Analysis of Mathematics Problem Items on National Examination Elementary School 2018/2019 Based on Bloom's Taxonomy

[1]Ainun Nurjanah, [2]Ridho Alfarisi, [3]Arik Aguk Wardoyo, [4]Titik Sugiarti, [5]Sunardi

1,2,3Primary School Teacher Education Study Program, Department of Education, FKIP,
University of Jember, Jember, Indonesia
E-mail: [1]ainunnj34@gmail.com, [2]alfarisi.fkip@unej.ac.id, [3]arikaguk.fkip@unej.ac.id
4,5Mathematics Education Study Program, MIPA Education Department, FKIP
University of Jember, Jember, Indonesia
E-mail: [4]Titiksugiarti.fkip@unej.ac.id, [5]sunardi.fkip@unej.ac.id

Abstract: *Bloom's taxonomy is divided into two dimensions, namely the cognitive process dimension and the knowledge dimension which is important as a basis for evaluation. Based on this, this study aims to determine the percentage of items based on the dimensions of cognitive processes, the dimensions of knowledge, and the scope of the material. The object of research used the text of the primary school mathematics national exam questions for the 2018/2019 academic year. The method used is a qualitative descriptive method. The data collection instrument is a data recording sheet in the form of a question distribution table. Based on the data analysis, the results showed that the categories of remembering (C1) were 6 questions (17.14%), understanding (C2) was 13 questions (37.14%), and applying (C3) were 16 questions (45.71%). This shows that the text of the 2018/2019 SD mathematics exam questions still applies Lower Order Thinking Skills (LOTS). In the knowledge dimension, it is found that factual knowledge is 1 question (2.85%), conceptual knowledge is 6 questions (17.14%), and procedural knowledge is 28 questions (80%). The percentage of the scope of mathematics material is obtained that in the material of numbers as many as 13 questions (37.14%), geometry and measurement as many as 15 questions (42.85%), and data processing material as many as 7 questions (20%).*

Keywords—SD Mathematics UN 2018/2019; Bloom's taxonomy; scope of material

1. INTRODUCTION

Permendikbud Number 4 of 2018states that the government and education units need to evaluate the learning outcomes of students to improve the quality of learning outcomes and to encourage the achievement of national graduate competency standards. Permendikbud number 23 of 2016 states in 3 articles regarding the form of assessment, namely in articles 6, 7 and 8. Article 6 states that the assessment of learning outcomes by educators is carried out in the form of tests, observations, assignments, and / or other forms as needed. Article 7 states that the assessment of learning outcomes carried out by educational units is carried out in the form of school / madrasah exams. Finally, Article 8 states that the assessment carried out by the government is carried out in the form of a national exam and / or other forms as needed.

As with the forms of educational assessment above, one of the highlights in education assessment is the education assessment carried out by the government, namely the National Examination (UN). The National Examination is carried out to measure the achievement of the competence of students' graduates as a result of the learning process for certain subjects in accordance with the Graduate Competency Standards (SKL). A good test is known to have main characteristics including being trustworthy, valid or valid, objective, and practical (Basuki & Hariyanto, 2014). An important component of evaluation is the quality of the questions tested. The characteristic of a quality question is that it must be valid and reliable. Sahih means actually measuring what to measure. Said to be reliable / reliable means that each measuring instrument produces accurate and constant measurements. To obtain good quality questions, the question writer must formulate the grid first. The exam grid is a reference for developing and assembling the text for the National Standard School Examination (USBN) and National Examination (UN) questions. The grid is prepared based on the criteria for achieving the Competency Standards for Graduates (SKL), content standards, and the applicable curriculum (Permendikbud, 2018).

According to Shrock and Coscarelli (in Basuki & Hariyanto, 2014), one of the important learning theories as a basis for evaluation is Bloom's taxonomy. This learning theory concerns 3 learning domains, namely the cognitive, affective, and psychomotor domains. Bloom's Taxonomy ranks and classifies skills in thinking that describe the goals to be achieved. The thought process describes the stages of ability that students must master so that they can demonstrate the ability to process thoughts and then be able to put theory into action. This theory is very helpful in the preparation of the test questions being tested. Bloom's taxonomy is divided into two dimensions, namely the cognitive process dimension and the knowledge dimension. The cognitive process dimension is an activity carried out such as remembering (C1), understanding (C2), apply (C3), analyze (C4), assess (C5), and create (C6) to achieve goals. Second, the knowledge dimension is a type of knowledge that is learned, such as knowledge of facts, concepts, principles, procedures, and metacognitive.

The subjects tested in the National Examination are only on certain subjects. Especially at the primary education level SD / MI, the subjects tested were Indonesian, Natural Sciences, and Mathematics. Mathematics is a subject that is very influential in human life both as a science and in carrying out daily activities. The scope of material in elementary mathematics subjects includes aspects of numbers, geometry and measurement, as well as data processing.

This research is similar to the research conducted by Sari (2019) which mostly focuses on the application category (C3) and procedural knowledge. and in accordance with the research conducted by Faizah (2017) where the questions under study show more geometry and measurement material.

Based on the explanation above, the formulation of the problem studied is: What is the percentage of math questions on the 2018/2019 school year national exam based on the cognitive process dimensions of Bloom's taxonomy, the dimensions of Bloom's taxonomy knowledge, and the scope of mathematics material?

2. METHODOLOGHY

This type of research used in this research is descriptive qualitative research. This research uses documents in the form of the scope of the 2018/2019 elementary school mathematics material based on KI and KD, the grid of the primary school mathematics national exam for the 2018/2019 academic year, and the text of the primary school mathematics national exam for the 2018/2019 academic year. from the Jember Regency Education Office. The data collection instrument in this study was a data recording sheet in the form of a question distribution analysis table.

The data analysis method used in this research is descriptive qualitative data analysis method. The data obtained are in the form of numbers which represent the percentage of the narrated analysis results. The validity test was carried out on the two-dimensional Bloom's taxonomic indicator and the scope indicator for elementary mathematics material. This is done to determine the "validity" or "feasibility" of the research instrument so that it can be used after being declared "valid" or "feasible" by the validator. According to Masyhud (2016), researchers need to process the value or score obtained from the validator into a scale of 100 so that it can be confirmed with the instrument validity criteria.

The research procedure is a series of steps that are carried out in the research process sequentially and systematically to obtain the data needed in the study. The research procedure in this research is simple can be seen in Figure 1. below.
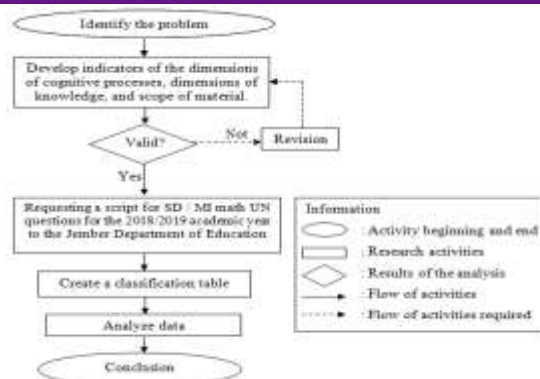

Figure 1. Chart of research procedures

3. RESULTS AND DISCUSSION

The results of the analysis of mathematics question items on the 2018/2019 academic year national elementary school exams based on the dimensions of Bloom's taxonomic cognitive process found that these questions only met three categories, namely remembering (C1), understanding (C2), and applying (C3). The results of the data analysis are presented in Table 1 below.

Table 1. Dimensions of the cognitive process of math problem items on the national primary school exams for the 2018/2019 academic year

The Cognitive Process Dimension	Question Number	Many Questions
Remember	1, 2, 3, 4, 6, 14.	6
Understand	5, 7, 8, 9, 13, 15, 20, 22, 25, 26, 27, 29, 32.	13
Apply	10, 11, 12, 16, 17, 18, 19, 21, 23, 24, 28, 30, 31, 33, 34, 35.	16
Analyze	-	-
Evaluate	-	-
Create	-	-

Based on Table 1 above, it can be seen that the most application is in the third category, namely applying (C3) with 16 questions or 45.71%. In the second category understanding (C2) as many as 13 items or 37.14% and in the remembering category (C1) as many as 6 items or 17.14%.This shows that the C1 category in the text of the national exam questions is less than C2 and C3, while the C2 category is more than C1 but less than C3. The percentage of the cognitive process dimensions can also be seen in the pie chart in Figure 1 below.
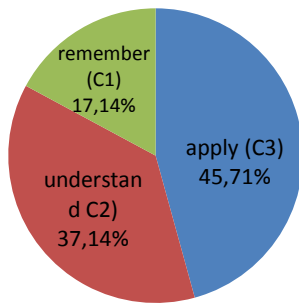
Figure 1. Percentage diagram of the cognitive process dimensions of math problem items on the primary school national exam for the 2018/2019 academic year

+   The results of the analysis of the mathematics question items on the 2018/2019 academic year national elementary school exams based on the dimensions of Bloom's taxonomic knowledge found that these questions only met three categories, namely factual knowledge, conceptual knowledge, and procedural knowledge. The application of this procedural knowledge category almost reached 100% of the existing 35 items. The results of the data analysis are presented in Table 2 below.

Table 2. Dimensions of knowledge of mathematics question items on the national primary school exams for the 2018/2019 academic year

Knowledge Dimensions	Question Number	Many Questions
Factual K.	20.	1
Conceptual K.	1, 2, 14, 15, 22, 29.	6
Procedural K.	3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 16, 17, 18, 19, 21, 23, 24, 25, 26, 27, 28, 30, 31, 32, 33, 34, 35.	28
Metacognitive K.	-	-

Based on Table 2 above, it can be seen that the most application is in the third category, namely procedural knowledge with 28 items or equal to 80%. The most questions were followed by the second category of conceptual knowledge, which was 6 items or equal to 17.14% and in the category of factual knowledge only 1 item was obtained or equal to 2.85%. This shows that the conceptual knowledge in the text of the national exam questions is less than procedural knowledge but more than factual knowledge. The percentage of this knowledge dimension can also be seen in the pie chart in Figure 2 below.
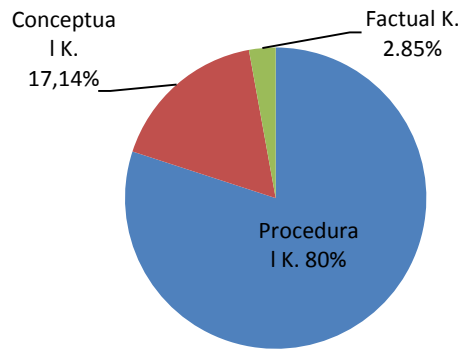

Figure 2. Percentage diagram of the dimensions of knowledge of mathematics question items on the national primary school exams for the 2018/2019 academic year

The analysis of the scope of the mathematics question items on the 2018/2019 school year primary school national exams is classified into three material scopes which are slices of the 2016 curriculum or KTSP with the 2013 curriculum. These materials are numbers, geometry and measurement, and data processing. The results of the data analysis are presented in Table 3 below.

Table 3. The scope of the mathematics question item material on the national primary school exam for the 2018/2019 academic year

Material Linkup Space	Question Number	Many Questions
Number	1, 2, 3, 4, 5, 6, 7, 8, 9, 11, 12, 31, 32.	13
Geometry and Measurement	10, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 33, 34.	15
Data processing	25, 26, 27, 28, 29, 30, 35.	7

Based on Table 3 above, it can be seen that the most material is found in geometry and measurement with as many as 15 items or equal to 42.85%. Not much different from geometry and measurement material, matterNumbers also have quite a lot of questions, namely as many as 13 items or equal to 37.14%, while 7 of the 35 items are filled with data processing material or equal to 20%. This shows that number material is less than geometry and measurement material but more than data processing material. The percentage of the scope of this material can also be seen in the pie chart in Figure 3 below.
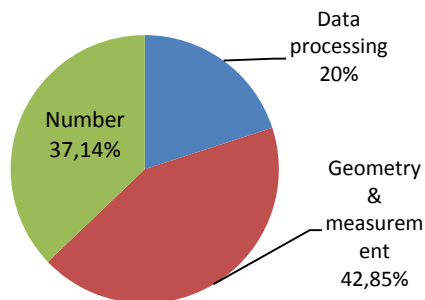
Figure 3. Percentage diagram of the scope of the mathematics question item material on the primary school national exam for the 2018/2019 academic year

The results of the analysis of the material scope which are classified into three scopes of this material have detailed data as in Table 4 below.

Table 4. Two dimensions of Bloom's taxonomy in the scope of the question material

Scope of Material			The Cognitive Process Dimension			Knowledge Dimensions		
Theory	Many questions	%	Category	Many questions	%	Category	Many questions	%
Number	13	37.14	C1	5	14.28	Factual K.	0	0
			C2	5	14.28	Conceptual K.	2	5.71
			C3	3	8.57	Procedural K.	11	31.42
Geometry and Measurement	15	42.85	C1	1	2.85	Factual K.	1	2.85
			C2	4	11.42	Conceptual K.	3	8.57
			C3	10	28.57	Procedural K.	11	31.42
Data processing	7	20	C1	0	0	Factual K.	0	0
			C2	4	11.42	Conceptual K.	1	2.85
			C3	3	8.57	Procedural K.	6	17.14

The analysis of the cognitive process dimensions of the mathematics question items on the national elementary school exam for the 2018/2019 academic year is mostly the problem of applying the third category in Bloom's taxonomy, namely applying (C3). Applying or C3 which is the third level category of cognitive processing dimensions in Bloom's taxonomy involves using procedures to solve problems or problems. Based on this, it can be said that the items still apply low-level thinking skills or *Lower Order Thinking Skills* (LOTS). Students do not get questions that are at a high level of thinking or High Order Thinking Skill (HOTS). This is similar to research conducted by Kusumaningrum (2014) and Mujib (2018) on elementary school exam questions.

Mathematical question items on the 2018/2019 school year primary school national exams emphasize procedural knowledge. Problems that emphasize procedural knowledge can also be seen from the number of questions that apply the cognitive process dimensions to apply or C3 which tend to use procedures in solving problems. This research is similar to the research conducted by Sari (2019), which mostly focuses on the application category (C3) and procedural knowledge.

The scope of the material in the 2018/2019 academic year primary school mathematics national exam questions is more about geometry and measurement. This is because geometry and measurement have more indicatorsand to shape students in elementary schools to become accustomed to developing logical, analytical, and systematic thinking powers (Farah & Budiyono, 2018). This research is in

accordance with research conducted by Faizah (2017) where the questions under study show more geometry and measurement material.

Based on the above explanation, it can be seen that Mathematics subject questions on the 2018/2019 elementary school national exams based on Bloom's taxonomy are focused on applying (C3) which means that they are still applying low-level thinking skills or *Lower Order Thinking Skills* (LOTS). The application of LOTS tends to make students answer factual questions. To achieve optimal learning outcomes, high-order thinking skills or *High Order Thinking Skill* (HOTS) should be applied to students from elementary school age so that students are accustomed to higher-order thinking to find and develop ideas they have. To support this, students also need to be given questions that apply metacognitive knowledge so that students do not only rely on certain existing procedures. In addition, the application of HOTS in elementary schools especially on exam questions is very necessary so that students at the next school level are familiar with the HOTS system because we know that the results of the 2018 Program for International Student Assessment (PISA) study in mathematics still score below the average, namely as many as 379 with an average score of the Organization for Economic Co-operation and Development (OECD) 487 (Ministry of Education and Culture, 2019).

4. CONCLUSION

Based on the results of data analysis and discussion of mathematics question items on the 2018/2019 academic

year national exam which consists of 35 questions, the following results are obtained.

1) The percentage of math questions on the 2018/2019 academic year national elementary school exams based on the dimensions of Bloom's taxonomic cognitive process obtained that categoryremember (C1) as many as 6 items (17.14%), understand (C2) as many as 13 items (37.14%), and apply (C3) as many as 16 items (45.71%).

2) The percentage of math questions on the 2018/2019 academic year national elementary school exams based on the dimensions of Bloom's taxonomic knowledge shows thatfactual knowledge is 1 item (2.85%), conceptual knowledge is 6 items (17.14%), and procedural knowledge is 28 items (80%).

3) The percentage of math questions on the 2018/2019 school year national exam based on the scope of the mathematics material shows that 13 item numbers (37.14%), 15 geometry and measurement (42.85%), and 7 data processing items (20%).

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