Focus **ACT**ion **O**f **R**esearch **M**athematic
Volume 6, No. 1, June, 2023, 109-130

ISSN: 2655-3511 (print)
ISSN: 2656-307X (online)
DOI:10.30762/factor_m.v6i1.1057

Analysis of Students' Cognitive Difficulties Based on the Revised Bloom's Taxonomy in Solving Mathematics Problems

Azis[1*], Imelda Tria Handayani[2], Ferniati[3], Nurmarini Anggriana[4], Aisyah[5]
[1*,2,3,4,5] Dayanu Ikhsanuddin University, Baubau, Indonesia
*Corresponding author Jln. Sultan Labuke, 93727, Baubau, Indonesia
E-mail: azis.nasam@gmail.com [1*)]
imeldatriahandayani02@gmail.com [2)]
ferniati012@gmail.com [3)]
anggriananurmarini@gmail.com [4)]
aisyah.ichan98@gmail.com [5)]

Keywords

Analisis Kesulitan, Kesulitan Kognitif, Taksonomi Bloom, Soal Matematika

ABSTRACT

Kesulitan belajar tidak memandang kemampuan intelegensi yang dimiliki siswa. Banyak siswa dengan intelegensi tinggi dapat meraih prestasi belajar yang rendah. Siswa sulit mengerjakan soal yang ada dikarenakan sulitnya memamahami soal, kurangnya mampu menguasai materi yang diajarkan oleh guru disekolah, serta ketika menjelang Ujian, siswa tidak belajar dengan sungguh-sungguh. Tujuan penelitian ini untuk mendeskripsikan tingkat kesulitan kognitif berdasarkan taksonomi bloom revisi dan letak kesulitan belajar matematika siswa pada aspek kognitif pada pelajaran matematika dalam menyelesaikan soal-soal matematika SMP di Kota Baubau. Penelitian ini menggunakan metode survei. Subjek pada penelitian ini adalah siswa kelas IX SMP di Kota Baubau tahun pelajaran 2020/2021. Pengumpulan data dalam penelitian ini dilaksanakan dengan teknik pengukuran dalam bentuk tes diagnostik yang berupa soal-soal Ujian Nasional Matematika tahun pelajaran 2018/2019 yang telah dimodifikasi oleh peneliti dan wawancara untuk mendukung hasil analisis. Berdasarkan hasil penelitian diperoleh kesimpulan: 1) tingkat kesulitan kognitif berdasarkan taksonomi bloom revisi dalam menyelesaikan soal-soal matematika SMP di Kota Baubau dengan skor sebesar 42,43 yaitu berada pada tingkat kesulitan sedang, dan 2) letak kesulitan belajar matematika siswa pada aspek kognitif, yaitu: kesulitan pemahaman faktual dengan persentase interval sebesar 10,48%-20,52%, kesulitan pemahaman konseptual dengan persentase interval sebesar 72,26%-83,74%, dan kesulitan pemahaman prosedural dengan persentase interval sebesar 86,44%-94,56%.

Difficulty Analysis, Cognitive Difficulties, Bloom's Taxonomy, Math Problems

Learning difficulties are regardless of a student's intelligence. Many students with high intelligence can achieve low learning achievement. Students find it difficult to work on existing problems due to the difficulty of understanding the questions, the lack of being able to master the material taught by the teacher at school, and when approaching the exam, students do not study seriously. The purpose of this study was to describe the level of cognitive difficulties based on Bloom's revised taxonomy and the location of students' learning difficulties in the cognitive aspect of mathematics in solving junior high school math problems in Baubau City. This research used survey method. The subjects in this study were grade IX junior high school students in Baubau City in the 2020/2021 academic year. Data collection in this study was carried out using measurement techniques in the form of diagnostic tests in the form of Mathematics National Examination questions for the 2018/2019 school year which had been modified by the researcher and interviews to support the analysis results. Based on the results of the study, the conclusions were obtained: 1) the level of cognitive difficulty based on Bloom's revised taxonomy in solving junior high school math problems in Baubau City with a score of 42.43, which is at a moderate level of difficulty, and 2) the location of students' mathematics learning difficulties in cognitive aspects, namely: factual comprehension difficulties with a percentage interval of 10.48%-20.52%, conceptual comprehension difficulties with a percentage interval of 72.26%-83.74%, and procedural comprehension difficulties with a percentage interval of 86.44%-94.56%.

INTRODUCTION

Education is very important for a nation. With education, quality human resources will be obtained which will advance a nation. This quality resource is a great asset for a nation, because it will determine the success of a development. Education is an investment in the development of human resources in influencing current and future lives. It is in these circumstances that education is needed and seen as a basic need for people who want to develop. Education that humans need is education that has no end in which the process is continuous. As said by Najwa Shihab "*Only education can save the future, without education Indonesia is impossible to survive*". This is also in line with what is stated in Law Number 20 of

2003 concerning the National Education System. To realize the goals of national education, formal education in Indonesia is divided into several levels, namely SD/MI/equivalent, SMP/MTs/equivalent, SMA/MA/SMK/ equivalent and University.

In an effort to improve the quality of Indonesian education, the National Examination is held as a form of assessment as an evaluation of student learning outcomes during 3 years of study at school. In recent years, the presence of the National Exam has become a debate and controversy in the community. This is also in line with (Silverius, 2010) that the National Exam only assesses cognitive aspects. The form of the UN question is multiple choice. This form is very effective for measuring the achievement of teaching and learning objectives and can cover all learning materials. Assessment of multiple choice items is generally only to see the right or wrong answer.

In this study not only saw the correct answers from students, but also wrong answers and no answers. Because the assessment must also question the reasons students get wrong answers and don't answer. To find out the reasons students answered, the questions were made into the form of a description. Therefore, in this study, students' difficulties in working on questions were seen from the mistakes made by students when working on math problems (Elvia et al., 2020), (Malikha & Amir, 2018), (Nurjannah et al., 2019).

The results of the absorption capacity of public junior high schools in Baubau City at the Southeast Sulawesi Province level are the output from the National Examination Results Report of the Education Assessment Center of the Ministry of Education and Culture in the 2018/2019 academic year National Examination from 17 Regencies/Cities in Southeast Sulawesi Province as shown in Table 1.

Table 1.
Mathematics Lesson Absorption Ranking

No.	Academic Year	Baubau City Rating	Mean		
			Baubau	Sultra	National
1	2014/2015	16	42.62	59.13	56.28
2	2015/2016	16	34.35	51.18	50.24
3	2016/2017	16	39.17	52.78	50.31
4	2017/2018	15	36.61	45.19	43.34
5	2018/2019	13	39.88	44.47	45.52

Source: National Examination Results Report of the Education Assessment Center, Ministry of Education & Culture

Based on the table above, in the 2014/2015 academic year, Baubau City's ranking at the Southeast Sulawesi Province level was in 16th position out of 17 Regencies/Cities with an average score of 42.62, which is still below the provincial average of 59.13 and National 56.28. In the 2015/2016 school year, the ranking of Baubau City at the Southeast Sulawesi Province level was still in 16th position out of 17 Regencies/Cities with an average score of 34.35. In the 2016/2017 academic year, the ranking of Baubau City at the Southeast Sulawesi Province level was still in 16th position again out of 17 Regencies/Cities with an average score of 39.17. In the 2017/2018 academic year, Baubau City's ranking at the Southeast Sulawesi Province level rose one level to 15th position out of 17 Regencies/Cities with an average score of 36.61. In the 2018/2019 academic year, the mathematics score in Baubau City with an average score of 39.88 is also still below the province's average score of 44.47 and 45.52 nationally. In 2018/2019, Southeast Sulawesi's ranking rose to 13th out of 17 Regencies/Cities. From this data, it was used as a basis for researchers to determine which materials were considered difficult for all junior high school students in Baubau city.

Research conducted by (Azis & Sugiman, 2015) in high schools in Baubau City stated that mathematic material that is considered difficult should not be left difficult, in the sense of finding out how to make difficult mathematical material easy to work on so that learning outcomes can be optimal. The old methods used by teachers who are considered less effective can be changed. Materials that are considered difficult by students, so that they can be helped how to make it easier. It is necessary to make efforts to evaluate the results of the National Examination in a more incentive manner every year so that little by little the quality and results of student learning are always monitored and the learning difficulties experienced by students can be overcome. The factors that cause students to have difficulty in solving mathematical problems are that students tend to be unable to read problems properly, students are unable to remember the concepts or principles that must be used in solving problems properly, students are unable to understand the problem at hand so that students are unable to use the procedures or steps used to solve mathematical problems, students are unable to apply or master concepts and apply strategies in solving mathematical

problems, and are unable to analyze answers whether there are errors made by students in answering questions (Juniawan, 2021), (Azizah & Khoiri, 2022), (Handayani et al., 2022), (Velria Jun et al., 2022). Other research conducted by (Hasibuan, 2018), (Rosyidah & Mustika, 2021), (Utari et al., 2019) to research conducted by (H Mailili, 2018) all agree that mathematics learning difficulties in solving mathematics problems also occur in the difficulty of skills, concepts, and principles.

Learning difficulties in students do not look at the intelligence abilities of students. Many students with high intelligence can achieve low learning achievement. In addition to being influenced by factors, learning routines are often recognized as influencing those that cause learning difficulties (Sudarwo & Adiansha, 2021), (Pramesti & Prasetya, 2021), (Zakiyah et al., 2019).

The level of difficulty of students in working on math problems cannot be formally identified. Students find it difficult to work on existing questions due to difficulty understanding the questions, lack of ability to master the material taught by teachers at school, and when approaching the National Examination, students do not study seriously (Wouters et al., 2017).

Previously, the National Examination at the SMP/MTs level for the 2018/2019 academic year was scheduled to take place on April 20-23 2020. However, in the midst of the widespread spread of the new corona virus or Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) that causes disease Corronavirus Disease 2019 (Covid-19) which is expected to continue until the end of 2020, the Minister of Education and Culture Nadiem Anwar Makarim decided to abolish the implementation of the National Exam for all levels of education, (SD, SMP, SMA/SMK) in 2020 even though the official abolition of the new National Exam will be held in 2021. This means that the 2020 National Examination will be the last. The decision to abolish the 2020 National Examination is part of the Covid-19 pandemic response system, one of which is to prioritize the health safety of students and their families. Apart from that, the elimination of the National Examination is also in line with the policy social distancing to cut the chain of spreading the SARS-2 or Covid-19 corona virus. The abolition or cancellation of the National Examination is stated in Circular Letter Number 4 of 2020 concerning Implementation of Education Policies in the Emergency Period of Corona Virus Disease (Covid-19).

Each student has a different intellectual level so that the development of students' thinking skills in learning mathematics is also different. These differences lead to differences in mastery of understanding concepts and learning stages experienced as a result of the factors that influence them. According to (Anderson & Krathwohl, 2001), cognitive aspects are divided into six levels, namely: remember, understanding, apply, analyze, evaluate, and create. These six aspects are interconnected or overlapping, where the higher cognitive aspect includes all the aspects below it (Wahyuningtyas et al., 2022), (Sentosa et al., 2020). So to go to higher cognitive aspects students must have been able or have passed the previous cognitive aspects. As well as students can understand a material then first students must have basic knowledge about the material.

METHODS

This research uses a survey method where researchers make direct observations. In this study, students were asked to complete questions on the Mathematics National Examination for the 2018/2019 school year in the form of a diagnostic test to measure the cognitive aspects of these students. Then, to clarify the students' difficulties found through the analysis of answers, an interview was held with the subject. The interview is based on the difficulty in solving the questions found.

The place for conducting this research was at a junior high school in Baubau City, Southeast Sulawesi Province. The research time to obtain data and information was carried out from January to April 2020. This research was conducted before the graduation of junior high school students for the 2019/2020 academic year.

The population in this study were ninth grade students of public junior high schools in Baubau City in the 2019/2020 academic year, totaling 2699 students. The number of public junior high schools in Baubau City is 18 schools. In order to obtain a sample that truly represents the population, sampling is done by taking into account the strata in the population. Sampling using stratified proportional random sampling technique, researchers selected 4 schools at each level categorized as high, medium, and low on the National Exam results in mathematics subjects in 2018/2019, where the high category is 1 school, the medium category is 2 schools, and the low category is 1 school. Determination of sample size based on the table of the number of samples Krejcie and Morgan (1970) in (Azis & Rikfan, 2022).

Based on the table, the population is 2,699, giving a sample of 336.485≅336. The number of samples is the minimum amount that can be taken by researchers. However, due to circumstances that made it impossible to get that many students during a pandemic, the researchers took a sample of only 5 people at each school by visiting these students directly while observing health protocols.

The data collection techniques used in this study are measurement and interview techniques. The measurement technique used in this research is in the form of National Examination questions for the 2018/2019 school year which have been modified by researchers. The questions given are in the form of a diagnostic test so that later they can analyze the cognitive difficulties experienced by students in dealing with the National Examination in mathematics. The interviews conducted were informal interviews in an ordinary, natural setting, while the questions and answers proceeded as ordinary conversations in everyday life.

The data collection instrument used in this study was a diagnostic test. Diagnostic test to measure students' cognitive difficulties. The diagnostic test made is a National Examination question with a total of 10 essay questions modified from multiple choice questions from the 2018/2019 National Examination. These 10 items are the lowest absorption capacity of the Baubau City National Examination results for the 2018/2019 school year which were designed by the researchers themselves.

The steps for analyzing and interpreting data are carried out in stages: 1) Collecting and formulating all data obtained from the field, 2) Analyzing data, and 3) Drawing conclusions. Then in the final conclusion, the population interval is determined, namely the proportion of the population Anderson et al. in (Azis & Nurlita, 2018) as follows:

$$\bar{p} \pm z_{\frac{\alpha}{2}} \sqrt{\frac{\bar{p}(1-\bar{p})}{n}}$$

$\bar{p}$ = population proportion
z estimator
α = area under normal curve
n = real level
= sample size

RESULT AND DISCUSSION

Research Result

At the beginning of March President Joko Widodo announced that the Corona Virus had entered Indonesia, where at first there were only two positive cases, but until

entering August 2020 the Corona virus was still present in Indonesia. With the corona virus, it has a huge impact on the world of education, one of which is that all schools and colleges are closed in an effort to stop the spread of the Corona Virus. Instead, the government continues to implement the Distance Education System using internet technology.

Therefore, this research was conducted by visiting the homes of each student while still observing health protocols. The subjects of this research were class IX students of State Junior High Schools who were used as the research sample. With these limitations, in this study the researchers took 5 samples from each school that was used as a sample, namely Baubau 1st Middle School, Baubau 3rd Middle School, Baubau 8th Middle School, and Baubau 9th Middle School. Where 5 samples in each school were taken randomly based on the average ability of all class IX students of junior high school in Baubau City, namely 1 student in the average category with high ability, 2 students in the average category with moderate ability, and 2 students low-ability average category students. This is intended so that the research is more evenly distributed and the data is more accurate.

There are two forms of data that will be presented in this study, namely data on students' written test answers and data from interviews. Both of these data serve as benchmarks in determining the level and location of learning difficulties in mathematics experienced by class IX students in solving National Examination questions for the 2018/2019 school year at junior high schools in Baubau City in the 2020/2021 academic year.

The implementation of research data collection began with the researcher providing 10 number of question numbers describing the results of the modification of the 2018/2019 UN multiple choice questions which were the lowest answered. Students are given 80 minutes to answer the question. After the allotted time has ended, the researcher then checks each student's answers to see the correct answers, wrong answers, and questions that were not answered. Each student's answer number is given a score based on the diagnostic test scoring guideline rubric, namely factual knowledge scores, conceptual knowledge scores, and procedural knowledge scores. After checking the answers, the researcher then conducted interviews with each student.

Table 2.

Descriptive Statistics

No.	Description	Statistics
1	Response	20
2	Ideal Value	100
3	Maximum Value	77.14
4	Minimum Value	14.29
5	Mean	42.43
6	Standard Deviation	20.22
7	Total	848.57
8	Total Ideal	2000

Based on Table 2, information was obtained for all research subjects, 20 students from the 10 items given, it can be seen that the maximum score was 77.14 out of the ideal score of 100 while the minimum score was 14.29, the overall average was 42.43, the overall standard deviation is 20.22, the total score for the 20 respondents is 848.57 out of the ideal total of 2000. The total score of the five respondents is 848.57 then divided by the ideal total and multiplied by 100, a score of 42.43% is obtained. The category of level of difficulty in learning mathematics, for a score of 42.43% is in the category of moderate level of difficulty in learning mathematics. To see the number of questions answered correctly, answered incorrectly, and not answered at

all of the 10 questions given to 20 students, can be seen in Table 3.

Table 3.

Diagnostic Test Answer Results

No.	Description	Amount	Percent (%)
1	Correct answer	19	9,50
2	Wrong answer	158	79,00
3	Not answered	23	11,50
	Total	200	100,00

Based on the table above, information was obtained for all research subjects, 20 students from the 10 questions given, so that out of 10 questions worked on by 20 students, a total of 200 student answers were obtained. Based on the 200 student answers, information was obtained that there were 19 correct answers with a percentage of 9.50%, 158 wrong answers with a percentage of 79.00%, and 23 no answers at all with a percentage of 11.50%. Furthermore, from the 10 questions given with a total of 20 students a total of 200 answers, will be assessed based on factual,

conceptual, and procedural knowledge of each item by referring to the existing assessment rubric. To see the location of the factual knowledge difficulties experienced by 20 students can be seen in Table 4.

Table 4.

Factual Knowledge Difficulties

Score	Total Factual	Percentage (%)	Difficulty %
0	27	13,50	15,50
1	4	2,00	
2	169	84,50	
Total	200	100,00	

Based on the table above, out of a total of 200 items, it can be seen that students did not answer in the sense that they got a score of 0 totaling 27 items. Students who answered by obtaining a score of 1 totaled 4 items with a percentage of 15.50%. While the students who answered correctly by obtaining a score of 2 totaled 169 items with a percentage of 84.50%.

Thus, the percentage of students' difficulties in solving the 2018/2019 National Exam questions on factual knowledge is 15.50%. To see the location of the conceptual knowledge difficulties experienced by 20 students can be seen in Table 5.

Table 5.
Conceptual Knowledge Difficulties

Score	Total Conceptual	Percentage (%)	Difficulty %
0	123	61,50	78,00
1	33	16,50	
2	44	22,00	
Total	200	100,00	

Based on the table above, out of a total of 200 items, it can be seen that students did not answer meaning that they got a score of 0 totaling 123 items with a percentage of 61.50%. There were 33 students who answered by obtaining a score of 1 with a percentage of 16.50%. Whereas the students who answered correctly by obtaining a score of 2 totaled 44 with a percentage of 22.00%. Thus, the percentage of students' difficulties in solving 2018/2019 National Examination

questions on conceptual knowledge is 78.00%. To see the location of the procedural knowledge difficulties experienced by 20 students can be seen in Table 6.

Table 6.
Difficulty of Procedural Knowledge

Score	Total Procedural	Percentage (%)	Difficulty %
0	128	64,00	90,50
1	32	16,00	
2	21	10,50	
3	19	9,50	
Total	200	100,00	

Based on the table above, out of a total of 200 items, it can be seen that students did not answer meaning that they got a score of 0 totaling 128 points with a percentage of 64.00%. Students who answered by obtaining a score of 1 totaled 32 items with a percentage of 16.00%. The students who answered by obtaining a score of 2 totaled 21 with a percentage of 10.50%. Whereas the students who answered correctly by obtaining a score of 3 totaled 19 with a percentage of 9.50%. Thus, the percentage of students' difficulties in solving the 2018/2019 National Examination questions on procedural knowledge is 90.50%.

Based on the three difficulties described above, it can be seen that of all the items given, students experienced many difficulties with procedural knowledge of 90.50%, then conceptual knowledge of 78%, and then on factual knowledge of 15.50 %.

After the results of the students' answers were analyzed, interviews were then conducted in which the researcher found out what caused the difficulties experienced by students in carrying out the diagnostic test. On the results of the analysis of students' difficulties in answering the diagnostic test, the researcher interviewed all the research objects.

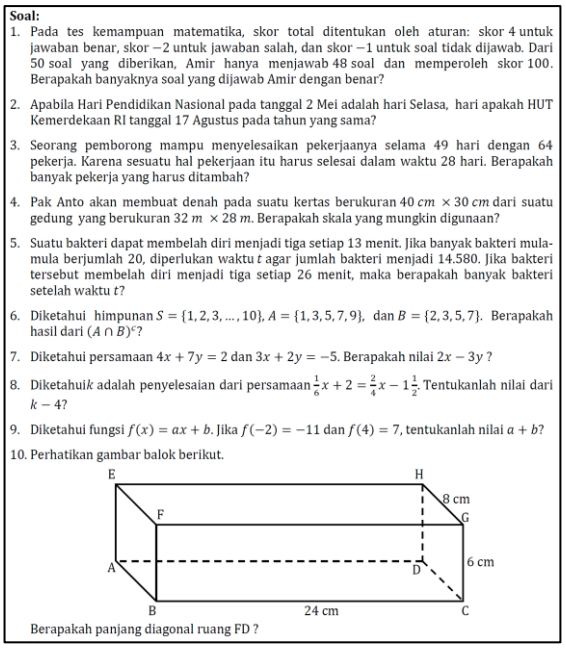
Discussion

From the study using a sample of 20 students, the results of students' math answers using National Examination questions for the 2018/2019 school year for junior high schools in Baubau City, based on Table 6, show that the level of difficulty faced by students can change if the teacher pay attention to the difficulties. - What difficulties do students experience? From

Table 6, it can be seen that 9.50% of the samples answered the questions correctly, 79.00% answered incorrectly, and 11.50% did not answer the questions at all. Based on these results, the school can reduce the difficulties experienced by its students in order to improve their mathematics learning outcomes. Because it is still very small or few students who answer questions correctly. it can be assumed that the lack of seriousness of students in learning, lack of confidence in solving problems. Not infrequently it is also seen from the behavior of students who show a feeling of laziness to learn and are slow in understanding the material that has been given to the teacher.

The results of the analysis of the answers to the 10 numbers of math questions that have been used as a result of the modified National Exam questions for the 2018/2019 academic year, show that the level of difficulty in learning mathematics experienced by all students is in the medium category. This is based on Table 5 that the average result of student answers from the 10 number of questions completed is 42.43. It is suspected that the students were not careful in solving problems, were in a hurry to solve problems, and did not study seriously.

Because this research aims to find out the difficulties faced by students in solving the 2018/2019 National Examination questions, it is also necessary to analyze student work for errors and then conduct interviews to clarify the difficulties. The location of student difficulties consists of wrong answers and not answered at all by students. On factual knowledge learning difficulties were obtained from students who scored 0 and 1, on conceptual knowledge learning difficulties were obtained from students who scored 0 and 1, and on procedural knowledge learning difficulties were obtained from students who scored 0, 1 and 2. The following In this section, the researcher presents the difficulties experienced by students in each item.



Soal:

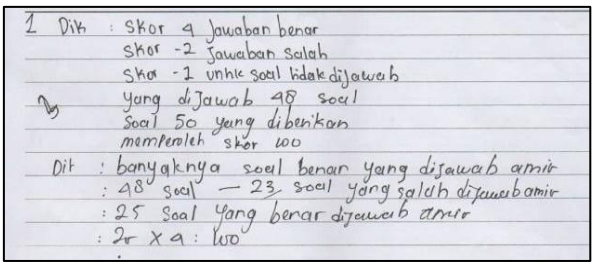
1. Pada tes kemampuan matematika, skor total ditentukan oleh aturan: skor 4 untuk jawaban benar, skor -2 untuk jawaban salah, dan skor -1 untuk soal tidak dijawab. Dari 50 soal yang diberikan, Amir hanya menjawab 48 soal dan memperoleh skor 100. Berapakah banyaknya soal yang dijawab Amir dengan benar?
2. Apabila Hari Pendidikan Nasional pada tanggal 2 Mei adalah hari Selasa, hari apakah HUT Kemerdekaan RI tanggal 17 Agustus pada tahun yang sama?
3. Seorang pemborong mampu menyelesaikan pekerjaanya selama 49 hari dengan 64 pekerja. Karena sesuatu hal pekerjaan itu harus selesai dalam waktu 28 hari. Berapakah banyak pekerja yang harus ditambah?
4. Pak Anto akan membuat denah pada suatu kertas berukuran 40 cm $\times$ 30 cm dari suatu gedung yang berukuran 32 m $\times$ 28 m. Berapakah skala yang mungkin digunaan?
5. Suatu bakteri dapat membelah diri menjadi tiga setiap 13 menit. Jika banyak bakteri mula-mula berjumlah 20, diperlukan waktu t agar jumlah bakteri menjadi 14.580. Jika bakteri tersebut membelah diri menjadi tiga setiap 26 menit, maka berapakah banyak bakteri setelah waktu t?
6. Diketahui himpunan $S = \{1, 2, 3, \ldots, 10\}$, $A = \{1, 3, 5, 7, 9\}$, dan $B = \{2, 3, 5, 7\}$. Berapakah hasil dari $(A \cap B)^c$?
7. Diketahui persamaan $4x + 7y = 2$ dan $3x + 2y = -5$. Berapakah nilai $2x - 3y$?
8. Diketahui$k$ adalah penyelesaian dari persamaan $\frac{1}{6}x + 2 = \frac{2}{4}x - 1\frac{1}{2}$. Tentukanlah nilai dari $k - 4$?
9. Diketahui fungsi $f(x) = ax + b$. Jika $f(-2) = -11$ dan $f(4) = 7$, tentukanlah nilai $a + b$?
10. Perhatikan gambar balok berikut.

Berapakah panjang diagonal ruang FD ?

Figure 1. 10 Modified Question Numbers Researcher

Question Number 1

For question number 1 with integer operations material, there were no factual difficulties with the 20 research subjects. The conceptual difficulty is in item number 1, where there are students who cannot understand the problem, and they cannot write the correct formula to solve the problem. It can be seen from the answers that from the total questions answered by Amir he subtracted 23 to obtain 25 then multiplied by 4 for the score answered correctly to obtain a score of 100. For procedural difficulties this student could not know the steps in working on the problem. This can be seen in Figure 2 that the student completes item number 1 with inappropriate steps.



1 Dik : skor 4 jawaban benar
skor -2 jawaban salah
skor -1 untuk soal tidak dijawab
yang dijawab 48 soal
soal 50 yang diberikan
memperoleh skor 100
Dit : banyaknya soal benar yang dijawab amir
: 48 soal — 23 soal yang salah dijawab amir
: 25 soal yang benar dijawab amir
: 2r x 4 : 100

Figure 2. Results of Answer Number 1

Question Number 2

In problem number 2 with the material for arithmetic operations on

multiples of integers, the factual difficulty in this item is that students do not write down what constitutes factual knowledge in the item. For conceptual difficulties, it can be seen in Figure 3 that the student has written the correct formula to solve the problem. However, in the end, counting from May 2, namely Tuesday 2 days after, is Thursday, which should be counting from Monday. For procedural difficulties, this student writes down the steps that are correct, but this student writes conclusions but is not correct.

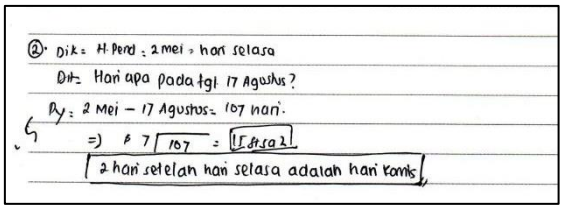


Figure 3. Results of Answer Number 2

Question Number 3

In question number 3, the material for back-value comparison, factual difficulties in item number 3, namely that there were 2 students who did not answer the question at all and the rest of the factual knowledge in this question, all students answered correctly. For the conceptual difficulties contained in this item, students cannot understand the problem. In figure 4, student cannot write down the correct formula to solve the problem. Where to answer this student's question subtract 64 from 49 so that a value of 15 is obtained, then 15 is added to 28 so that the result is 43 which should use the concept of reverse comparison. For the procedural difficulties contained in this item can be seen from the students' answers using inappropriate steps to solve the problem.

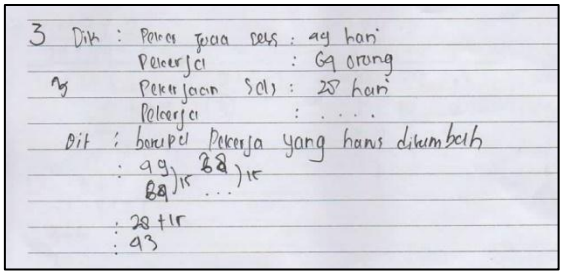


Figure 4. Results of Answer Number 3

Question Number 4

In question number 4 the possible scale prediction material, factual difficulties in the items there are still some students who do not answer the questions and the

tone also determines what is known in the questions. For the conceptual difficulties contained in this item, figure 5 explain that the students use correct formula to calculate the length of the paper and the building. However, this student did not use the same formula to calculate the width of the paper and the building. For the procedural difficulties found in this item where students only do halfway, students do not complete their work. Students only look for the length of the paper and the building.

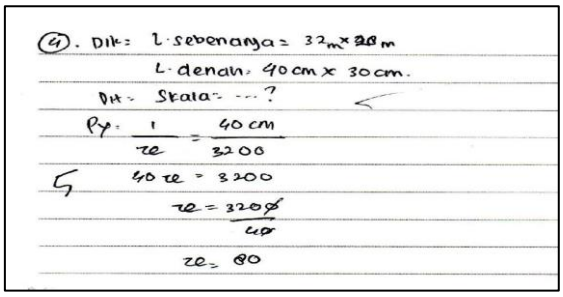


Figure 5. Results of Answer Number 4

Question Number 5

In question number 5 on the arithmetic series material, there are also factual difficulties in the items that some students do not answer the questions and the tone also determines what is known in the questions. The conceptual difficulty in these items was that these students did not understand the problem, did not write down the correct formula to solve the problem, so the questions could not be answered. The procedural difficulty in this item is that students cannot know the steps in working on item number 5. This can be seen from the students not being able to solve the problem.

Question Number 6

In question number 6 the complement material from the intersection of the two sets, the factual difficulty in this item is that from the results of the work it can be seen that this student does not clearly write down what is known from the problem.

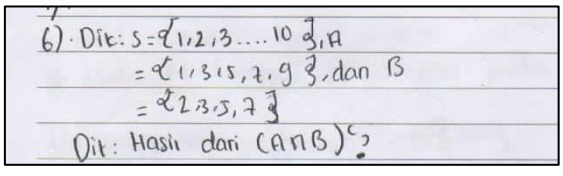


Figure 6. Results of Answer Number 5

To see the conceptual difficulties contained in this item, the researcher took the results of the students' answers as shown in Figure 7 that the student already knew the initial formula used, namely finding the slices of the sets A and B, but

then this student did not look for the complement of the slices both sets.

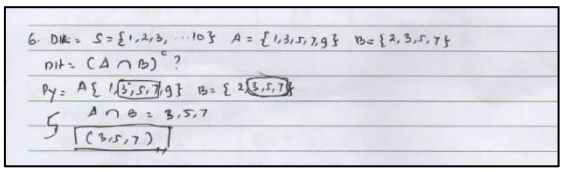


Figure 7. **Results Answer Number 6**

For the procedural difficulties contained in this item, as seen in Figure 7 this student only did halfway, the student did not finish up to what was asked by the problem. Students only look for intersections of the two sets.

Question Number 7

In question number 7 with the material on the System of Two-Variable Linear Equations, the factual difficulty in this item is that students do not write down what constitutes factual knowledge in this item. Of the conceptual difficulties contained in this item, students cannot understand the problem. Students cannot write down the correct formula to solve the problem, so the question cannot be answered correctly. Students solve the problem by adding up the existing equations so that a new equation appears and the student should eliminate one of the existing variables. For procedural difficulties in this item, it can be seen from Figure 8 that students experience procedural difficulties in this item where students cannot know the steps in working on the problem. This can be seen from the student making the wrong steps by adding up all the equations.

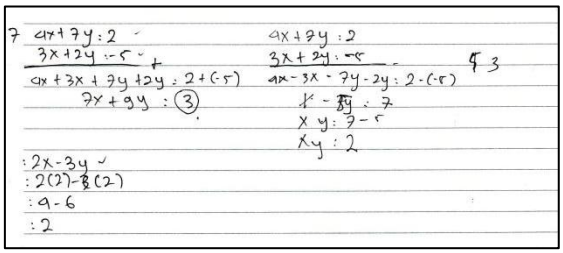


Figure 8. Results of Answer Number 7

Question Number 8

In question number 8 the one variable equation material, factual difficulties in this item the students did not write down what became factual knowledge in item number 8. Of the conceptual difficulties contained in this item, students cannot understand the

problem. Students cannot write down the correct formula to solve the problem, so the question cannot be answered correctly. The student solves the problem by directly substituting k = -4 into the existing equation. For the procedural difficulties contained in this item, it can be seen from Figure 9 that students cannot know the steps in working on the problem. The steps taken by the student from the start were not right.

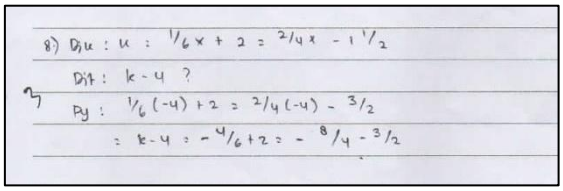


Figure 9. Results of Answer Number 8

Question Number 9

In question number 9 on functional value material, there are factual difficulties in this item that some students do not answer item number 9 correctly. For the conceptual difficulties contained in this item, this student already knows the initial formula used, namely substituting the values f(-2) = -11 and f(4) = 7 into the equation f(x) = ax + b then eliminating the variable the b to get the value of the variable a. However, in the subtraction step, students do not know the concept of subtracting with negative numbers where -2a – 4a results in 2a so it affects other values, which should result from -2a – 4a is -6a. For the procedural difficulties contained in this item, which can be seen in Figure 10 that the steps to complete item number 10 are the first from eliminating one of the variables then the result is substituted for the existing equation that has been carried out by this student, it's just that this student is not thorough in the process of subtracting with negative numbers.

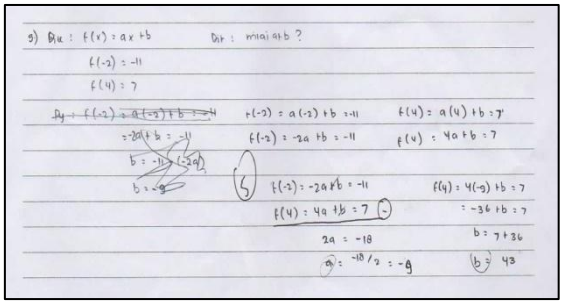


Figure 10. Result of Answer Number 9

Question Number 10

In question number 10 the material determines the length of the diagonal of a

geometric shape, the factual difficulty in this item is that students do not write down what is factual knowledge in the item. For the conceptual difficulties contained in this item, that this student cannot understand the problem. It can be seen that students equate the length of BC with the length of FD, even though BC is the length and FD is the diagonal. With this the student cannot write down the correct formula to solve the problem, so the question cannot be answered. For the procedural difficulties contained in this item, students cannot know the steps in working on problem number 10. This can be seen from the student's failure to solve the problem.

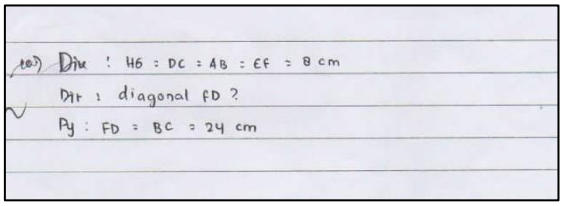


Figure 11. Result of Answer Number 10

Based figure 11, all student answers, it can be said that students are still experiencing difficulties in completing the 2018/2019 National Exam questions. The difficulty in question is seen from the students' mistakes in solving the problem. Furthermore, these errors were deepened through interviews as a verification step whether students really experienced difficulties or not. Based on the results of interviews with both students who answered the questions correctly, students who answered the questions wrong and students who did not answer the questions at all. Students who answer correctly have the reason that the student still remembers the material (knows the formula used) from the questions presented. Students who answered incorrectly had the reason that students only answered questions students did not know the concept used to solve the questions presented while students who did not answer the questions at all had various reasons including students not knowing at all how to solve the questions given or forgot what formula to use. Cooney et al. in (Azis et al., 2022), (Wulandari & Amir, 2022) states that difficulty using mathematical concepts is characterized by an inability to state the meaning of a particular concept. The results obtained are in line with certain opinions, where there are still many students who do not know the concept in working on the questions given and most students do not remember the previous material. As opinion Widdiharto in (Alfiyah et al., 2021) which states that difficulty in mathematics

is characterized by not remembering one or more terms of a concept. From the results of the overall student answers, it was obtained that the percentage of learning difficulties in mathematics in the cognitive aspect in solving National Examination questions in terms of factual knowledge was 15.50%, the percentage of conceptual difficulties was 78.00%, and the percentage of procedural difficulties was 90.50%.

Based on the formula Anderson et al. in (Azis & Nurlita, 2018) it can be obtained the percentage of difficulty in learning mathematics in the cognitive aspect in solving National Examination questions in terms of Factual Understanding Difficulties with a difficulty interval percentage of 10.48%-20.52%. Conceptual Understanding Difficulty with a difficulty interval percentage of 72.26%-83.74% and Procedural Understanding Difficulty with a difficulty interval percentage of 86.44%-94.56%. Based on the three difficulties that have been described above, it can be seen that from all the items given, students experience many difficulties in procedural understanding and conceptual understanding, then factual understanding.

CONCLUSION

Based on the results and discussion, the conclusions of this study can be drawn as follows: 1) The level of difficulty in learning mathematics experienced by students in solving mathematics questions in the SMP National Examination in Baubau City with a score of 42.43, which is at a moderate level of difficulty; 2) The location of students' mathematics learning difficulties in the cognitive aspect in solving math questions in the SMP National Examination in Baubau City, namely: a) Factual Understanding Difficulties with a difficulty interval percentage of 10.48% - 20.52%, b) Conceptual Understanding Difficulties with a difficulty interval percentage of 72.26% -83.74%, c) Procedural Understanding Difficulty with a difficulty interval percentage of 86.44% - 94.56%.

From these results, the following suggestions are presented: 1) It is better for students to increase their motivation to study more actively and pay attention to the lessons conveyed by the teacher, so that they better understand and remember mathematics learning material; 2) Based on the results of the research and conclusions, there are several problem solving in overcoming the learning difficulties of students in class IX junior high school students in Baubau City, including: a) To overcome the difficulty factors that originate from within the student, the

teacher can provide guidance to students, conduct training questions continuously. To increase student learning motivation, teachers and parents can provide reinforcement in the form of advice. b) The difficulty factor that comes from the teaching system and also the method used, needs to be overcome by the teacher. The teacher reaffirms learning on subjects that tend to be difficult for students to master. Teachers also need to use a variety of learning methods so that learning runs effectively. 3) Parents should pay more attention to the development of student learning in order to know the difficulties experienced by students. Parents should pay attention to the development of student learning, create a conducive, comfortable and safe atmosphere when students study at home so that students concentrate more on learning. In addition to providing supervision of the activities of students in the environment where they live, parents also need to provide guidance to students so that they are more active in learning.

REFERENCES

Alfiyah, Z. N., Hartatik, S., Nafiah, N., & Sunanto, S. (2021). Analisis Kesulitan Belajar Matematika Secara Daring Bagi Siswa Sekolah Dasar. *Jurnal Basicedu*, *5*(5).

Anderson, L. W., & Krathwohl, D. R. (2001). A taxonomy for learning, teaching, and assessing: A revision of Bloom's taxonomy of educational objectives. In *Wesley Longman, Inc*. Wesley Longman, Inc.

Azis, A., Iriana, A., & Sudin, L. (2022). Analisis Kesalahan Siswa dalam Menyelesaikan Soal-Soal Pemecahan Masalah Matematika pada Siswa Kelas XI MIA SMA. *Jurnal Akademik Pendidikan Matematika*. https://doi.org/10.55340/japm.v8i1.697

Azis, A., & Nurlita, M. (2018). Analisis Kemampuan Pemahaman Pengetahuan Mahasiswa pada Mata Kuliah Statistik Matematika. *Jurnal Akademik Pendidikan Matematika*, *4*(2), 46–54. https://doi.org/10.31219/osf.io/2njfv

Azis, A., & Rikfan, R. (2022). Pengaruh Respon Siswa dalam Pembelajaran Daring Dimasa Pandemi Covid-19 Terhadap Hasil Belajar Matematika Siswa. *Journal of Mathematics Education and Science*, *5*(1), 13. https://doi.org/10.32665/james.v5i1.29

Azis, A., & Sugiman, S. (2015). Analisis Kesulitan Kognitif dan Masalah Afektif Siswa SMA dalam Belajar Matematika Menghadapi Ujian Nasional. *Jurnal Riset Pendidikan Matematika*, *2*(2), 162. https://doi.org/10.21831/jrpm.v2i2.7331

Azizah, L., & Khoiri, M. (2022). Student Errors Analysis on the Subject of Class VII Algebraic Form Based on Nolting's Theory. *Journal Focus Action of Research Mathematic (Factor M)*, *5*(1). https://doi.org/10.30762/f_m.v5i1.578

Elvia, R., Rohiat, S., & Ginting, S. M. (2020).

Identifikasi Miskonsepsi Mahasiswa Pada Pembelajaran Daring Matematika Kimia Melalui Tes Diagnostik Three Tier Multiple Choice. *Hydrogen: Jurnal Kependidikan Kimia*, *9*(2). https://doi.org/10.33394/hjkk.v9i2.4422

H Mailili, W. (2018). Deskripsi Hasil Belajar Matematika Siswa Gaya Kognitif Field Independent dan Field Dependent. *ANARGYA: Jurnal Ilmiah Pendidikan Matematika*, *1*(1). https://doi.org/10.24176/anargya.v1i1.2371

Handayani, U. F., Hakim, W., & Putri, A. O. (2022). Analisis Kesalahan Mahasiswa dalam Pembuktian Identitas Trigonometri. *Journal Focus Action of Research Mathematic (Factor M)*, *4*(2). https://doi.org/10.30762/factor_m.v4i2.4146

Hasibuan, E. K. (2018). Analisis Kesulitan Belajar Matematika Siswa pada Pokok Bahasan Bangun Ruang Sisi Datar di SMP Negeri 12 Bandung. *AXIOM : Jurnal Pendidikan Dan Matematika*, *7*(1). https://doi.org/10.30821/axiom.v7i1.1766

Juniawan, E. A. (2021). Analisis Kesulitan Belajar Matematika Siswa Dyscalculia Dalam Menggunakan Konsep Matematis Di Lihat Dari Kesalahan Menyelesaikan Soal Logaritma. *Jurnal Multidisiplin Madani*, *1*(3). https://doi.org/10.54259/mudima.v1i3.251

Malikha, Z., & Amir, M. F. (2018). Analisis Miskonsepsi Siswa Kelas V-B MIN Buduran Sidoarjo Pada Materi Pecahan Ditinjau Dari Kemampuan Matematika. *Pi: Mathematics Education Journal*, *1*(2). https://doi.org/10.21067/pmej.v1i2.2329

Nurjannah, N., Danial, D., & Fitriani, F. (2019). Diagnostik Kesulitan Belajar Matematika Siswa Sekolah Dasar Pada Materi Operasi Hitung Bilangan Bulat Negatif. *DIDAKTIKA : Jurnal Kependidikan*, *13*(1). https://doi.org/10.30863/didaktika.v13i1.340

Pramesti, C., & Prasetya, A. (2021). Analisis Tingkat Kesulitan Belajar Matematika Siswa dalam Menggunakan Prinsip Matematis. *Edumatica : Jurnal Pendidikan Matematika*, *11*(02). https://doi.org/10.22437/edumatica.v11i02.11091

Rosyidah, U., & Mustika, J. (2021). Analisis Kesulitan Belajar Matematika Pada Materi Statistika Kelas IX. *LINEAR: Journal of Mathematics Education*. https://doi.org/10.32332/linear.v2i1.3204

Sentosa, R. D., Maizora, S., & Agustinsa, R. (2020). Analisis Soal Dalam Buku Teks Matematika SMP Kemendikbud Revisi 2017 Kelas VII Materi Bentuk Aljabar Berdasarkan Taksonomi Bloom Revisi. *Jurnal Penelitian Pembelajaran Matematika Sekolah (JP2MS)*, *4*(3). https://doi.org/10.33369/jp2ms.4.3.315-326

Silverius, S. (2010). Kontroversi Ujian Nasional Sepanjang Masa. *Jurnal Pendidikan Dan Kebudayaan*, *16*(2). https://doi.org/10.24832/jpnk.v16i2.446

Sudarwo, R., & Adiansha, A. A. (2021). Kemampuan Calon Guru Sekolah Dasar Dalam Mengatasi Kesulitan Belajar Siswa. *Jurnal Ilmiah Mandala Education*, *7*(4). https://doi.org/10.36312/jime.v7i4.2350

Utari, D. R., Wardana, M. Y. S., & Damayani, A. T. (2019). Analisis Kesulitan Belajar Matematika dalam Menyelesaikan Soal Cerita. *Jurnal Ilmiah Sekolah Dasar*, *3*(4). https://doi.org/10.23887/jisd.v3i4.22311

Velria Jun, Sri Hariyani, & Tatik Retno Murniasih. (2022). Analisis Kesalahan Peserta Didik dalam Penyelesaian Soal Cerita Teorema Pythagoras berdasarkan Teori Newman. *Journal Focus Action of Research Mathematic (Factor M)*, *4*(2). https://doi.org/10.30762/factor_m.v4i2.3722

Wahyuningtyas, D., Widodo, S., & Katminingsih, Y. (2022). Analisis Tingkat Kognitif Kompetensi Dasar Kurikulum 2013 Mata Pelajaran Matematika Wajib Kelas X SMA/MA Berdasarkan Taksonomi Bloom Revisi Anderson. *Jurnal Cendekia : Jurnal Pendidikan Matematika*, *6*(1). https://doi.org/10.31004/cendekia.v6i1.1104

Wouters, P., van Oostendorp, H., ter Vrugte, J., vanderCruysse, S., de Jong, T., & Elen, J. (2017). The effect of surprising events in a serious game on learning mathematics. *British Journal of Educational Technology*, *48*(3). https://doi.org/10.1111/bjet.12458

Wulandari, D., & Amir, M. F. (2022). Analysis of Elementary School Students' Difficulties in Fraction Addition. *Kreano, Jurnal Matematika Kreatif-Inovatif*, *13*(1). https://doi.org/10.15294/kreano.v13i1.35275

Zakiyah, E., Handayani, T., & Sofyan, F. A. (2019). Analisis Kesulitan Belajar Matematika Materi Operasi Hitung Campuran Siswa Kelas IV di MI Hijriyah II Palembang. *Al-Adzka: Jurnal Ilmiah Pendidikan Guru Madrasah Ibtidaiyah*, *9*(1).https://doi.org/10.18592/aladzkapgmi.v9i1.3006