Use of the Rasch Model in Analyzing Evaluation Questions in End of Year Mathematics Lesson Assessments

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Abstract

The quality of education in Indonesia still needs to be improved by evaluating on the boutiques and student answer sheets. So this research aims: (1) Clarifying the End of Year Mathematics Lesson Assessments (EYA)'s sheets based on the Bloom's Taxonomy; (2) Counting percentages on the boutiques and the correct answers based on the Bloom's Taxonomy; and (3) Analyze the EYA's grain based on the Winsteps app. This research is a qualitative research with therapeutic methods. Data is the documentation method form 35 boutiques of EYA mathematical subjects and 277 sheets of student answers class VIII in teaching 2021/2022. The research results: (1) There are 11 Lower Order Thinking Skills (LOTS) grains, 16 Middle Order Thinking Skills (MOTS) grains, and 8 HOTS grains; (2) Percentage of grains resulting is 31% of LOTS, 46% of MOTS, and 23% of the HOTS with percentages of the correct answers is 51.5% on LOTS, 42% on MOTS, and 35% on HOTS; and (3) Results of analysis using Rasch model obtained 31 of 35 will have been valid with 4 remaining needs revised, the reliability includes the category is sufficient with the alpha value of 0.72, has a sufficiently diverse level of disassembling, the power of the distinguishing is good, and the effectiveness of its refining has 100% function .

Keywords: Question Items, Student Answer Sheets, Bloom Taxonomy, Rasch Model

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INTRODUCTION

Learning is one of the human effort to gain new experiences. The aim of learning is to help students have various abilities such as knowledge, skills and attitudes that students must have as a result of learning which are expressed in the form of behavior that can be observed and measured (Daryanto, 2010).The learning process that takes place at school is a collaboration between teachers and students in utilizing all the potential that students have, both inside and outside of themselves (Sanjaya, 2010:26). Mathematics learning is expected to end with an understanding that students can capture well (Sobarningsih et al. 2019:68). In order for the learning carried out by teachers at school to run optimally, there needs to be encouragement to improve the quality of education.

Referring to education quality data taken from the results of the PISA (Program for International Student Assessment) survey which aims to evaluate the education system by assessing reading, mathematics and science abilities from 2000 to 2018, Indonesia is always at the bottom of the list (Mark, 2019:1–3). Apart from that, according to the results of a study from TIMSS (Trends in International Mathematics and Science Study), which is a research aimed at monitoring the results of the education

system related to student learning achievement in mathematics and science in 2003-2015, it shows that Indonesia is at the bottom of the list (Hadi & Novaliyosi, 2019:562–563). Based on these two data, it can be explained that the quality of education in Indonesia is still relatively low and needs to be improved. The quality of education itself cannot be separated from the assessment system and the quality of learning that supports it (Alfarisa & Purnama, 2019:367). One way to measure student learning processes and outcomes and to determine achievement of the learning objectives implemented is by do evaluation.

Evaluation is an activity to collect the results of a systematic learning process to determine whether changes have occurred in students and how much these changes can affect students' lives (Idrus, 2019:920–921). With evaluation, educators can take appropriate steps or actions towards the object they are evaluating. When the evaluation is carried out, it is necessary to consider the types of questions that will be included in the evaluation test. In the cognitive realm of Bloom's Taxonomy after revision by Anderson and Krathwohl (2010)There are 6 levels of ability including: (1) remembering, (2) understanding, (3) applying, (4) analyzing, (5) evaluating, and (6) creating. Then the six levels of ability shared into three cognitive levels, namely the level with low thinking process abilities called Lower Order Thinking Skills (LOTS), the next level is the ability that requires a rather complicated thinking process called Middle Order Thinking Skills (MOTS), and finally the ability that demands a high level thinking process called High Order *Thinking Skills* (HOTS)(Fanani, 2018).

Function Evaluation is to determine whether or not the learning objectives have been achieved and to determine the quality of the elements prepared (Fitrianawati, 2017:284).To test whether the items that make up the learning outcomes test can fulfill their function as a good measuring tool, it is necessary to analyze these items. Item analysis can help improve the quality of test items by revising or eliminating ineffective questions. It can also be used as diagnostic information about whether students understand the material being taught or not. (Fauziana & Wulansari, 2021:12). Analysis of question items is also needed to find out which questions need to be revised, discarded or reused by entering them into the teacher's question bank.(Mania et al. 2020).

Based on the results of an interview with one of the class VIII mathematics teachers at one of the junior high schools in Jatinangor, information was obtained that there was no analysis of the questions after obtaining the raw scores on the evaluation results. So it is necessary to carry out an analysis of the questions to determine the quality of the questions given and to find out how much students understand the material that has been provided taught. The questions that will be analyzed are the End of Year Assessment (EYA) questions for the even semester in class VIII mathematics made by the class VIII mathematics teacher in the 2021/2022 academic year.

One method for analyzing question items in a modern way is studying question items using Item Response Theory (IRT). IRT is a theory that uses mathematical functions to relate the chance of answering a question correctly and a student's ability (Huang et al., 2009). One of the IRT models is the Rasch Model or Rasch modeling which was developed by Georg Rasch. Rasch modeling itself is a model-based approach that provides a different approach to using existing values or raw data in an assessment context. The main goal is to create a measurement scale with equal intervals so that it can provide information about the test taker and the quality of the questions the test taker is working on. This means that analysis of the Rasch model will provide information about the characteristics of the test items and test takers which have been transformed into the same matrix (Bond & Fox, 2015:10). Rasch modeling jointly uses score data based on each person and score data per item. Systematically, Rasch modeling combines an algorithm that expresses expected results probability (Bond & Fox 2015:11). Analysis of

Rasch modeling using software called Winsteps. Winstep is Windows software whose function is to carry out computations on the Rasch model.

Approach analysis of test results that is currently widespread is the approach Classical Test Theory (CTT)(Erfan et al. 2020:13) CTT only focuses only on visible test scores, which usually mean a person can pass the test (Muntazhimah et al. 2020:63).In this method, little attention is paid to the interaction between each student and the question item, making it difficult to measure students' actual abilities (Safihin, 2019:4). In line with this, in research on CTT analysis using items and Rasch modeling, differences in results were obtained where in analyzes using items respondents with the same score were considered to have the same ability, whereas in Rasch modeling respondents with the same score could see differences. Nuryanti et al. 2018:232). In research conducted by Laksmi, Masyikuri, & Ariana in 2021 by comparing the analysis of student answers using the Rasch model and the Classic Test, it was concluded that using the Rasch model gave better results compared to using the classic test in evaluating student learning outcomes (Purniasari et al. 2021:213).

METHODS

The research method used in this research is a descriptive method with a non-interactive qualitative approach or it can also be called analytical research where this research is research carried out by means of a review based on document analysis (Hermawan, 2019:20). Documentation techniques or also called documentation studies are data collection techniques by collecting and analyzing documents, both written, image and electronic documents (Amirin, 2000).

This research uses primary data in the form of End of Year Assessment (EYA) question sheets for Middle School Mathematics subjects for the 2021/2022 academic year, student answer sheets, Final Year Assessment question writing grids, and rubrics coring for assessing student answer sheets for junior high school mathematics for the 2021/2022 academic year. The End of Year Assessment questions in mathematics consist of two types of questions, namely code A questions and code B questions. Both types of questions consist of the same questions for type A and type B, only the numbering is different. So the number of questions that will be analyzed remains 30 multiple choice questions and 5 essay questions. The data source in this research is class VIII for the 2021/2022 academic year with the number of students who are research subjects being 277 people.

The End of Year Assessment question sheet and question writing grid aims to classify Every question in Mathematics for class VIII semester 2 of the 2021/2022 academic year is based on the revised Bloom's Taxonomy. End of Year Assessment (EYA) question sheets and student answer sheets are used for count percentage every question item and every cognitive aspect of the mathematics class VIII semester 2 2021/2022 academic year is based on the revised Bloom's Taxonomy. Student answer sheets and rubric scoring in Mathematics class VIII semester 2 of the 2021/2022 academic year was used to analyze the instrument's validity, reliability, distinguishability, level of difficulty and effectiveness of distractors using Rasch modeling theory assisted by the Winsteps application.

RESULTS AND DISCUSSION

A. Classification of EYA Question Items in Mathematics Based on Bloom's

Taxonomy

The data obtained is to classify the question items End of Year Assessment (EYA)Mathematics subjects come from EYA questions for Mathematics in class VIII for the 2021/2022 academic year consisting of 30 multiple choice questions and 5 essay questions. On the process, the researcher divided the results of the classification of questions into 3 cognitive levels broken down back based on the previous cognitive domain further more into cognitive categories/processes. The cognitive level is divided into three levels, namely those with low thinking process abilities called Lower Order Thinking Skills (LOTS), the next level disabilities that require a rather complicated thinking process are called Middle Order Thinking Skills (MOTS), and finally abilities that require a high level thinking process are called High Order Thinking Skills (HOTS)(Anderson & Krathwohl, 2010). The recapitulation of data from the classification of questions based on Bloom's Taxonomy can be seen in table 1.

Table 1. Recapitulation of Data from Classification Results of EYA Questions Based on Bloom's Taxonomy

Cognitive Level	Cognitive Domain	Cognitive Category	Question Number	Number of Questions for Each Domain	Number of Questions for Each Level
LOTS	Remembering (C1)	Recognize	1,7,15,25	5	11
		Recalling	31		
	Understanding (C2)	Interpret	-	6	
		Provide examples	23		
		Classify	3		
		Summarizing	-		
		Withdraw Decision	8,19,22,34		
		Compare	-		
		Explain	-		
MOTS	Applying (C3)	Execute	4,5,10,16,17, 18,20,26,27,35	16	16
		Implement	2,13,21,24, 32.33		
HOTS	Analyzing (C4)	Elaborate	9,11,28	8	8
		Organize	6,12,14,29,30		
		Attributing	-		
	Evaluate (C5)	Inspect	-	0	
		Criticize	-		
	Creating (C6)	Make	-	0	
		Plan	-		
		Produce	-		
Amount					**35**

Based on data on table 1 regarding the classification of End of Year Assessment questions in mathematics subjects obtained results where at the low level cognitive thinking (LOTS) level there were 11 items included into it, at that LOTS level shared again into two cognitive domains, namely the domain of remembering (C1) with 5 questions and the understanding domain (C2) with 6 questions. Furthermore, for the moderate level of cognitive thinking (MOTS) there are 16 questions included in to it, at this MOTS level only the applied domain (C3) is included into it. Therefore, the number of questions in the application

domain (C3) is 16 questions. Finally, for the higher order cognitive thinking (HOTS) level there are 8 questions included in to it, the HOTS level is divided into three domains, namely the analyzing domain (C4) with 8 questions, the evaluating domain (C5) with 0 questions, and the creating domain (C6) with 0 questions. The results of the EYA questions analyzed showed that there were no questions for the cognitive domains of evaluating (C5) and creating (C6), based on information from the subject teacher who created the questions, this was because the questions were made according to the students' abilities during the lesson.

Results analysis Classification of question items found that questions number 1, 7, 15, 25, and 31 were included in the cognitive remembering domain (C1) because in these five questions students were asked to draw return information or knowledge stored in long-term memory. These five questions also only ask students to remember the material they have studied in order to choose or mention the material again. In the cognitive domain, remembering (C1) is divided into two cognitive categories, namely categories recognize, where in this category students are asked to show, remember, state the information given(Farida, 2019: 31–32). Questions in this category students are asked to choose the correct answer. Therefore, it is in line with questions number 1,7,15,25 which are multiple choice questions. Then for the cognitive category of recall, in this category students are asked to mention, recall, or state return data on a given question. Different from the recognition category, in this category students are required to produce accurate information after being asked a question, for this reason in this category the type of questions used are description questions or short answers. So, in line with that, question number 31 is a short description type, where in this question students have to recall the material about space planes on the diagonal of the beam and mention it again accurately.

Analysis results classification questions obtained from the real cognitive understanding (C2) is in questions number 3, 8,19,22,23, and 34 because on these six questions student asked to recall the material given then students need to understand the material, capture the information they receive, translate a verbal statement into the mathematical formulation, predict based on certain tendencies, as well as expressing a concept with various form presentation(Farida, 2019:33)In the cognitive realm of understanding (C2) it is divided into seven cognitive categories, namely interpreting, give example, classify, summarize, draw decisions, compare, and explain. In the 6 questions that are included in the cognitive realm of understanding, only 3 cognitive categories correspond to the six question items, namely the categories of giving examples, classifying, and making decisions. Question number 23 is a question that is included in the cognitive category providing examples because in this question students are asked first to recall material on the properties of a cube, then students must understand which of the four choices above is not included in the properties of a cube. Question number 3 is included in the category classify because in this question students are asked to remember return tangential material, then students need to understand the questions given by imagining or describe position at two circle the. In the interesting decision category there are 4 questions that are in accordance with the meaning of this category, namely questions number 8, 19,22, and 34 with 3 questions choice double and 1 description.

The results of the analysis of the classification of question items showed that questions number 2, 4, 5, 10, 13, 16, 17, 18, 20, 21, 24, 26, 27, 32, 33 and 35 were included in the applied cognitive domain (C3) because they In these 16 questions, students are asked to use certain procedures in working on the questions, students are also asked to utilize or use a procedure to solve the problem.(Farida, 2019: 42)). Question items number 4, 5, 10, 16, 17, 18, 20, 26, 27, and 35 are included in the cognitive executing category because in these questions students are asked to do solving questions or problems with appropriate procedures or steps that students already have know such information and are able say with

certain procedures that must be implemented to solve the problem, students are allowed to make modifications to the standard procedures that have been established (Gunawan and Paluti 2017:106).Meanwhile, question items number 2, 13, 21, 24, 32 and 33 are included in to the implement category, because students are asked to choose and use procedures for things that are unknown or unfamiliar. Students also need to recognize and understand the problem first and then determine the appropriate procedures for finish problem(Gunawan and Paluti 2017:106).

The analysis results show that there are 8 questions which are included in the cognitive analyzing domain (C4), namely questions number 6,9,11,1,14,28,29,30 with 3 questions included in the describing category, 5 questions in the category organize, and 0 questions in the attributing category. Questions number 9, 11, and 28 are included questions in Cognitive categories describe due to this category student asked to differentiate concepts, procedures or formulas related to the material to solve a problem, then students are also asked to study or analyze a given customs (Anderson & Krathwohl, 2010). Questions number 6, 12, 14, 29, and 30 are questions that fall into the cognitive organizing category because students are asked to connect or combine concepts, procedures or formulas related to the material.(Anderson & Krathwohl, 2010)

Based on the theory of a good cognitive level distribution should be distributed as follows: remembering (C1) as much as 5%, understanding (C2) as much as 10%, applying (C3) as much as 45%, analyzing (C4) as much as 25%, evaluating (C5) as much as 10 %, and creates (C6) as much as 5% (Helmawati, 2019). Meanwhile, based on research results obtained by researchers, the distribution of cognitive levels on EYA questions is not the same as the standard for good cognitive levels and some even have much different percentages. the distribution of cognitive levels on EYA questions is not proportional enough. This is because at the cognitive level remembering (C1) is more than 9%, understanding (C2) is 7%, applying (C3) is more than 1%, analyzing (C4) is less than 2%, whereas for evaluating and creating there is no meaning at all to evaluate less. 10% and creates less 5%. Therefore, in making end of year assessment (EYA) questions, it is hoped that the distribution of cognitive levels will be more varied by adding questions that have cognitive levels of analyzing (C4), evaluating (C5), and creating (C6) so that the questions are more proportional.

B. Percentage of Question Items and Correct Answers on EYA Questions Mathematics Subjects Based on Bloom's Taxonomy

The data obtained to determine the percentage of questions based on Bloom's taxonomy and the percentage of correct answers to each question was obtained from the EYA question sheet and student answer sheets. The following is a recapitulation of the percentage results of EYA question sheets at each cognitive level based on Bloom's taxonomy, which can be seen in Figure 1.

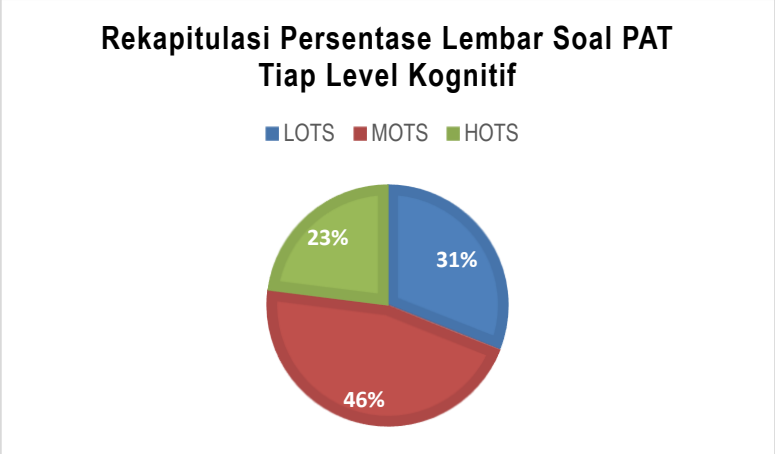

Figure 1 Recapitulation of Percentage of EYA Question Sheet Results at Each Cognitive Level Based on Bloom's Taxonomy

Based on Figure 1, data from the recapitulation results in the percentage analysis of EYA question sheets show analysis results found that of the 35 EYA questions, there are 11 questions or 31% of the total questions are questions with a low cognitive level (LOTS), then there are 16 questions or 46% of the total questions are questions with a medium cognitive level (MOTS), and the remaining 8 questions or 23% of the total questions are questions with a high cognitive level (HOTS).The low ability of students to answer questions correctly proves the need for developing more varied question practice with abilities that emphasize problem solving (Sajidan & Afandi, 2017:19).

At the low cognitive level there are two cognitive domains, namely the domain of remembering (C1) and the domain of understanding (C2). In the remembering domain there are 5 questions or 14% of the total items included in to it, these questions are questions number 1,7,15,25, and 31. Furthermore, in the realm of understanding there are 6 questions or 17% of whole question items, these question items are questions number 3, 8, 19, 22, 23, and 34. At the medium cognitive level there is one cognitive domain, namely the application domain (C3). Based on the results of the analysis, there are 16 questions or 46% of the questions are applied questions, these questions are questions number 2, 4, 5, 10, 13, 16, 17, 18, 20, 21, 24, 26, 27, 32, 33, and 35. Finally, for the high cognitive level there are three domains, namely the domain of analyzing, evaluate, and the realm of creation. In the realm of analysis, there are 8 questions or 23% of the total questions which are analysis type questions. Meanwhile, for the realm of evaluating and creating there are no questions included in to it.The following is a recapitulation of the percentage of correct answers for each question item divided into each cognitive domain which can be seen in figures 2, 3, 4 and 5.

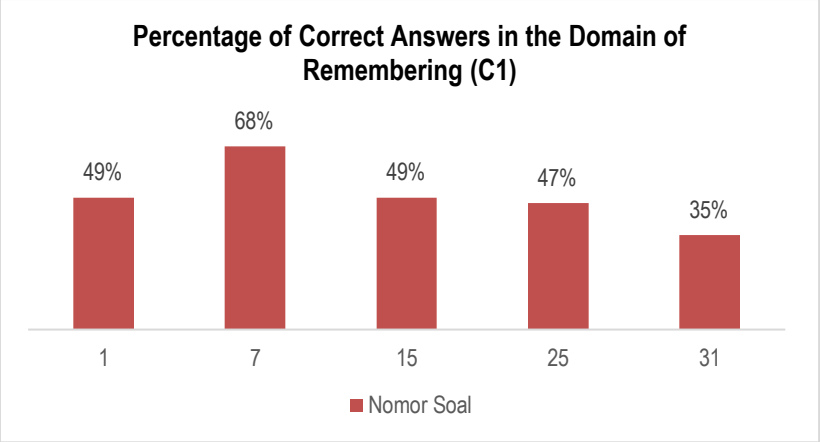

Figure 2 Recapitulation of the Percentage of Correct Answers in the Remembering Domain (C1)

Based on Figure 2 in the cognitive domain remember, there are 5 questions in cluding into it, where in the problem with percentage the smallest is question number 31that is as big as 31% of 100% overall. Furthermore, question number 25 had a percentage of 47% where 130 students could answer correctly out of a total of 277 students. Question number 15 has a percentage of 49%, which means 135 people answered that question correctly. Next, for question number 1, the percentage is the same as question number 15. Then question with percentage the largest number that students could answer was question number 7, which was 68%, meaning that the students who could answer correctly were 187 students out of 277 students in total.

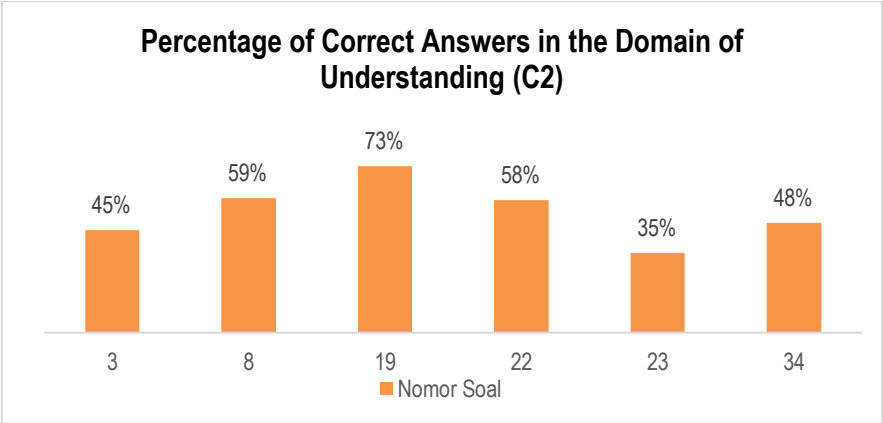

Figure 3 Recapitulation of Percentage of Correct Answers in the Understanding Domain (C2)

Based on Figure 3, in the cognitive realm of understanding, there are 6 questions included in to it, where in the problem with percentage the smallest was question number 19 with 23 correct, namely 35%, which means only 97 students out of 277 students could answer question number 23 correctly. Question number 3 had a percentage of 45% where as many as 124 out of 277 students could answer the question correctly. In question number 34, the percentage of correct answers is 48%. Question number 22 had a total percentage of correct answers of 58% where 162 students were able to answer the question correctly. Furthermore, for question number 8, 59% of students were able to answer it correctly. Then for percentage the smallest was in question number 19, namely 73% overall, which means that 201 students out of 277 students could answer.

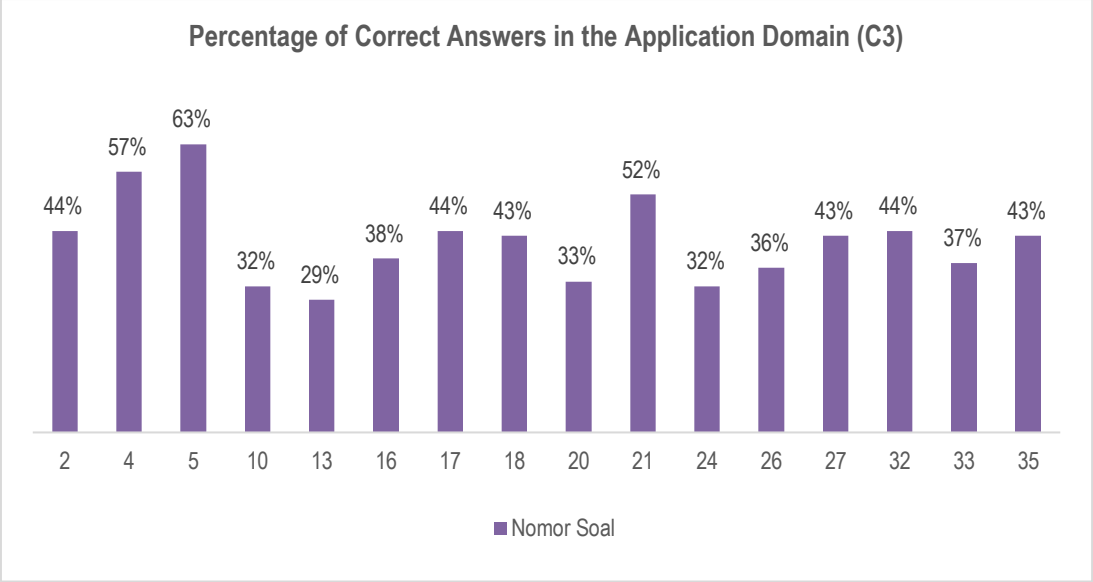

Figure 4 Recapitulation of the Percentage of Correct Answers in the Application Domain (C3)

Based on Figure 4 in this cognitive domain, questions with percentage the largest is in question number 5 with the number the percentage63%, which means that 187 students out of 277 students could answer correctly. Question number 4 is the question with the second highest percentage in this domain with a percentage of 57% or 159 students out of 277 students were able to answer correctly. Question number 21 has a percentage of 52%. Then question number has a total percentage of 44%, questions number 17 and number 2 also have a total percentage of correct answers of 44%. This means that 124 students were able to answer the questions correctly. Questions number 18, 27 and 35 have a total percentage of correct answers of 43%. Question number 16 has a percentage of 38%, meaning 105 students were able to answer that question correctly. Question number 20 had a total percentage of 33%, then questions number 24 and number 10 had 32% or 88 out of 277 students who answered the questions correctly. Last for percentage the smallest was in question number 13, namely 29%, which means only 79 out of 277 students could answer that question correctly.

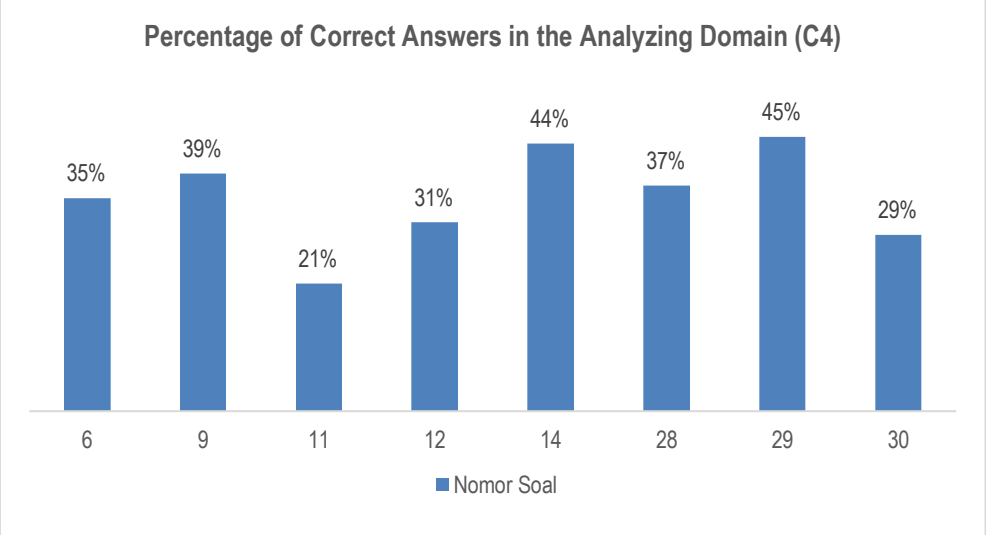

Figure 5 Recapitulation of the Percentage of Correct Answers in the Analyzing Domain (C4)

Based on Figure 5 in the analysis domain, there are questions with percentage the biggest correct answer is question number 29that is as much45% of students could answer the questions correctly, meaning that 124 out of 277 students could answer correctly. Furthermore, question number 14 had a percentage of 44% or 121 out of 277 students answered correctly. Question number 9 had a percentage of 39% or as many as 109 students could answer the question correctly. Question number 28 had a percentage of 37% or 102 students answered correctly. On question number 6, 35% of students could answer the question correctly. Question number 12 had a percentage of 31% or only 87 students could answer the question correctly. For question number 30, only 30% of students could answer the question correctly, meaning only 79 people could answer it. Where as for quantity percentage the smallest was in question number 11, namely 21% of students could answer the question correctly, meaning that only 57 out of 277 students could answer question number 11.

Below are presented some of the results of students' answers during the End of Year Assessment test (EYA) eye class VIII mathematics lessons for the 2021/2022 academic year. The answer results served is wrong one example is taken from each group, namely the low value group, the medium value group and the high value group. The results of the student's answers can be seen sequentially join in Figure 4.6 until 4.8.

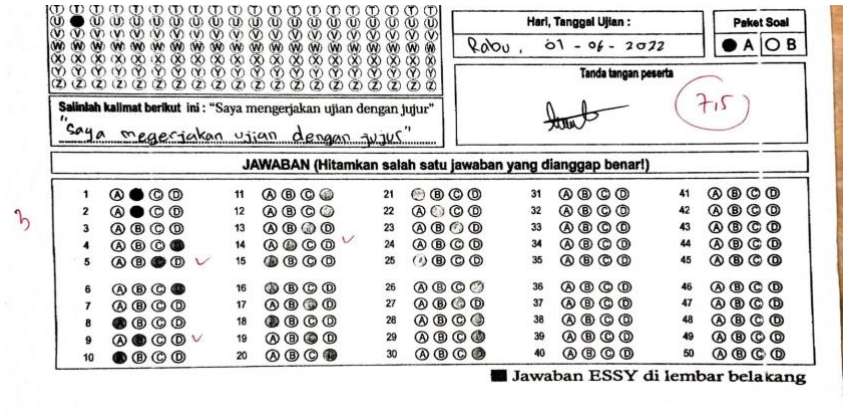

Figure 6 Low Group Student Answer Results

Figure 6 is the result answer students with code-167. The score obtained by students with this code is 7.5. Students can only answer multiple choice questions with cognitive domains C3 to C4, but students cannot answer questions with lower cognitive levels and neither do students.do Essay Questions. So it is possible that students will work on the EYA questions randomly or haphazardly.

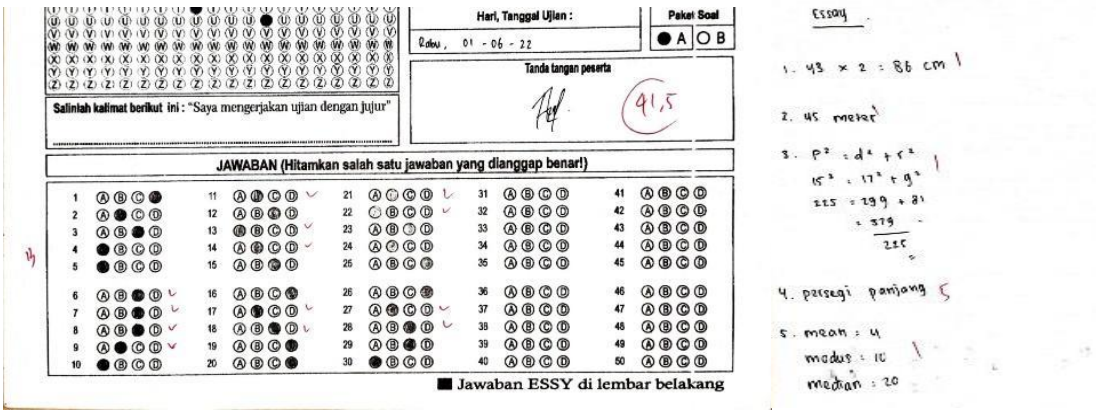

Figure 7 Results of Medium Group Students' Answers

Figure 7 is the result of students' answers code-004. The value obtained by students with this code is 41.5. The student answered a number of questions with a moderate to high level of difficulty are sufficient. However, many people cannot answer questions with a low cognitive level answered correctly, for essay questions students can only work on questions on the domain cognitive remembering (C1).

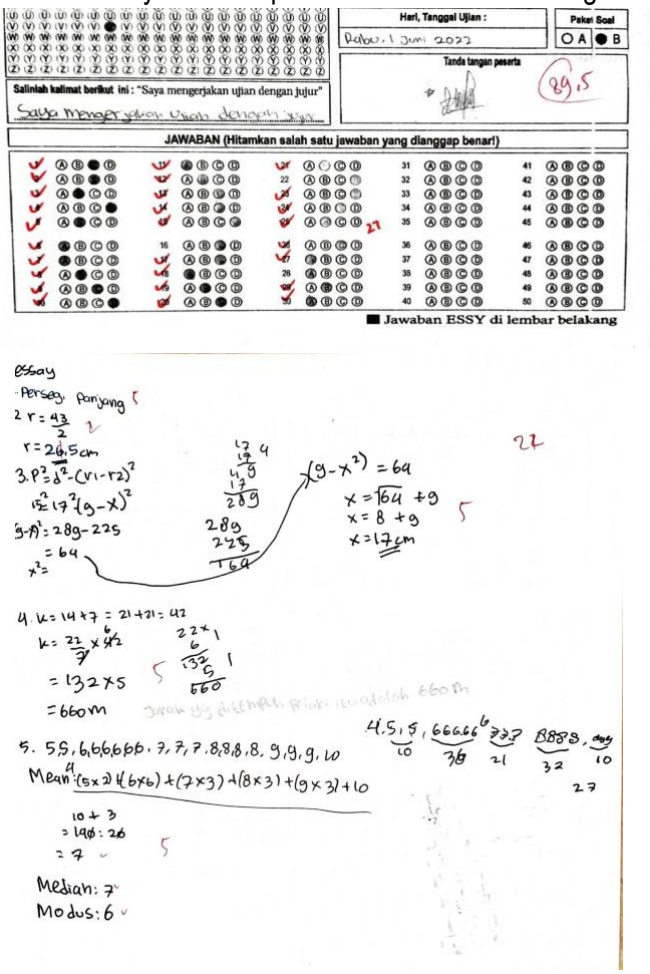

Figure 8 High Group Student Answer Results

Figure 8 is the result of one of the students' answers from the high group with student code 039. The score obtained by students with this code was 89.5. Students with this code made mistakes in answering several questions in the cognitive domains C3 and C4, but the level of student success in solve the questions are good, whether they are multiple choice questions or essay questions.

C. Instrument Analysis of EYA Evaluation Results Questions for Mathematics Subjects Using the Rasch Model Assisted by the Winsteps Application.

The data used is student answer sheet data which is analyzed based on the Rasch model with the help of the Winsteps application. The results obtained are in the form of instrument analysis on validity, reliability, discrimination, level of difficulty and effectiveness of distractors. The following is a recapitulation of the results of the validity analysis on the student answer sheets which can be seen in table 2.

Table 2 Recapitulation of Validity Analysis Results on Student Answer Sheets Based on the Rasch Model

Category	Question Number	Amount	Percentage
Valid	1,2,4,5,6,7,8,9,10,11,13,14,16,17,18,19,20,21,22,23,25,26,27,28,29, 30, 31,32,33,34,35	31	88.57%
Less Valid	3,12,15,24	4	11.43%
Invalid	-	0	0%
Total		**35**	**100%**

Based on table 2, there are 31 questions in the valid category and 4 questions in the less valid category or about must revised so that can be reused. If you look at table 4.15, questions no. 3, 12, 15, and 24 are said to be less valid because they only fulfill one indicator of the 3 necessary conditions. These four questions do not meet the ZSTD and PT Mean Corr score criteria, where question number 3 has a ZSTD value of 3.6 and Pt Mean Corr 0.15. Then for question number 12own ZSTD value 2.3 and Pt Mean Corr 0.17. Furthermore, question number 15 has a ZSTD value of 2.5 and PT mean Corr 0.21. Finally, question number 24 has a ZSTD value of 3.6 and PT mean Corr 0.2. So, it is necessary to review the question items because if there are question items that are not suitable, then this is an indication of students' misconceptions about the questions (Sumintono & Widhiarso, 2015: 8). For the other 31 questions, at least two indicators were met, there were even several questions that met all three criteria, namely questions number 5, 6, 7, 10, 16, 20, 31, 31, 34, and 35.Following is recapitulation of the results of the reliability analysis on the student answer sheets which can be seen in table 3.

Table 3 Recapitulation of Reliability Analysis Results on Student Answer Sheets Based on the Rasch Model

Question Type	Cronbach's Alpha Value	Reliability Item Values	Person Reliability Value
Multiple choice	0.74	0.95	0.74
Description	0.78	0.91	0.78

Based on table 3, the value results are obtained reliability based on Rasch model where value alpha Cronbach the multiple choice and description questions fall into the sufficient category, then the item value reliability in multiple choice questions and in description questions the quality is very good, while for the person value reliability the multiple choice questions and descriptions are in the sufficient category.Following is recapitulation of the results of the difficulty level analysis on the student answer sheets which can be seen in table 4.

Table 4 Recapitulation of Difficulty Level Analysis Results on Student Answer Sheets Based on the Rasch Model

Difficulty Level	Question Number	Amount	Percentage
Very Difficult	11	1	2.28%
Hard	6,9,10,12,13,16,18,20, 23,26,27,28,30,31,33	16	45.71%
Easy	1,2,3,4,5,8,14,15,17, 21,22,25,29,32,34,35	16	45.71%
Very easy	7.19	2	5.71%
Total		**35**	**100%**

Based on table 4, 1 question was obtained which was in the very difficult category percentage the difficulty level of the questions is 2.28% for very difficult category questions. Then there are 16 questions in the difficult category so that's the total the percentage is 45.71% on the question category hard. In the easy category questions, there are 16 questions included depth then the amount the percentage45.71% in easy category questions. Finally, for the very easy category, there are 2 questions included in to it with the number percentage as much as 5.71%. The following is a recapitulation of the results of the analysis of the level of difficulty on the student answer sheetscanseen in table 5.

Table 5. Recapitulation of Differential Power Analysis Results on Student Answer Sheets Based on the Rasch Model

Differentiating Power	Question Number	Amount	Percentage
Good	1,2,3,4,5,6,7,8,9.10,11,12, 13,14,1516,17,18,19,20,21 ,22,23,24,25,26,27, 28,29,30,31,32,33,34,35	35	100%
Enough	-	-	-
Bad	-	-	-
Total		**35**	**100%**

Based on table 5 concluded that 100% of the questions are correct tested to respondents has good discriminating power because all items have a standard error value below 0.5. Followingis a recapitulation of the results of the analysis of the level of difficulty on the student answer sheets which can be seen in table 6.

Table 6 Recapitulation of Results of Distractor Effectiveness Analysis on Student Answer Sheets Based on the Rasch Model

Differentiating Power	Question Number	Amount	Percentage
Works	1,2,3,4,5,6,7,8,9.10,11,12,13,14,15 16,17,18,19,20,21,22,23,24,25,26, 27, 28,29,30,31,32,33,34,35	30	100%
Does not work	-	-	-
Total		**30**	**100%**

Based on table 6, obtained from the 30 multiple choice questions, there are no questions with distractors below 5%, which means that all the distractors in the questions have a good level of effectiveness. So it can be said that 100% of the distractors function as they should.

CONCLUSION

From the analysis, there are 11 questions at the low cognitive level (C1 and C2), 16 questions at the moderate cognitive level (C3), and 8 questions at the high cognitive level (C4). There are no questions for the evaluation level (C5) and creation level (C6). Based on the percentage of questions, 31% are of low difficulty, 46% are of medium difficulty, and 23% are of high difficulty. This indicates that the number of questions for high ability is less than what is expected by government standards. Based on the

percentage of correct answers, 51.5% of students answered correctly at the low cognitive level, 42% at the medium level, and only 35% at the high level. This indicates a challenge for students in answering more complex questions. From the aspect of question quality, the validity of the questions reached 88.57%, with 11.43% being invalid. The reliability of the questions is quite good, with an alpha of 0.74 for multiple-choice questions and 0.78 for descriptive questions. At the difficulty level, 2.28% were very difficult, 45.71% difficult, 45.71% easy, and 5.71% very easy. All questions are in the good category, and the effectiveness of the distractors reaches 100%. After revising the less valid questions, the EYA questions were deemed suitable for use. Thus, the results of this study indicate the need to increase the number of high-level cognitive questions to meet the expected evaluation standards.

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