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Mathematical Literacy Ability and Adversity Quotient in Climber Type Students

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ABSTRACT

This study aims to describe the mathematical literacy skills and Adversity Quotient (AQ) of students with the Climbers type. Mathematical literacy is an essential skill in modern education that enables students to understand and apply mathematical concepts in everyday activities. Meanwhile, Adversity Quotient represents a person's ability to face and overcome obstacles. This study employs a descriptive qualitative approach involving 36 students from seventh grade at SMP Negeri 2 Mandiraja as research subjects. Data were collected through the Adversity Response Profile (ARP) questionnaire, written tests on mathematical literacy skills, and interviews with the research subjects. The findings indicate that Climbers type students possess high mathematical literacy skills, supported by a high Adversity Quotient. They are capable of formulating information, employing problem-solving strategies, and explaining the results obtained. The study concludes that Climbers type students have good mathematical literacy skills and suggests that further research be conducted to explore learning media that can support the learning process for Climbers type students.

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1. INTRODUCTION

Modern society in the 21st century does not only need content knowledge, but also other skills such as critical thinking, problem-solving, creativity, innovation, communication, collaboration, flexibility, adaptability, self-diversionary initiatives, social, cross-cultural, productivity and accountability, leadership and responsibility and literacy [1]. The term literacy is closely related to the current international program, namely PISA (The Programme for International Student Assessment). PISA is an idea launched by OECD (Organization for Economic Cooperation and Development) member countries that uses literacy as one of the measurement tools to assess the quality of education in various countries.

Mathematical literacy is the ability to formulate, apply, interpret mathematics in various situations, as well as reason and relate mathematics to daily activities [1]. Mathematical literacy skills are an important part of modern education [2] which allows students to understand and apply mathematical concepts in daily activities [3] In today's global context, mathematical literacy is not just a tool to solve problems, but can be used as a basis for students to participate in an increasingly complex and data-based society.

Good mathematical literacy skills greatly support the development of Higher Order Thinking Skills (HOTS), because by having good mathematical literacy skills, students are not only able to understand and apply mathematical concepts, but also analyze, evaluate and create solutions to complex problems that occur in daily life [4]. Therefore, mathematical literacy not only improves students' cognitive abilities, but also prepares them

to be able to adapt to a changing world. The interaction between mathematical literacy and HOTS is becoming increasingly relevant when considering the needs of today's data-driven society. Students with these abilities will be adaptable and contribute effectively, not only in the academic field, but in their professional and social lives [5]. Therefore, Development in Education on these two aspects is very important to form a critical and innovative generation.

However, the challenges of achieving high mathematical literacy abilities vary among learners, especially on different psychological and emotional characteristics. One of the factors that affect mathematical literacy skills is Adversity Quotient (AQ) [6]. Adversity Quotient is an individual's ability to face and overcome obstacles [7] Adversity Quotient can be interpreted as a person's ability to survive when facing problems [8]. This ability reflects how individuals respond to challenges and difficulties in life, as well as how well they can survive and try to bounce back after a lifetime of failure. [9]stated that Adversity Quotient is one of the factors that affect the learning behavior of students. In facing problems, students have different solving techniques depending on their characteristics. There are students who choose to face and consider it as a challenge, some who solve the problem only within their ability and some choose to avoid the problem [10].

[7]classify the Adversity Quotient into Climbers (high), Campers (medium) and Quitters (low). [11]explained that the Quitter type is easier to give up in facing a problem while students with the Camper type have enthusiasm to face problems and challenges but they lack the fighting spirit to solve the existing challenges due to lack of motivation and are easily satisfied with the achievements that have been obtained, in contrast to Climber type students who have high fighting power and motivation in facing a challenge and problem they face. In line with this [12] revealed that students with a good level of Adversity Quotient will be able to solve problems related to mathematical literacy well. The same thing is also stated by [13], The level of Adversity Quotient in participants is directly proportional to the motivation and enthusiasm of students in learning.

Students in the "Climbers" category have a high Adversity Quotient and tend to be able to see challenges as opportunities to learn. Previous research has shown that students with a high Adversity Quotient have a more positive approach to learning and are better able to survive in the face of adversity[14]. While Camper type students are students who have an Adversity Quotient in the medium category, in this category students have dared to face problems and try to solve these problems, but due to the obstacles encountered when solving existing problems, they choose to give up on the situation [15]. The Quitter type is an individual with minimal drive and low ambition. They rarely show creativity, dislike risk-taking, and choose to avoid challenges [16]. However, despite an indicated link between Adversity Quotient and mathematical literacy, there is still a lack of research that specifically explores this dynamic among Climbers-type learners.

The gap in existing research shows that although some studies have covered Adversity Quotient and mathematical literacy, many have not conducted an in-depth analysis of students with high Adversity Quotient, particularly in the context of mathematics learning that includes mathematical literacy skills. Therefore, the purpose of this study is to analyze the relationship between mathematical literacy skills and Adversity Quotient in Climbers type students, as well as how these characteristics affect their learning outcomes. By filling in the gaps, it is hoped that the research can provide new insights into learning dynamics and also contribute to the development of more effective teaching methods.

This study covers how Adversity Quotient affects mathematical literacy ability in Climbers type learners and uses a theoretical framework that focuses on the relationship between Adversity Quotient and mathematical literacy. The significance of this research lies in its potential impact on educational practices, learning policies, and curriculum development. The results of the research are expected to provide useful insights for educators in planning inclusive and responsive teaching strategies according to the needs of students. This research is also expected to contribute to the development of educational theories related to Adversity Quotient and mathematical literacy.

2. METHOD OF THE RESEARCH

A qualitative approach was used in this study to analyze mathematical literacy skills and Adversity Quotient (AQ) in students who were included in the climber category. The qualitative design was chosen to find out more about how these two variables interact with each other in the context of learning.

The type of method in this study is qualitative descriptive. 36 students in class VII H SMP Negeri 2 Mandiraja in the 2024/2025 school year are the subjects of this study, grouped based on adversity quotient as climbers, campers and quitters. The process of choosing a subject is based on the results of the adversity quotient questionnaire or Adversity Response Profile (ARP) and the mathematics teacher's consideration. To collect data using the results of ARP, written questions about mathematical literacy skills and interviews were conducted with the selected subjects. Analysis of data uses data reduction from written test results and interviews, presentation of test results data and analysis of interview results, then conclusion making is carried out. Source triangulation is

used to analyze data based on the process in mathematical literacy, namely formulating, using and explaining mathematical concepts in various contexts [4]with the following indicators:

Table 1. Indicators of mathematical literacy

The Process of Mathematical Literacy	Indicator
Formulate	Formulating or formulating existing information from a problem and then used in decision-making
Employ	Implement problem-solving strategies to find solutions through data that has been obtained using mathematical concepts in the problem-solving process
Interpret	Re-explain why the chosen outcome or solution fits the real-world context

The materials and instruments in this study include an Adversity Quotient questionnaire and a mathematical literacy test. The Adversity Quotient Questionnaire is designed to measure students' ability to face challenges and overcome difficulties, while the mathematical literacy test functions to determine understanding and measure students' ability to apply mathematical concepts in real situations. Both instruments have gone through a validation process to ensure their reliability and relevance in the context of research.

The research procedure is carried out in several stages. First, the researcher will introduce students and explain the purpose and benefits of the research. Furthermore, students were asked to fill out the Adversity Quotient questionnaire, followed by the implementation of a mathematical literacy test within two hours. To ensure consistency, all participants will be instructed in the same atmosphere, as well as given equal time to complete both instruments.

The data was collected directly in the classroom, where the researcher supervised the implementation of questionnaires and tests. The data obtained is recorded and stored securely, maintaining the confidentiality of students' identities. After the data collection was completed, the researcher selected a random research sample and analyzed the test results and conducted interviews. Data from the Adversity Quotient questionnaire and the results of the mathematical literacy test were analyzed to identify patterns and relationships between the two variables, as well as to understand how learners applied their mathematical literacy skills in the face of challenges.

Through a descriptive qualitative approach, it is hoped that the research can contribute to the relationship between mathematical literacy and Adversity Quotient in climber-type learners, as well as produce recommendations to improve their learning experience in the classroom. Thus, the results of this research are expected to be used as a reference for the development of more effective and inclusive teaching methods.

3. RESULT AND DISCUSSION

After 36 subjects worked on written test questions about mathematical literacy and filled out the Adversity Quotient questionnaire, data was obtained that in class VII H SMP Negeri 2 Mandiraja there were 6 students in the quitter category, 20 students in the camper category and 10 students in the climber category. Then from these results, the researcher selected 2 students to analyze the results of their answers regarding mathematical literacy skills as representatives of each existing climber. The results of data analysis regarding mathematical literacy skills are presented below.

Analysis of CL1 subject answers

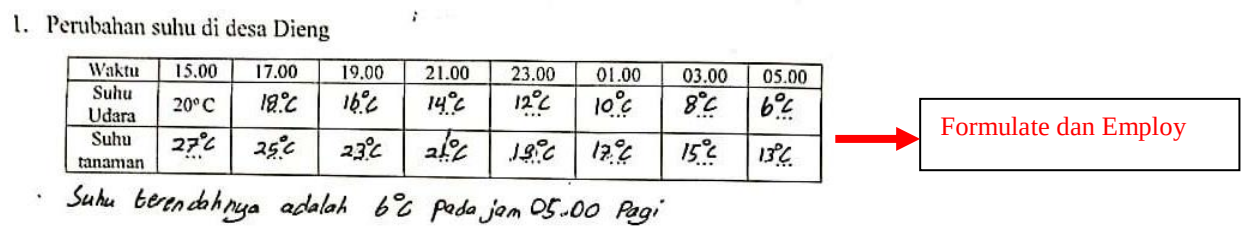
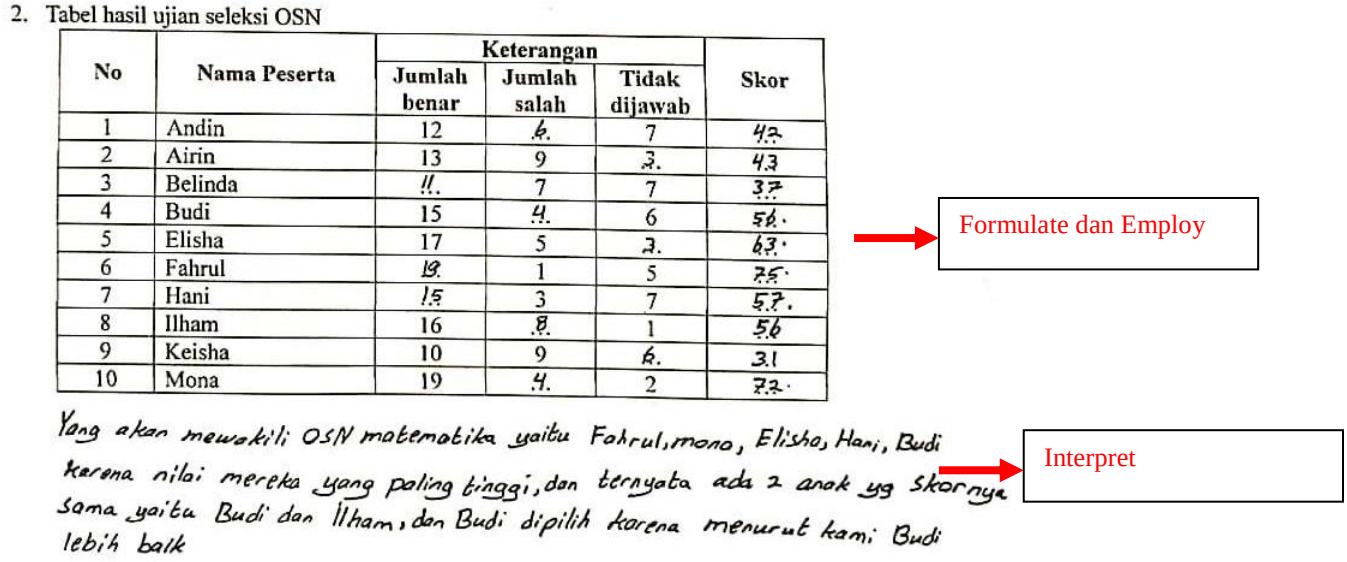


Figure 1. Answer sheet number 1 subject CL1

From figure 1, the CL1 subject can be seen to have been able to solve the problem in number 1 correctly, showing that the CL1 subject has been able to formulate the obtained from a problem to be considered in decision-

making, as well as apply the information to solve the problem at hand. From the results of these answers, the CL1 subjects have met the formulate and employ indicators.


2. Tabel hasil ujian seleksi OSN

No	Nama Peserta	Keterangan			Skor
		Jumlah benar	Jumlah salah	Tidak dijawab	
1	Andin	12	6.	7	42
2	Airin	13	9	3.	43
3	Belinda	11.	7	7	37
4	Budi	15	4.	6	56.
5	Elisha	17	5	3.	63.
6	Fahrul	19.	1	5	75.
7	Hani	15	3	7	57.
8	Ilham	16	8.	1	56
9	Keisha	10	9	6.	31
10	Mona	19	4.	2	72.

Yang akan mewakili OSN matematika yaitu Fahrul, mono, Elisha, Hani, Budi karena nilai mereka yang paling tinggi, dan ternyata ada 2 anak yg skornya sama yaitu Budi dan Ilham, dan Budi dipilih karena menurut kami Budi lebih baik

Formulate dan Employ

Interpret

Figure 2. Answer sheet number 2 subject CL1

From figure 2, it can be seen that the CL1 subject has been able to solve problems correctly and is able to show the ability of written argumentation in the decision-making that has been carried out. This shows that the subject of CL1 has been able to formulate or compile information that can be taken from a problem to be considered in the process of responsible decision-making. From the results of these answers, the CL1 subjects met the formulate, employ and interpret indicators.


3. diketahui : 10 L minyak goreng tropical
10 kg gulaku
8 L Frisianflag UHT
20kg segitiga biru
4 kg blue band

From figure 3, it has been seen that CL1 subjects have been able to compile the information contained in the problem, formulate problems, use them in the problem-solving process and carry out problem-solving strategies appropriately. This shows that the CL1 subjects have met the formulate, emlploy and interpret indicators.The following are the results of the interview from the CL1 subject

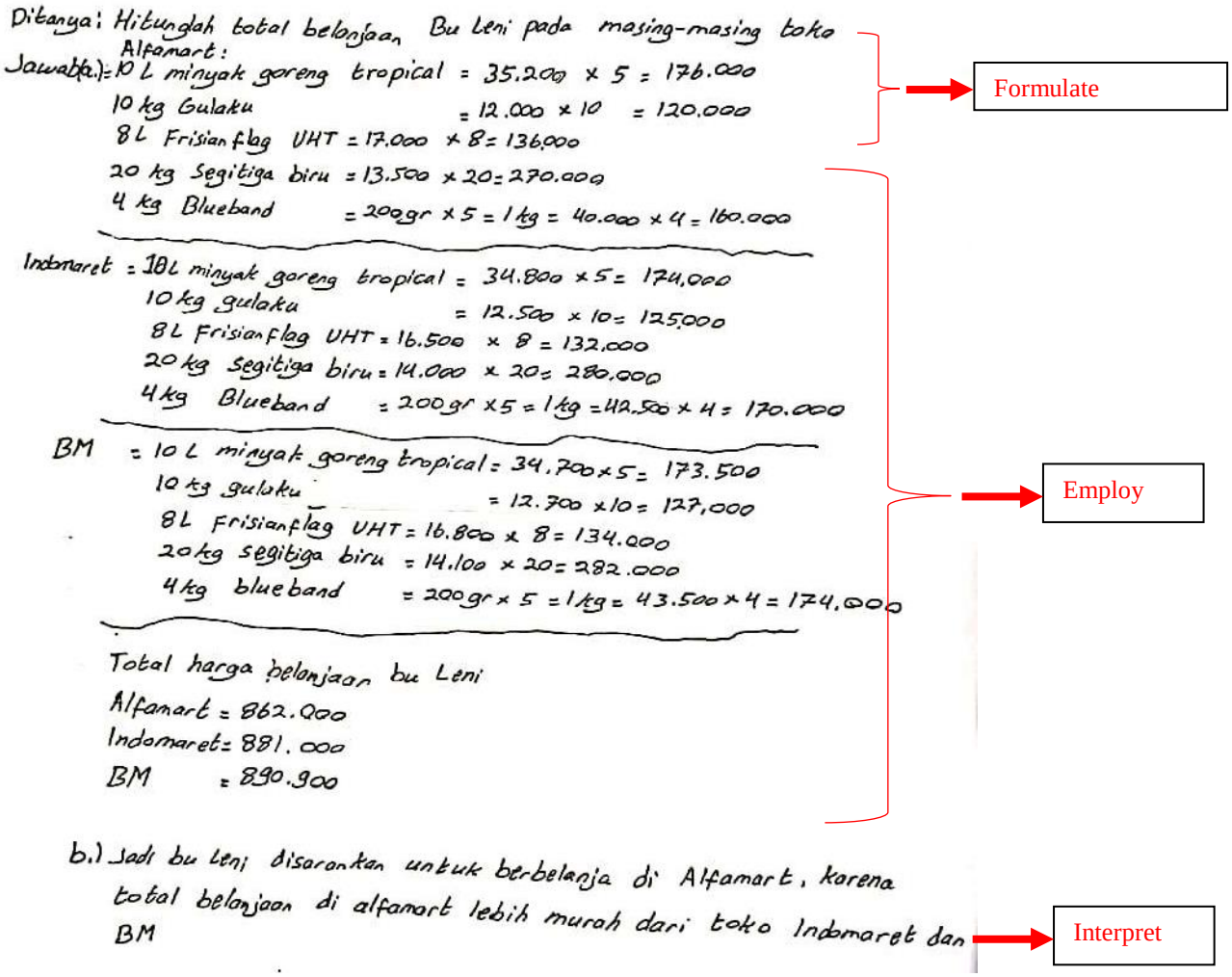


Figure 3. Answer sheet number 3 subject CL1

Interviewer	"Explain what information is in question number 1 using your own language"
Subject CL1	"Information was given that there was a decrease in temperature in Dieng and the community tried to reduce the impact of temperature drop on their vegetable crops"
Interviewer	“Well, then what is the question in the matter?"
Subject CL1	“Ask about the temperature changes that occur and the temperature changes in existing plants, then complete the table”
Interviewer	“Can you explain how you solved the problem?"
Subject CL1	“I first looked for known temperature information from the problem and the temperature change, then I looked for the temperature difference between the air and the protected plants. After that I calculated the results and completed the existing table of my calculations."
Interviewer	“So what conclusion did you draw from that matter?"
Subject CL1	“In conclusion, there is a temperature difference between the surrounding air and plants that are protected using tarpaulins and mulch, the use of tarpaulins and mulch on plants in Dieng can reduce damage due to extreme temperature drops.”
Interviewer	“Are there any obstacles experienced when working on the questions??"
Subject CL1	“The difficulty I experienced was when working on question number 2 because I met participants with the same number of scores”
Interviewer	“Then what are the steps you take to deal with those difficulties”
Subject CL 1	“I chose students with fewer wrong answers as their nominations.
Interviewer	“Do you feel confident in your answer?”

Subject CL1	"I am quite confident in my answer because I think Budi's students do not just answer questions but really analyze the questions well so that they get fewer wrong answers than Ilham's students"
Interviewer	"What about the number 3? Are there any obstacles in solving the problem?
Subject CL1	"For question number 3 at first I had difficulty understanding the problem, but after I read it again and understood the question I understood the meaning of the question. It's just that there are too many to count so it takes a long time to complete"

Based on the results of the analysis of the CL1 subjects' answers in figures 1, 2 and 3 and the results of the interview, data was obtained that the CL1 subjects were able to formulate or formulate the information contained in the questions that would later be needed to solve the existing problems. This can be seen from figures 1, 2 and 3 and the results of the interview that the CL1 subject can explain in detail the information contained in the question. Students have also been able to use the information that has been obtained in the process of finding solutions to existing problems as seen from the answer sheet. The CL1 subject has been able to solve the problem according to the instructions given in the question and has been able to explain why he chose the solution and the reason, this can be seen on the answer sheet and the results of the interview when the student explains the conclusion of the answer.

Analysis of CL2 subject answers

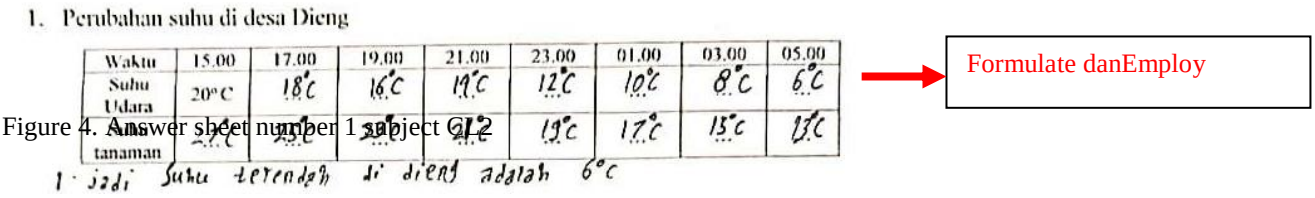


Figure 4. Answer sheet number 1 subject CL2

From figure 4, it can be seen that the CL2 subject has been able to solve the problem in number 1 correctly, this proves that the CL2 subject has been able to formulate or find information from an existing problem to be used as material in decision-making and apply the information that has been obtained to solve the existing problem. From the results of these answers, the CL2 subjects have met the formulate and employ indicators.

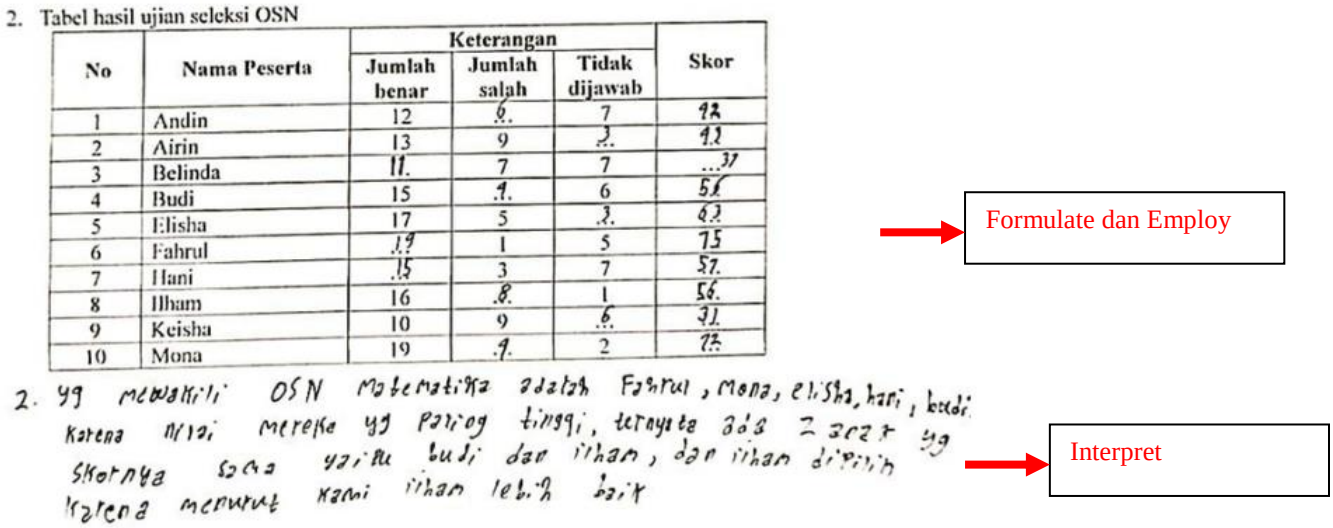


Figure 5. Answer sheet number 2 subject CL2

From figure 5, it can be seen that the CL2 subject has been able to solve problems correctly and is able to show the ability of written argumentation in the decision-making that has been carried out. This shows that the CL2 subject has been able to formulate or compile information from a problem to be used as material for responsible decision-making. From the results of these answers, the CL2 subject meets the indicators of formulate, employ and interpret.

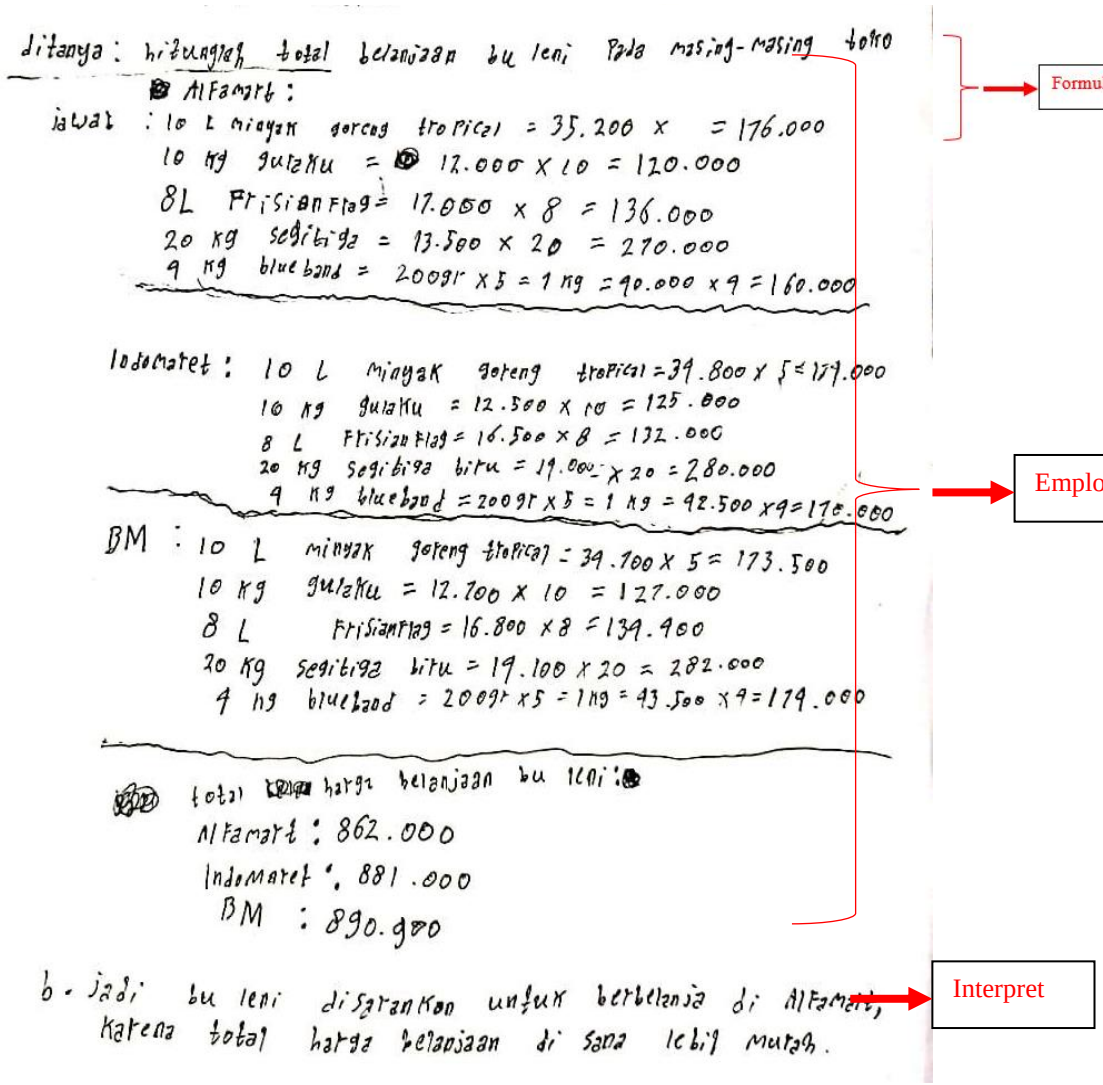


Figure 6. Answer Sheet 3 Subject CL2

From figure 6, it can be seen that CL2 subjects have been able to compile the information contained in the problem, formulate problems, use this information in the problem-solving process and implement problem-solving strategies appropriately. This shows that the CL2 subjects have met the formulate, emlploy and interpret indicators. The following are the results of interviews from CL2 subjects

Interviewer	"Explain the information in question number 2 in your own language"
Subject CL2	"Explain the information in question number 2 in your own language"
Interviewer	"Is there any other information?"
Subject CL2	"It is known that if the answer is correct multiplied by 4, the wrong answer is multiplied by -1 and if it is not answered then it is multiplied by 0"
Interviewer	"Well, then what is the question in the matter?"
Subject CL2	"Ask to select 5 students with the highest score"
Interviewer	"Try to explain the way you have chosen to find a solution to the problem?"
Subject CL2	"First I completed the table first which contained the true, false and unanswered answers. The number of the three must be 25 because the number of questions is known in the question there are 25. Then after that I multiply the correct answer by 4, the wrong answer by -1 and the unanswered one multiplies the number by 0. After getting the results, I add them up to be used as a score"
Interviewer	"The conclusion of the question is?"
Subject CL2	"In conclusion, there are 4 students with the highest ranking score and there are 2 students whose score is the same in 5th place"

Interviewer	"Are there any obstacles in working on these questions?"
Subject CL2	"The difficulty when choosing from 2 students with the same score"
Interviewer	"Then how do you choose it?"
Subject CL2	"I chose Ilham because I answered more questions correctly than Budi"
Interviewer	"Are you sure of your answer?"
Subject CL2	"Yes, I'm sure"
Interviewer	"Are there any difficulties when working on other matters?"
Subject CL2	"There is, when working on question number 3 because there are many counts"
Interviewer	"Can you solve question number 3?"
Subject CL2	"I was able to solve it even though at first I had difficulty in understanding the meaning of the problem"
Interviewer	"What effort did you make to solve question number 3?"
Subject CL2	"I read the question again and tried to understand the meaning of the question then calculated one by one the price of the goods spent in each store and looked for the cheapest price of the three"

Based on the results of the analysis of the CL2 subjects' answers in figures 4, 5 and 6 and the results of the interviews, data was obtained that the CL2 subjects were able to formulate or formulate the information contained in the questions that would later be needed to solve the existing problems. It can be seen from figures 4, 5 and 6 and the results of the interview that the CL2 subject can explain in detail the information contained in the question. Students have also been able to use the information that has been obtained in the process of finding solutions to existing problems as seen from the answer sheet. The CL2 subject has been able to answer the question according to the instructions given in the question and has been able to explain why he chose the solution and the reason, this can be seen on the answer sheet when the student explains the conclusion of the answer.

4. CLOSING PART

Conclusion

Based on the results of the analysis of the answer sheets of the two climber type subjects , it was found that the two types of *climbers* have been able to formulate or formulate information from the questions as material in the problem-solving process. This indicates that the type *of climber* has been able to formulate or formulate information in a problem to be used as a consideration for finding a solution to a problem. The two climber-type subjects have also been able to use the information obtained to find solutions to existing problems, as can be seen from the answer sheets which show that the two climber-type subjects have been able to use facts, concepts and solve problems according to the procedures to obtain solutions. In addition, the two climber type subjects have also been able to re-explain and evaluate the process that has been taken in solving problems. In line with that, [17]states that the climber type is able to infer the problem mathematically and then utilize existing data and procedures to find solutions as well as interpret, apply and assess the results of calculations

The results of this study indicate that a high *level of Adversity Quotient* has a positive influence on mathematical literacy ability. These results are in line with research [8] which states that *the Climbers* type does not pay attention to the abilities or skills they have, but rather focuses on achieving the goal of solving problems. Students with a good *Adversity Quotient* tend to be better able to face difficulties in learning mathematics, which has an impact on improving their academic performance [18]. The *Climbers type* in carrying out understanding the problem, designing a plan, executing a plan, and evaluating the answer has covered all the necessary aspects, namely the aspects of reasoning, argumentation, communication, modeling, connection, and representation [19]. This shows that *Adversity Quotient* is not just a psychological measure, but also contributes directly to learning outcomes [20]. Education that emphasizes the development of mathematical literacy and *adversity quotient* simultaneously is essential. Therefore, the researcher recommends that teachers and educators can integrate learning that encourages students to overcome challenges and create a learning environment that supports the development of *the Adversity Quotient*, so that students can learn from difficulties and increase their resilience.

Although this study provides valuable insights into the relationship between *Adversity Quotient* and mathematical literacy, there are limitations in terms of the number of subjects and the context of the study. Therefore, further research is needed to involve more subjects from different backgrounds and explore other factors that may affect.

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