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Analysis Of Competency Test Problems In Class Viii Mathematics Books With Basic Competencies

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Abstract
The purpose of this study is to describe the cognitive level of the questions in the eighth grade mathematics textbook on the material of the Pythagorean theorem, circles and tangents to circles according to the revised bloom taxonomy. In this study, the research subject was a competency test item contained in the Mathematics book for SMP / Mts Class VIII Semester 2 written by M Cholik Adinawan and published by Erlangga as many as 101 questions divided into 33 questions of competency 1, competency test 2 of 39 and competency test 3 as many as 29 questions. This research was conducted by analyzing the cognitive level of the questions based on the cognitive process in solving the questions. Based on the cognitive indicators of the revised bloom taxonomy, each cognitive level of questions was classified into six cognitive levels. The result of this research is the cognitive level in each competency test. The results of each cognitive level of the material pythagorean theorem C1 3.03%, C2 6.06%, C3 60.6%, C4 24.24%, C5 6.06%, and C6 0%. The results of the cognitive process level questions on the subject circle C1 2.56%, C2 25.64%, C3 51.28%, C4 20.51%, C5 and C6 0%. And the results of the cognitive process level questions on the subject tangent to circle C2 21.42%, C3 62.06%, C4 17.24% and C1, C5 and C6 0%. These results meet the achievement criteria for Basic Competence at C3 and C4 as much as 40%, do not meet the achievement for C1 and C2 as much as 30% and C5 and C6 as much as 30%. From the above results it can be concluded that the percentage of question analysis has not fulfilled the distribution of questions that support the achievement of basic competencies.

Keywords: *Textbook analysis, cognitive level, bloom taxonomy.*

INTRODUCTION

The teacher uses learning tools such as syllabus and lesson plans in the learning process. Another tool that must be used by teachers is teaching materials. With the existence of teaching materials, learning can be carried out well. Teaching materials are used as a very important requirement in the form of subject matter. One of the teaching materials that are often used in schools is textbooks. Textbooks can be used as guidelines for the learning process in schools. Textbooks are subject books that contain material descriptions, are made based on the applicable curriculum and are arranged systematically and are selected with the aim of being a learning resource for teachers and students in the learning process carried out (Muslich, 2009). Textbooks in mathematics are very important. So, textbooks include the needs of the teacher and are used as a learning tool. Government Regulation number 13 of 2015 in article 1 paragraph 23 states that in achieving basic competencies and core competencies, textbooks are needed as the main learning source. So, to make it easier for teachers to deliver learning materials, textbooks are used as a reference.

The evaluation tool is a way to find out student learning outcomes. Cognitive, affective, and psychomotor abilities are processes of learning outcomes. These three domains must be assessed to find out how much Basic Competence has been achieved. In Permendikbud No. 24 of 2016 Basic Competence is the ability and minimum learning material that students must achieve for a subject in each education unit which refers to the Core Competencies. To assess students' cognitive abilities, teachers often use mathematics textbooks. There are several assessments in mathematics books that must be assessed for accuracy according to BSNP, one of which is a question. BSNP (2014a) states that the presentation of questions must be in accordance with the material and the level of difficulty varies so that it supports the achievement of basic competencies. In the questions in each chapter, there must be questions that measure the ability of higher order thinking skills, namely analyzing, evaluating and creating.

From the results of interviews with teachers regarding the use of mathematics textbooks, the teacher always uses the material and competency tests in mathematics textbooks for learning and knowing the achievement of students' cognitive abilities. But in junior high school mathematics textbooks it is very rare to find problems in the category of analyzing, evaluating and creating. In questions, there is often a category, just enter the formula and solve it. Previous research has stated that the weakness in today's mathematics textbooks is the low level division of questions that supports reasoning skills in solving math problems (Masduki, Subandariah, Irawan & Prihantoro 2013). The questions that are often found are those at the level of remembering, understanding and applying. This is also related to the research conducted by Giani (Giani, Zulkardi & Hiltrimartin, 2015) who got the percentage of analysis of questions at the cognitive level of 3.23% at the C1 level, 30.97% at the C2 level, 61.93%. found at levels C3, 3.87% found at levels C4, and 0% found at levels C5 and C6. In this study, there were no questions at level C5 and level C6. The distribution of questions was also not spread out or evenly distributed because it was more dominant to level C3. This shows that the textbook has weaknesses, namely it does not support students in solving problems using higher-order thinking skills such as analytical skills, problem solving, reasoning and critical and creative thinking skills. Other research also found the fact that the questions contained in the mathematics book did not meet the basic competency attainment based on the applicable curriculum (Rinawati, 2013). In this study, the students' textbooks were analyzed. In the research conducted, the results of the cognitive level were 12.7% at levels C1 and C2, 75.2% at levels C4 and C5, and 12.1% at levels C6. From the results of the analysis carried out also on the mathematics books of SMP class VIII semester II owned by the Ministry of Education and Culture have not yet met the basic competency attainment criteria. The results of the percentage analysis about the cognitive level of 7.24% are at the C2 level, 62.32% are at the C2 level, 37.68% are at the C3 level, and 0% are at the C1, C5 and C6 levels (Maimunah, 2019) .

In the form of presentation, mathematics books will be effective if they are adjusted to the cognitive abilities of students. Cognitive level grouping of questions needs to be made in order to make it easier for students to solve questions, from simple questions to difficult questions. Taxonomy is a way of categorizing questions. Taxonomy makes it easier for teachers to classify the material that students must learn. One of the groupings of questions uses the education taxonomy compiled by Bloom (Bloom, 1956). Benjamin S. Bloom gave an idea for categorization in order to facilitate the preparation of questions so that they have the same learning objectives even though the questions are made by different people. The thinking ability in Bloom's Taxonomy consists of low level abilities including knowledge and understanding of higher-order thinking including application, analysis, synthesis and evaluation. Anderson and Kratwohl revised the level of the bloom taxonomy because of the need to relate existing knowledge to current thinking in education. These changes are made at the level of knowledge using verbs. He stated that there are six cognitive levels, the first level is remembering (C1), the second level is understanding (C2), the third level is implementing (C3), the fourth level is analyzing (C4), the fifth level is evaluating (C5), and the most level is evaluating (C5). height is creating (C6) (Anderson & Kratwhol, 2010).

Based on this explanation, the things that will be examined in this study are determining the quality of The six revised taxonomic levels are arranged in order, from low to high levels. At the first level, namely

remembering (C1), this level includes two cognitive processes, namely recognizing and recalling. This category relates to the abilities used by students in remembering previously learned knowledge. Remembering is the lowest level of cognitive level. Then the second level is understanding (C2), this category is related to comparing and classifying activities. Not only remembering information, but the answers from students must show an understanding of the material they know about the new knowledge that is already in students' thinking. Understanding includes exemplifying, explaining, classifying, comparing, summarizing, interpreting, and concluding. At the third level, namely implementing (C3), this level includes two cognitive processes, namely implementing and executing. Implementing and executing or using procedures in carrying out exercises in solving problems related to procedural knowledge. At the fourth level, namely analyzing (C4), this level directs the student's ability to describe a situation into smaller parts and be able to understand the relationship between one state and another. At the fifth level, namely evaluating (C5), these levels include two cognitive processes, namely criticizing and examining. At this level students are able to give grades based on existing conditions. The sixth level is the highest level, namely creating (C6), this level includes three cognitive processes, namely planning, making, and producing (Effendi, 2017). A question is said to be in an easy category according to the cognitive level of remembering and understanding. A question is also said to be in the middle or in progress category according to the cognitive level of applying and analyzing. While the questions are said to be in the difficult category to make from the level of ability to evaluate and create. To determine the achievement of basic competencies, each cognitive level of Bloom's Taxonomy is classified based on the criteria for achieving basic competencies, for level C1 and level C2 by 30%, for level C3 and level C4 by 40%, and for level C5 and level C6 by 30. % (Giani, Zulkardi, Hiltrimartin, 2015).

The results of the researchers' preliminary observations indicated that the Mathematics textbook published by the class VIII was the supplementary book most often used by teachers in schools. Therefore, this study will analyze the cognitive level of the questions contained in the mathematics book of class VIII publisher issued by PT. Gelora Script Primary. In this study, it provides information about the description of the competency test questions contained in the mathematics textbook of class VIII Junior High Schools. This study is to determine the achievement of basic competencies based on the cognitive level of Bloom's Taxonomy.

METHOD

In this research, a descriptive qualitative research was conducted. Descriptive qualitative research is research that describes an event, situation, object whether people, or everything whose variables can be explained using either numbers or words. This study aims to describe the cognitive level of the VIII grade mathematics competency test questions based on the revised Bloom taxonomy cognitive level. The subject of this research is the question of competency test in mathematics books published by Erlangga. The cognitive level of the questions is measured based on the cognitive ability to solve the questions. The data in this study were obtained by analyzing each exercise question based on the cognitive level of Bloom's Taxonomy..

This research was conducted in October 2020 at SMPN 2 Bangkinang Kota. The analysis conducted in this research is descriptive analysis using a quantitative approach. Researchers can analyze data by describing or describing the data that has been collected. The type of data used in this research is quantitative data. The data collected were PAT multiple choice question sheets, syllabus, question grids, student answer sheets, and answer keys to PAT questions in mathematics for the 2019/2020 school year. The research variable is the quality of the items seen from the level of validity, reliability, difficulty, differentiation, and effectiveness of options (distracting). The population in this study were the question sheets and answer sheets for all eighth grade students. Then, the sampling technique was carried out by purposive sampling, namely 30 student answers. The technique used to collect research data is documentation technique. Previously, the researchers prepared the material that would be used to analyze the questions. Researchers will take class VIII PAT questions and student answers according to the agreement.

Then, the criteria for the level of difficulty of a test item are carried out by looking at the comparison between the average score obtained and the maximum score of an item. Meanwhile, the size of an item

discriminant index is known to see the distinguishing power of a question. Then, the effectiveness of an item's options can be seen based on a scale ranging from very good to not good.

In this study, the study was a mathematics textbook consisting of multiple choice competency tests and essays consisting of 101 questions. The questions are divided into competency test 1 as many as 33 questions, competency test 2 as many as 39 questions and competency test 3 as many as 29 questions. Problem Cognitive level analysis in this study was carried out in the form of a percentage obtained from the revised Bloom Taxonomy cognitive level analysis

RESULTS AND DISCUSSION

Results

The Mathematics Book for Class VIII Semester 2 SMP / Mts written by M Cholik Adinawan and published by Erlangga consists of 6 subjects. Each subject of the book consists of a Competency Test. In this book the multiple choice competency test consists of 101 questions. Cognitive level analysis in this study was carried out in the form of a percentage obtained from the revised bloom taxonomic cognitive level analysis. The results of this analysis after data checking techniques for the overall multiple choice competency test and essays from the Mathematics book class VIII were written by M Cholik Adinawan and published by Erlangga.

In the three basic competencies, there are three main subjects, namely the Pythaghoras theorem, circles and tangents to circles. There are competency test questions on the objective questions and essays on each subject, as many as 101 questions consisting of 33 questions on the competency test 1, 39 questions on the competency test 2 and 29 questions on the competency test 3.

From the results research information is obtained that the questions on the subject of the Pythagorean theorem, circles and tangents to the circle of Semester 2 Mathematics in Class VIII of the Mathematics book published by Erlangga are analyzed based on cognitive levels of Bloom's Taxonomy. The results of the analysis showed that there was a buildup of questions at the C3 cognitive level of 57.43%, while at the C6 cognitive level, there were no questions at the cognitive level. The following describes the results of the cognitive level analysis of each competency test.

From the results above, information is obtained that the questions on the subject of the Pythagorean theorem, Circles and Tangents to Semester 2 Circles in Mathematics for Class VIII in the Mathematics book published by Erlangga are analyzed based on cognitive levels of Bloom's Taxonomy. The results of the analysis show that there is an accumulation of questions at the C3 cognitive level on competency 1 test of 60.6%, competency test 2 of 51.28%, and competency test 3 of 62.06%. Whereas at the cognitive level C6, there is no problem at that cognitive level.

Discussion

Based on the percentage results obtained from the results of the cognitive level according to the revised bloom taxonomy to the subject of the Pythagorean theorem in the competency test 1, at the cognitive level C1 there is 1 question of 3.03%, at the C3 cognitive level there are 20 questions of 60, 6%, at the C4 cognitive level there were 8 questions of 24.24%, at the C2 and C5 cognitive levels there were 2 questions of 6.06%, and at the C6 cognitive level there were none at all. The basic competence in the 1st competency test is to explain and prove the Pythagorean theorem and the Pythagorean triple. The question consists of 39 questions, which are divided into 24 multiple choice questions and 15 essay questions. Here are some examples of questions that represent the bloom taxonomic category on the competency test 1.For example, the questions contained in item number 8:

"At ΔABC, it is known that the length of AB = 9 cm, BC = 40 cm, and AC = 41 cm, the types

of ΔABC that can be formed are ..."

This problem leads students to understand the properties of determining the type of triangle. Therefore, it is categorized into the level of understanding (C2). Another example, the problem contained in item number 1 essay:"It is known that the length of the hypotenuse of a right triangle is 25 cm. One of the perpendicular sides is 24 cm long. The length of one side of the other is ..... "

"The length of the base of an isosceles triangle is 20 cm, and the length of the other side is 26 cm. Calculate the length of the line height from the vertex and area of the triangle "

This problem reminds students to know the concept of an isosceles triangle, then continues to use the concept to solve problems using the Pythagorean theorem. Therefore, it is categorized into the level of applying (C3). As for the level of analysis (C4) on the questions, it can be seen in item 5 essay:

In the picture above, the length of KL = 32 cm, KP = 24 cm, LM = 30 cm, MN = 40 cm and PN = 10√4 cm. calculate the lengths of LP and LN and prove that ΔPLN is right at L "

This problem leads students to analyze because it requires the ability to organize, determine how Pythagorean fits in an image to prove a triangle is right or not. From the results of the analysis carried out on the competency test questions, the proportions for the total levels of C3 and C4 were 84.84%. This result exceeds the distribution of questions for the achievement of basic competencies, which is 40%. The results found at the C3 cognitive level were 60.6%, meaning that of the total number of questions, more than half of the questions were found at the C3 level. The level of questions C1, C2, C3, and C4 did not yet fulfill the question proportions. Because the total percentage of C1 and C2 is 9.09% and the total percentage of C5 and C6 is 6.06%, it is still far from the expected proportion of questions, namely 30%. It is necessary to make improvements based on the percentage produced. This improvement can be provided by the teacher by providing questions in accordance with the expected categories.

Based on the percentage results obtained from the results of the cognitive level according to the revised bloom taxonomy to the subject circle in the competency test 2, at the C1 cognitive level there is 1 question of 2.56%, at the C2 cognitive level there are 10 questions of 25.64 %, at the C3 cognitive level there were 20 questions of 51.28%, at the C4 cognitive level there were 8 questions of 20.51%, at the C5 and C6 cognitive levels there were none at all. The basic competency in competency 2 test is to explain the center angle, the perimeter angle, the arc length, and the circle area, and their relationship. The question consists of 33 questions, which are divided into 20 multiple choice questions and 13 essay questions. Here are some examples of questions that represent the bloom taxonomic category on the competency test 2.For example, the questions in question number 1:

"Look at the image of a circle, PU is the bowstring, the shaded area of QOS is the circle, OR is the apothem, the correct statement is ..."

This question leads students to recall the elements of the environment. Therefore, it is categorized into the level of remembering (C1). Another example is in question number 21:

“The lengths of the sides of a triangle are 12 cm, 16 cm, and 20 cm. the length of the radius of the circle in the triangle is ... "

This problem reminds students to know the concept of a circle in a triangle, then continues to use the concept to solve the problem. Therefore, it is categorized into the level of applying (C3). As for the level of analysis (C4) on the questions, it can be seen in item 6 essay:

"Six circles whose fingers are 6 cm each intersect. Calculate, the circumference of the shaded area, the area of the shaded area, and calculate the minimum length of rope needed to tie the 6 loops ".

This question leads students to measure the ability to solve non-routine questions because students are presented with 6 circle pictures and use the circle concept to solve them. From the results of the analysis carried out on the competency test items, the proportion for the total levels of C3 and C4 was 71.79%. This result exceeds the distribution of questions to achieve basic competence, which is 40%. The results of the questions at the C3 cognitive level were 51.28%, meaning that of the total number of questions, more than half of the questions were at the C3 level. The level of questions in C1 and C2 has a total percentage of 28.2% which is almost close to the proportion of questions that should be 30%. Meanwhile, the levels C5 and C6 did not yet fulfill the question proportions. Because there are no questions that meet that level. It is necessary to make improvements based on the percentage produced. Improvements can also be provided by the teacher by providing questions that fit the expected category.

Based on the percentage results obtained from the results of the cognitive level according to the revised bloom taxonomy to the subject circle on the competency test 3, at the cognitive level C2 there were 6 questions of 21.42%, at the C3 cognitive level there were 18 questions of 62.06% , at the C4 cognitive level there were 5 questions 17.24%, and at the C1, C5 and C6 cognitive levels there were none at all. The basic competency in the 3rd competency test is to explain the tangents of the outer partnership and the partnership in two circles and how to paint it. The question consists of 29 questions, which are divided into 20 multiple choice questions and 9 essay questions. Here are some examples of questions that represent the bloom taxonomic category on the competency test 3.For example, the questions in question number 2:

"Two circles with centers M and N, radius r1 and r2 and distance MN> (r1 + r2). Many tangents to the inner and outer communion of the two circles are… ".

This problem directs students to understand how to determine the form of tangents to the inner and outer partnership. Therefore, it is categorized into the level of understanding (C2). Another example, the problem in question number 12:

"The distance between the two centers of the circle is 17 cm, while the length of the common tangent is 15 cm. the radius of one of the circles is 3 cm. the length of the radius of the other circle is… ".

This problem reminds students to know the concept of the inner common tangent, then continues to use the concept to solve the problem using the formula for the internal common tangent. Therefore, it is categorized into the level of applying (C3). From the results of the analysis carried out on the competency test questions, it also fulfilled the proportion for the total levels of C3 and C4, namely 79.3%. This result also exceeds the distribution of questions for which basic competence is achieved, which is 40%. The result of the questions at the C3 cognitive level was 62.06%, meaning that of the total number of questions, more than half of the questions were found at the C3 level. For the level of questions in C2 it has a total percentage of 21.42% which is almost close to the proportion of questions that should be 30% but competency test 3 does not have a problem at level C1. Meanwhile, the levels C5 and C6 did not yet fulfill the question proportions. Because there are no questions that meet that level.

Based on the results obtained, it is necessary to make improvements in giving questions to students. This improvement can be done by the teacher making questions in accordance with the expected categories. Making questions is one of the reflection activities for the teacher to improve or increase the achievement of Basic Competencies. Problems at the cognitive level C6 were not found. In mathematics textbooks, most of the time there is only the ability to remember, understand and apply problems that are in accordance with the concept of the lesson. The questions contained in the mathematics book did not contain questions at a higher cognitive level because it would be too difficult for students to solve these problems. Standards to meet the competencies of junior high school graduates state that students must be able to demonstrate higher order thinking skills such as solving problems in life. To reach graduates with these competencies, assessment must require understanding, analysis, application, evaluation, and creativity so that students are accustomed to solving problems at that level.

CONCLUSIONS AND SUGGESTIONS

The results of the research obtained from the analysis of the competency test in the Mathematics book for SMP / Mts Class VIII Semester 2 written by M Cholik Adinawan and published by Erlangga, can be concluded, (a) the level of cognitive process of questions on the subject of the Pythagorean theorem on competency test 1 at the level of C1 cognitive level is 1 question of 3.03%, at the C3 cognitive level there are 20 questions of 60.6%, at the C4 cognitive level there are 8 questions of 24.24%, at the C2 and C5 cognitive level there are 2 questions amounted to 6,06%, and at the level of cognitive level C6 did not exist at all. (b) the cognitive process level of the questions on the subject circle in the competency test 2 at the C1 cognitive level is 1 question of 2.56%, at the C2 cognitive level there are 10 questions of 25.64%, at the C3 cognitive level of 20 questions of 51.28%, at the cognitive level of C4 there were 8 questions of 20.51%, at the cognitive level of C5 and C6 there were none at all. (c) the cognitive process level of questions on the subject tangent to the circle on the competency test at the C2 cognitive level is 21.42%, at the C3 cognitive level there are 18 questions of 62.06%, at the C4 cognitive level 5 questions 17.24%, and at the cognitive levels C1, C5 and C6 did not exist at all. (d) The above results obtained information that the questions on the subject of the Pythagorean theorem, circles and tangents to the circle Semester 2 Mathematics of Class VIII in the Mathematics book published by Erlangga were analyzed based on the cognitive level of the revised Bloom Taxonomy. The results of the analysis showed that there was a density of questions at the C3 cognitive level on competency 1 test of 60.6%, competency test 2 of 51.28%, and competency test 3 of 62.06%. Whereas at the cognitive level C6, there are no questions at that cognitive level. Suggestions that can be given based on the results of the research are: (a) For teachers, before the questions are given to students, they should first be tested and select the cognitive level of the questions; (b) For writers and publishers, the results of the research can be used as input in revising the next book so that it covers all levels of Bloom's Taxonomy; (c) For other researchers, it is better to understand in detail about the cognitive level according to the revised bloom taxonomy and the questions should be tested first on students so that the results of the research are more visible from students' activities in working on these questions.

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