematical sentences. 2. Changing information related to trigonometric equations (including the coverage of the sub-chapters trigonometric identities and inverse trigonometric functions) into another form, such as from words to graphs or images, or vice versa, from words to numbers or vice versa, or from word to word.
Example	Give an example or make an illustration of existing information or facts related to trigonometric equations (including the scope of the subchapter
clasifacation	1. Grouping patterns or characteristics or properties of

	trigonometric equations (including coverage of the sub-chapters trigonometric identities and inverse trigonometric functions) 2. Find concepts or characteristics or patterns of trigonometric equations (including coverage of the sub-chapters trigonometric identities and inverse trigonometric functions) after understanding the information obtained
Summarizing	Interesting process of selecting or retrieving information that can represent all information from a concept regarding matters related to trigonometric equations (including the coverage of the sub-chapters trigonometric identities and inverse trigonometric functions)
Conclude	Draw a core of information from a series of examples or facts that Fitri Novianti, Hanifah, Ringki Agustinsa Cognitive Level Analysis Compare Explain contains the concept of trigonometric equations (including the coverage of the subchapters trigonometric identities and inverse trigonometric functions).

The data analysis steps carried out by researchers are as follows:
1. Categorize questions on the subject of trigonometric equations in the class XI specialization mathematics book published by Erlangga using a cognitive level classification sheet of questions based on the researcher's perception.
2. Calculate the percentage distribution of cognitive levels of the questions, using the following formula:Format tulisan yaitu

$$P_i = \frac{N_i}{N} \times 100\%$$

Note: Pi = Percentage of questions categorized based on the cognitive level of Revised Bloom's Taxonomy
Ni = number of questions per level categorized based on the cognitive level of the Revised Bloom's Taxonomy.
N = number of all questions.
3. Next, validate the cognitive level of the questions using the cognitive level suitability sheet for the questions that will be filled in by colleagues.
4. Data on the cognitive level results of the questions according to researchers and colleagues were then analyzed using statistical tests using the Spearman Rank Correlation test.

$$p = 1 - \frac{6 \sum D^2}{n(n^2 - 1)}$$

Information:
ρ = Spearman rank correlation coefficient
$\sum D\,2$ = The sum of the squares of the difference between the rank of variable X1 and the rank of variable X2
n = Large sample size The size of the correlation coefficient is interpreted based on the following criteria.

Results and Discussion

Peneltian & tahun penelitian	Judul Penelitian	Hasil Penelitian
Fitri Novianti , Hanifah, Ringki Agustinsa (2021)	ANALYSIS OF THE COGNITIVE LEVELS OF TEST IN SPECIALIZED MATHEMATICS TEXTBOOKS FOR GRADE XI PUBLISHED BY ERLANGGA	This study aims to determine the distribution of the cognitive level of competency test review in the mathematics textbook of class XI published by Erlangga on trigonometric equations

	ON TRIGONOMETRIC EQUATIONS BASED ON REVISED BLOOM'S TAXONOMY	based on Bloom's revised taxonomy. This research is motivated because the revised Bloom's taxonomy is a communicator between the learning objectives to be achieved by the teacher and the students' abilities. The type of this research is Descriptive Research with qulitaitive research approach, This research is limited to efforts to reveal a problem or situation or event as it is so that it is merely revealing facts. The subjects in this research were competency test review in the 2013 revised edition of the 2016 curriculum mathematics textbook written by Sukino, consisting of 30 multiple choice and 23 essay questions. Instruments used in this research were classification and validation sheet of cognitive levels correspondence. The method used to collect data was documentation. The data were analyzed descriptively and the validity test used Spearman Rank correlation. The results showed that the percentage of cognitive level about the competency test of trigonometric equation material ware cognitive level C1 (remembering) 0% (0 question items), C2 (understand) 0% (0 question items), C3 (apply) 67,92 % (36 question items), C4 (analyzed) 30,19% (16 Fitri Novianti, Hanifah, Ringki Agustinsa Analisis Tingkat Kognitif... Volume 4 Nomor 2, September 2021, ISSN 2599-3291 (Cetak), ISSN 2614-3933 (Online) 95 question items), C5 (evaluating) 1,89% (1 question item), and C6 (creating) 0% (0 question item).
Venny Aulia Putri, Agus Susanta, Teddy Alfra Siagian	Analisis Tingkat Kognitif Soal Uji Kompetensi Pada Buku Teks Matematika Kelas VIII SMP/MTS Semester II Terbitan Erlangga Berdasarkan Taksonomi Bloom Revisi	This study aimed to determine the distribution of the cognitive levels of competency tests in Mathematics Textbook For Grade 8th Junior High School published by Erlangga based on Taxonomy Bloom. The

			method used to collect data was documentation. The result of competency test showed that from 39 questions about circle there were the cognitive level of understanding (C2) as 4 questions (10,83%), applying (C3) as 28 questions (69,58%), analyzing (C4) as 7 questions (19,59%), and it does not found the questions cognitive level of remembering (C1), evaluating (C5), and creating (C6). Meanwhile, the Tangent of Circle topic from 29 questions there were the cognitive level of understanding (C2) as 2 questions (5%), applying (C3) as 19 questions (65,83%), analyzing (C4) as 8 questions (29,17%), and it was not found the questions cognitive level of remembering (C1), evaluating (C5), and creating (C6).
Atika Anifarka1*, Raden Rosnawati (2023)		Analisis Buku Teks Matematika SMP Berdasarkan Tingkat Kognitif pada Taksonomi Bloom Revisi dan Numerasi pada AKM	Cognitive ability is one of the substantial things in mathematics learning so that textbooks that act as the main source of learning should encourage the development of students' cognitive abilities and learning objectives. The purpose of this study is to describe the results of the cognitive level analysis of junior high school mathematics textbooks in grade VII semester I based on Bloom's Taxonomy revision and numeracy. The type of research used is descriptive research. Data is collected by recording and coding the content of the book which focuses on sample questions, Let's Practice questions and Competency Test questions. Data analysis techniques use descriptive statistics. The results showed that there are 537 question items analyzed. The question consists of 88 sample questions and 447 items of Let's Practice and Competency Test questions. The results of the analysis showed the percentage between cognitive levels, namely C1 (0%), C2 (75.2%), C3 (20.3%), C4

		(3.9%), C5 (0.2%), and C6 (0.4%). The questions contained in the textbook do not contain a good proportion between each cognitive level, and there are still few in involving numeracy questions both involving personal, social and science contexts
Giani, Zulkardi, dan Cecil Hiltrimartin (2022)	ANALYSIS THE COGNITIVE LEVEL OF QUENTIONS IN MATH TEXT BOOK GRADE VII BASED TAXONOMY BLOOM	This study aimed to describe the cognitive level of problems in mathematics textbooks of grade VII chapter system of a linear variabel equations based bloom taxonomy. This type of research is descriptive. The subjects were questions Competency Test on BSE Mathematics curriculum KTSP, which was written by Dewi Nuharini and Tri Wahyuni, which published Pusat Perbukuan Departemen Pendidikan Nasional (2012) Chapter Linear Equations and Inequality One Variable much as 155 grains. In this research will be gradually analyzed the cognitive level on such questions based on the cognitive processes used in the settlement. Cognitive level for each question are classified into six cognitive levels based indicators of cognitive based on Bloom's taxonomy revision. Results from this study is the percentage of questions for each cognitive level is: C1 (3.23%), C2 (30.97%), C3 (61.93%), C4 (3.87%), C5 (0 %), C6 (0%). These results do not meet the proportion of questions that supports achievement of basic competencies, namely 30% for C1 and C2, 40% C3 and C4, and 30% for C5 and C6.
Shafira Wardatul Aini, Muhammad Mukhlis (2022)	Analisis Taksonomi pada Soal Asesmen Kompetensi Minimum Literasi Membaca di SMK Negeri 3 Pekanbaru	The Minimum Competency Assessment (AKM) measures literacy achievement to map the quality of education in Indonesia with international standards. This AKM aims to identify student achievements when working on AKM questions in terms of the reading literacy process. The importance of AKM training is

to improve teacher skills in developing learning frameworks that lead to students' reasoning in literacy. This study aims to determine the cognitive level of reading literacy AKM at SMK Negeri 3 Pekanbaru. This research method is content analysis with a qualitative approach. The analysis uses qualitative methods to interpret the cognitive level of the items. Based on the study results, the instrument question classification I percentage was 80% for C2 (Understanding); and 20% for C4 (Analysis). The percentage of instrument II questions is 74% for C2 (Understanding), 22% for C4 (Analysis), and 3% for C6 (Create). The cognitive level dominates the lower level, namely C2 (Understanding). While cognitive levels such as C1 (Remembering), C3 (Applying), C4 (Analyzing), C5 (Creating), and C6 (Evaluating) were found to be very few and had not even appeared in the AKM Reading Literacy question at SMK Negeri 3 Pekanbaru.

Results and and Discussion

This research was taken based on literature studies from several journals related to cognitive level analysis of competency test questions in junior high school (Junior High School) mathematics textbooks based on the revised Bloom taxonomy. Research that discusses analyzing the cognitive level of competency test questions in several junior high school mathematics textbooks where there is a more prominent level of dominance of cognitive theory as stated in several references where C3 (applying), C4 (Analyzing) and C5 (Evaluating), while C1 (Remembering), C2 (Understanding) and C6 (Creating) are practically non-existent. After obtaining the statement above, the author has the opinion that how students can learn effectively and efficiently, lack of knowledge regarding remembering, understanding that the learning process has not been achieved, they have been given material that they have not mastered and what is more, it feels impossible to become teaching material.

So it is necessary to understand book writers to focus more on writing books, this has an impact on the middle school education process in the mathematics learning process, especially subjects that most of our students don't like or even hate. This is a consideration for us, especially educators, who must be good at looking at the content. books that are suitable teaching materials that are easy to understand for middle school children.

The research comparison material from several articles related to this research isResearch written by Fitri Novianti et al in 2021 where this research discusses the importance of the revised Bloom taxonomy which is a bridge between the learning

objectives that teachers want to achieve and students' abilities. Where in writing research, in writing or making subject textbooks there must be a bloom taxonomy consisting of c1 to c6 as explained above so as to simplify the teaching and research process carried out by Atika Anifarka and Raden Rosnawati in 2023 where they discuss the importance cognitive abilities in subject textbooks, especially mathematics, because textbooks play a very important role in the learning process as teaching materials for teaching students in subject learning.

Conclusioan

Cognitive ability is one of the substantial things in learning mathematics so that textbooks which act as the main source of learning should encourage the development of students' cognitive abilities and learning goals. The aim of this research is to describe the results of the cognitive level analysis of junior high school mathematics textbooks for class VII semester I based on the revised Bloom's Taxonomy and numeracy. The type of research used is descriptive research. Data was collected by recording and coding the contents of the book which focused on example questions, Let's Practice questions and Competency Test questions. The data analysis technique uses descriptive statistics. The results of the research show that there are several existing literature studies that the cognitive level analysis of competency test questions in mathematics books must be revised so that students can understand the mechanism of questions according to the reading material regarding the contents of the book. The questions contained in textbooks do not contain a good proportion between each cognitive level, and there are still few numeracy questions involving personal, social or scientific contexts

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